

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter presents the environmental and socioeconomic consequences of management actions for each of the alternatives described in Chapter 2. Both beneficial and adverse effects (impacts) are described.

Assumptions used in analyzing the environmental consequences are described in Appendix 10 and are based on previous events, experience of personnel, and knowledge of resources and land uses in the planning area.

Impacts described in this chapter are estimates based on management options described in the alternatives. In some cases, existing data were used; in others very little data were available. Lack of data has contributed to a degree of uncertainty to the impact estimates. However, the assumptions for analysis of the alternatives include professional judgements and projections of anticipated actions and levels that provide an adequate reasonable range for analysis.

This chapter is arranged to address impacts to all resource elements or options for each particular alternative. The impact analysis for the No Action Alternative was prepared first, and contains some of the more detailed discussion of impacts that the other alternatives used for comparison. However, as in Chapter 2, the Preferred Alternative is listed first to enable the reader to identify it easily. Impact causes and relationships common to all alternatives are included within this analysis and precede the individual alternative impact sections. Table 4-1 is a summary comparison of the estimated total impacts of each alternative.

For purposes of analysis, short-term impacts described in this document are those that would last 10 years or less; long-term impacts would last 10 years or more. Irreversible or irretrievable commitments of resources and unavoidable adverse effects are discussed in the text if they would occur. Similarly, effects on a given environmental component caused by a particular management action are discussed if they would occur.

Impact causes and relationships to the core area and two ACECs that are associated with the core area are also addressed where applicable. In some cases, the affects to the core area are the same as described for the general planning area and are not repeated. Impact causes and relationships to other special management areas are also included. Cumulative impact summaries are also provided. A description of the factors considered in the cumulative impact analysis such as the effects of past, present, and future actions are included in the reasonably foreseeable development scenarios found in the assumption and analysis guidelines (Appendix 10) and in the affected environment in the EIS.

SIGNIFICANCE CRITERIA

Significance criteria were developed to measure the degree to which an impact would affect the human and natural environment. Not all resources have identified significance criteria. Developing significance criteria is difficult for a number of reasons. First, although used extensively throughout the Act, NEPA does not identify what is meant by significant on a resource-by resource basis. Second, it is often difficult to quantify impacts for some resources. In these cases, significance criteria must be subjective and often rely on the professional opinion of the persons preparing and reviewing the impact analysis. Third, for the reader, the significance of an impact is often framed in terms of personal experience. For instance, persons who benefit directly from the positive economic impacts of the project are more likely to consider that positive impact more significant than someone who will not receive direct financial gain. Similarly, someone who uses the project area for recreation is likely to find conflicts with project-related activities much more severe than someone who does not. Finally, much is unknown about the future level of use or development in the planning area. In many cases, the significance of the impacts described in this chapter will directly depend on the ultimate level of use or development. It is impossible at this point to understand what the ultimate use or development level in the planning area may be.

Cultural Significance Criteria

An undertaking has an effect on a historic property when the undertaking may alter characteristics that may qualify the property for inclusion in the National Register. For the purpose of determining the significance of effect, alteration to features of the property's location, setting, or use may be relevant depending on a property's significant characteristics and should be considered (36 CFR part 800).

Groundwater Significance Criteria

Impacts to groundwater supplies or springs would be considered significant if:

- the natural flow of water to local springs is interrupted; or groundwater quality is degraded so that it can no longer be classified for its current use; or
- the water table is lowered, as a result of drilling water supply wells, to a level that would require replacement or deepening of other groundwater wells in the project area.

Land and Resource Use Significance Criteria

Significant impacts to land and resource use would result from project-related activities if those activities:

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adversely affect the use, enjoyment or value of adjacent property or introduce safety and health risks or a nuisance or annoyance to an area where such risks, nuisance, or annoyance did not previously exist.

Oil and Gas Significance Criteria

Impacts on oil and gas exploration and development would be considered significant if:

in any instance where the potential gas resource from a typical field (greater than 5 billion cubic feet of cumulative production) could not be expected to be developed due to restrictions placed on exploration and development activity,

when 25 percent of the potential exploration and development activity cannot occur due to restrictions,

when 25 percent of the reserves from potential exploration and development activity cannot be recovered due to restrictions, or

when the number of wells that would likely be productive is reduced by 25 percent.

Significance criteria for coalbed methane development could not be determined since little is known about the potential for this resource in the planning area.

Paleontology Significance Criteria

A significant impact to paleontological resources would occur if important fossils, which could substantially add to scientific understanding of paleontological resources, are destroyed.

Recreation Significance Criteria

Several specific areas have been defined where project related activities would conflict with current recreation use. The impacts associated with these conflicts are considered significant if:

Activities result in long-term elimination or reduction of recreation use in any area of these areas;

A level of development which is incompatible with the stated objectives of special recreation management areas; or

Activities that would have a direct or indirect affect on wilderness suitability.

Surface Water/Watershed/Water Quality Significance Criteria

Impacts to surface water/watershed/water quality would be considered significant if the following occur:

accelerated erosion and runoff from permitted actions or activities into intermittent drainages and perennial streams alter the physical characteristics of streams;

accelerated erosion and runoff from permitted actions or activities into intermittent drainages and perennial streams cause increased sedimentation which degrades the quality of water;

accidental spill of fuels, liquids, chemicals or hazardous materials affects the quality of surface water; or an increase in sediment loading causes any rivers or streams to be identified as a water which does not support its designated use; or

disturbed areas are not adequately stabilized to reduce soil erosion and potential impacts to water quality; or

there is increased erosion or reduced soil productivity to a level which prevents reestablishment of vegetative cover within five years.

Threatened Endangered and Candidate Plant and Animal Species Significance Criteria

Impacts to Federally listed threatened and endangered species, species proposed for listing, candidate species, and species with special status recognized by USFWS, BLM, and WGFD would be considered significant if any of the following occurred:

the death due to activities of any individual plant or animal which would jeopardize the continued existence of a species;

reduced recruitment and/or survival of individual plants or animals that would impede species' recovery;

loss of Federally designated critical habitat for a species; contributing causes that warrant an unlisted species to be proposed for listing as threatened or endangered under the Endangered Species Act; or

use of water affecting the surface flow to the Colorado or Platte rivers or their tributaries.

Vegetation Significance Criteria

Impacts to vegetation would be considered significant if:

within five years reclaimed areas do not attain adequate vegetation cover and species composition to stabilize the site and to support pre-existing land uses including live-stock forage and wildlife habitat; or

there is invasion and establishment of noxious non-native weeds that contributes to unsuccessful revegetation.

Significant impacts could occur if adequate revegetation measures are not implemented and monitored to insure successful revegetation. Proper implementation of revegetation measures are necessary to insure that significant impacts do not occur.

VRM Significance Criteria

A significant impact to visual resources on federal lands is defined as activities or developments that would not meet VRM class objectives for an area. A significant impact would occur if facilities or other activities become the predominant feature in the landscape where objectives for that area are to maintain the existing character of the landscape.

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Wetland Riparian Significance Criteria

In February 1989, the COE and EPA entered into a memorandum of understanding in which the COE agreed to exercise its authority to review Section 404 permit applications nationwide so as to minimize loss of wetlands through appropriate mitigation requirements. Section 404 requires that a permit be issued to insure that no discharge of dredged material or fill material is permitted to enter waters of the U.S. if a practicable alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded. To obtain a Section 404 permit, the applicant must demonstrate that three steps have been accomplished: wetland impacts have been avoided, where practicable; potential impacts to wetlands have been minimized; and, compensation has been provided for any remaining unavoidable impacts through activities to restore or create wetlands.

For purposes of this EIS, it was determined that impacts to wetland and riparian areas would be significant if:

- there is a loss of wetlands or wetland function in the project area;
- there is a loss of riparian area or its functionality due to permitted management actions or other activities; or
- there is any violation of the requirements listed above for Section 404 permits.

Wild Horse Significance Criteria

Impacts to wild horses would be considered significant if: appropriate management level (AML) could not be achieved or maintained.

Wildlife Significance Criteria

Impacts to wildlife would be considered significant if any of the following occurred:

- increased mortality and/or decreased survival of native wildlife species considered as Vital, High, or Moderate by the WGFD Mitigation Policy;
- loss of habitat function and/or habitat value for habitats classified as Vital or High by the WGFD Mitigation Policy; or
- Long-term displacement of elk or deer from crucial habitats such as the core and parturition areas.

IMPACTS COMMON TO ALL ALTERNATIVES

Air Quality Impact Summary

The Pinedale Anticline Oil and Gas Draft EIS estimated air quality impacts from the proposed Pinedale Anticline project, as well as impacts from existing and reasonable foreseeable future development (RFD), including the Jack Morrow Hills project (USDI 1999a). Estimated impacts were derived from the air quality dispersion model CalPuff. Estimates of the impacts from the proposed Jack Morrow Hills project are

derived from the Pinedale Anticline EIS and summarized below. See Appendix 7 for more detailed information.

Near-Field Impacts

Near-field impacts are estimated increases in concentration within 5 kilometers of the emission source. Near-field cumulative emissions from the proposed Jack Morrow Hills project are expected to increase the concentrations of each of the pollutants considered [sulphur dioxide (SO₂), particulate matter (PM₁₀), fine particulate matter (PM_{2.5}), nitrogen dioxide (NO₂) and carbon monoxide (CO)] by less than two percent of the Wyoming and federal air quality standards (Figure 10). Concentration increases by the Jack Morrow Hills project alone are expected to be about ten percent of the PSD increment for PM₁₀ (24-hour average) and one percent or less for SO₂ (annual, 24 hour, and 3 hour), NO₂ (annual) and PM₁₀ (annual) (Figure 11). Therefore, no significant adverse near-field impacts would occur. Since analysis predicts that air quality would remain in compliance with federal and Wyoming air quality standards, no significant adverse impacts are expected to occur.

Far-Field Impacts

Far-field impacts are estimated increases in concentration, visibility impairment, and acid deposition within the modeling domain, in this case consisting of the entire counties of Sublette, Sweetwater, Uinta, and Lincoln, and parts of the counties of Teton, Fremont, Hot Springs, Washakie, Natrona, and Carbon (Map 63). Estimated impacts are reported for sensitive areas, such as wilderness areas, roadless areas, national parks, and lakes, within this modeling domain.

Pollutant Concentrations

Although cumulative emissions from the proposed Jack Morrow Hills project increased the concentrations of each of the pollutants considered by the Pinedale Anticline EIS, concentrations at all nearby wilderness areas and parks were in compliance with Wyoming and federal air quality standards (Figure 12). Concentrations of SO₂, PM₁₀, PM_{2.5} (24 hour), and NO₂ (annual) were below 20 percent of the WAAQS, while PM_{2.5} (annual) was below 40 percent of the standard.

Visibility

Visibility can be defined as the distance one can see and the ability to perceive color, contrast and detail. The deciview (dV) is one way to express visibility. One deciview represents a change in scenic quality (distance, color, contrast, and/or detail) that is just noticeable to an average person. Visibility impairment is expressed as the number of days per year that the cumulative emissions could decrease visibility in nearby sensitive areas by 0.5 deciview and by 1 deciview. Worst-case cumulative emissions from the Jack Morrow Hills proposed project and all other reasonably foreseeable development in southwest Wyoming are estimated to cause 9 days of visibility impairment greater than 0.5 deciview at Bridger Wilderness Area, although no visibility impairment greater than 1 deciview is expected at any of the sensitive areas in the Jack Morrow Hills region (Table 4-2).

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Acidification of Lakes

Lake acidification is expressed as acid neutralizing capacity (ANC), the lake's capacity to resist acidification from acid rain. A 10 percent change in ANC represents the limit of acceptable change (LAC) in ANC. Cumulative emissions from the Jack Morrow Hills proposed project and all other reasonably foreseeable development in southwest Wyoming are estimated to reduce ANC by less than one percent of the LAC for the five lakes included in this analysis (Appendix 7).

Cumulative

An Air Quality Assessment Protocol was developed which proposed the methodologies for quantifying potential air quality impacts from the Pinedale Anticline Project and other reasonably foreseeable development in southwest Wyoming. As a result, a modeling analysis utilizing the Wyoming DEQ-AQD, USDA Forest Service, Environmental Protection Agency, and BLM agreed upon CALMET/CALPUFF model, which includes the Jack Morrow Hills planning area, has been completed. Results are now available through the Pinedale Anticline DEIS (November 1999) air quality analysis. The cumulative impact analyses contained in this EIS assumed the implementation of over 8,450 new/replacement wells and associated compression, showed that a 1.0 deciview change threshold was not exceeded due to cumulative emissions. A 0.5 deciview change threshold, however, would be exceeded. The USDA Forest Service reviewed the days of modeled cumulative impacts that are greater than 0.5 deciview change and have determined that the cumulative impacts from the Pinedale Anticline Project, combined with other recently proposed projects in southwest Wyoming, are significant in increasing visibility impairment in the Bridger Wilderness Area. However, based on the application of emissions reduction mitigation efforts by Ultra Petroleum at the Naughton Power Plant, and considering the timing, magnitude, and duration of the remaining projected cumulative visibility impacts, the USDA Forest Service considers these impacts to be within an acceptable range (USDI 1999a and USDI 1999b).

Cultural

The overall density of archaeological sites in the Jack Morrow Hills area is probably about 3.2 sites per 640 acres, as it is across the Rock Springs Field Office area. However, there are portions of the planning area where site densities are projected to be considerably higher, and where sites are considerably larger than in other places within the Rock Springs Field Office area. Moreover, some kinds of sites, particularly PaleoIndian sites such as the Krmpotich and Finley sites are of national-level scientific significance. These factors must be considered when assessing potential impacts from other activities in the planning area.

The BLM's preferred strategy for managing most kinds of heritage resources is to avoid affecting them. However, avoidance is not always feasible. This is especially true when issues of public health and safety, or resource protection are involved. Thus, realistically, some loss of heritage resources is probably inevitable when development occurs in a given

region. In some cases, some kinds of archaeological sites and paleontological localities mitigation can be accomplished by scientifically recovering data that makes the resource valuable. Data recovery mitigation can be expensive in terms of both money and time.

Most heritage resources are primarily managed pursuant to the Federal Land Policy and Management Act (FLPMA) and the National Historic Preservation Act. However, the American Indian Religious Freedom Act (AIRFA), the Native American Graves Protection and Repatriation Act (NAGPRA), and Executive Order 13007 address management of sites of concern to Native American peoples for traditional, sacred or religious purposes. Several sites of this kind have been identified by Native American traditional elders in recent years, and are collectively called, "respected places." AIRFA and Executive Order 13007, and to some extent other Federal mandates including treaties, require the BLM to protect these places and to allow their use by Native American traditional people to the extent possible within the bounds of other legal mandates.

Mitigation of adverse effects to some kinds of historic properties can be accomplished by scientifically recovering the information that makes the resource valuable. Data recovery mitigation can be expensive in terms of both money and time. Data recovery mitigation may take several years to accomplish and project development could be impeded while this work is being accomplished.

The procedures for complying with the National Historic Preservation Act, and the Wyoming Protocol to the BLM National Programmatic Agreement with the Advisory Council on Historic Preservation are designed to take these factors into account when managing resources that are considered eligible for inclusion in the National Register of Historic Places. Resources that are not eligible for the National Register of Historic Places may still be important and require some level of management effort.

All mining claims within 3 miles of the historic trails corridor would be evaluated to ensure objectives of the South Pass Historic Landscape ACEC are maintained.

Hazardous Materials

The impact of hazardous materials would be the same for all alternatives. As development activities increase and as more people use the public lands, the possibility of chemical spills and even unauthorized dumping would increase. However, hazardous waste spills and/or dumping would be cleaned up by the responsible party to prevent endangering human health and/or further environmental damage. Lands would be inspected prior to transfer out of public ownership or prior to acquisition to protect the public from contact with hazardous materials. Water resources would be tested to determine if hazardous substances were present.

Noise

Noise is expressed in decibels (dBA). In general, noise levels can be categorized as follows (BLM 1999a):

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- quiet: noise level less than 60 dBA
- moderate: noise level from 60 to 90 dBA
- loud: noise level greater than 90 dBA

Noise levels in the Jack Morrow Hills region have not been monitored but are likely to be in the “quiet” category: 39 dBA during the day and 32 dBA at night (EPA 1971).

The Federal Energy Regulatory Commission regards a constant noise level greater than 49 dBA to be a significant disturbance or impact. Noise from a drill rig exceeds 49 dBA at distances within about 800 feet, and noise from a 26,000-horsepower compressor exceeds this significance level at distances within about 2,500 feet (USDI 1999a). Figure 13 shows noise levels for other activities in the Jack Morrow Hills region (USDI 1999c). It is not anticipated that drilling activities would occur within 800 feet of a residence (occupied dwelling) or within 2,500 feet for compressor sites, so impacts should not occur. Compressor facilities located closer than 2,500 feet to a sage grouse lek could significantly affect sage grouse lek use (USDI 1999a and USDI 1999b). However, no such activity is anticipated adjacent to sage grouse leks. If this should occur, it would be addressed in future analyses.

Special Status Plant Species

Any actions that would lead to the need to list any special status plant species as Threatened or Endangered would be determined to be a significant impact on the species and would be unacceptable. Avoidance would be the preferred form of mitigation for special status plant species. Thresholds for determining the significance of impacts on special status plant species would be based on the species entire range.

Wildlife

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) can be identified through environmental analysis but depending on economics, the companies can claim an economic hardship and may not have to implement all the recommended mitigation measures. Without specific mitigation such as remote monitoring, pad drilling, directional drilling, and centralized tank batteries, the areas where activity occurs would prevent elk from using the area for the life of the activity. The seasonal closure to protect big game birthing areas within the core and ACECs would not apply to oil and gas companies that need to access the area. This has the potential to have significant effects to elk, with the severity of the effects dependent on the amount of activity.

The amount of land used for road surfaces and well pads represents a direct loss of habitat. The loss of adjacent habitats because of a reduction in use by deer and elk due to harassment or habitat degradation is much more subtle, but has been observed and documented. Reported distances of avoidance areas for elk range widely depending on the area but it is well documented that elk regularly travel great distances in the planning area. Depending on amount and type of traffic, road

quality, and adjacent cover density, Lyon and Ward (1982) found that elk moved from 0.24 to 1.8 miles. Generally, road avoidance has been reported to be greater in areas of open vegetation with less adjacent cover (Perry and Overly 1976; Lyon 1979a); 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). During a study of elk distributions during winter in western Wyoming, some elk moved 0.5 to 2.4 miles away from a well site during its construction (Hayden-Wing Associates 1990). Elk have been observed to be displaced upwards of 3 miles (Green River RMP) in the planning area and have been seen running until they are completely out of sight. This occurs where no physical barriers exist to screen activity and noise, which is common in the planning area. Preliminary results from the Jack Morrow Hills Desert Elk Study support this assessment (Bock and Lindzey 1999).

Numerous studies (MacArthur, et al. 1982; Bromley 1985, Freddy 1979; Kautz, et al. 1981; Ward, et al. 1976;) indicate that human disturbances can increase movements by big game animals and cause more energy to be expended than if the disturbance had not occurred. A model developed by Hobbes (1989) links disturbance and mule deer movements with concomitant energy expense, and snow depths, to mule deer mortality under different conditions of winter severity. Hobbes computed that, under mild conditions (less than 1 inch of snow and average minimum temperatures), mortality rates of mule deer would be practically unaffected. But in severe winters with colder temperatures and 13 inches of snow, modeled mortalities of fawns and does increased substantially, depending on the frequency of disturbance and the distance animals traveled to escape. If, in a severe winter, adult mule deer were subjected to 2 disturbances per day and fled one half kilometer each time they were disturbed, their mortality rate would be twice as high as if they did not attempt to escape at all (Hobbes 1989). Likewise, the potential exists for increased mortality to elk and reduced calving success due to the long distances elk are known to travel once disturbed.

The planning area has had two proposals for potential coalbed methane development, in addition to other development proposals. Currently, 3 wells are located just outside of the planning area. If these wells should prove to be productive, the likelihood of coalbed methane development inside the planning area would be increased. Long-term big game habitat loss from exploration, development, and production may be significant due to well spacing requirements. Coalbed methane development under this proposal could displace as many as 300 to 400 elk from the Steamboat/Sands elk herd and may cause them to permanently leave the plains habitat and move to the Wind River Mountains and other areas of suitable habitat. This would make maintenance of the herd objective very unlikely. Antelope in the Killpecker drainage may be adversely impacted by displacement, animal stress, and long-term forage loss (50 years or more). Displacement moves animals into less desirable habitat and creates competition for available resources with other species and uses.

Big game habitat loss results from road construction and road use, facility construction and placement, pipeline con-

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struction, field facility maintenance, rights-of-way construction, range improvement construction, and disturbance zones around these areas. All disturbed acreages would not be fully reclaimed and portions would remain unavailable as habitat for wildlife for 20 years or more. Limited rainfall, poor soils, and severe winter conditions make reclamation difficult, increasing the time required to re-establish suitable vegetation to pre-disturbance composition and density.

Seasonal constraints would be used to mitigate impacts to wildlife from human activities during crucial periods and provide short-term protection for wildlife. Long-term maintenance and operations activities in crucial wildlife habitats would continue to cause displacement of wildlife from crucial habitats, including disruption of nesting, fawning and calving areas, and crucial big game winter habitats, unless additional measures are applied.

Elk tend to utilize both the steep terrain and dense sagebrush and the wide open spaces in the area. Because of the terrain in the core area (steep slopes and dense sagebrush used for elk calving and high ridge tops utilized during the winter), some elk use the core area year round. The actual effect from surface disturbing and disruptive activities in the flat, desert areas is larger than the direct loss of acreage indicates. Activities in this type of terrain tend to displace the elk great distances (upwards of 3 miles) due to the extended sight distances in the desert-type terrain. Elk disturbed in the Steamboat area tend to abandon the entire Steamboat area rather than seek shelter in adjacent canyons because of the narrowness of benches and canyons and lack of hiding cover in those areas.

Surface disturbance can have a direct impact on small mammals because they cannot easily leave their habitats and avoid heavy equipment and soil and vegetation removal. Therefore, some loss small mammals is expected to occur.

Given the specificity of sage grouse nesting requirements that include mature sagebrush, it is unlikely that destroyed nesting habitat can be restored to pre-disturbance condition in 20 years. Opportunities may exist, however, to enhance remaining vegetation and habitat characteristics to provide more suitable habitat than currently exists. If that cannot be accomplished, there would be a net loss of habitat function and impacts to sage grouse nesting habitat. Noise may adversely affect strutting and nesting grouse. The amount of impact is unknown at this time. Road construction and related traffic can also impact sage grouse leks. Generally, roads would avoid sage grouse leks. Pipelines could affect nesting habitats, depending on types of vegetation that would be removed. Construction within 2 miles of a lek would be restricted from March 1 through June 30.

Oregon Buttes ACEC

The natural values of the Oregon Buttes ACEC would benefit from resource management prescriptions. The area is closed to surface disturbing activities which would provide for long-term maintenance of ACEC values.

Since this ACEC lies within a Wilderness Study Area, no leasing is allowed. An assessment of the amount of explora-

tion and development activity that could occur if restrictions were not in place can not be made. Some potential drilling locations would not be available due to this restriction and some extra drilling and development costs would be required to access any potential reservoirs from off-site locations. No impacts would meet established significance criteria.

PREFERRED ALTERNATIVE

Cultural Impacts

Actions to maintain or enhance air quality and monitoring of air quality would in most cases have little impact upon cultural resources. In cases, such as the South Pass Historic Landscape or some resources of concern to Native Americans, viewshed is an important aspect of a cultural resources value. Air quality enhancement would be beneficial to these kinds of cultural resources.

Enhanced avoidance distances for Native American respected places would facilitate easier protection of all kinds of heritage resources. More detailed agency direction, including procedures for consultation with Native American traditional elders in some cases, should optimize flexibility for protecting heritage resources.

Efforts to control wild fires would generally be beneficial to cultural resources. Preventing or stopping the burning of historic structures would be a beneficial effect of fire suppression efforts. However, the use of heavy equipment and resultant surface disturbance could impact most kinds of cultural resources by disturbing the soil matrix within or upon which archaeological or historical resources are situated. Use of fire retardant chemicals could affect rock art sites and some historic structures.

Changing the visual appearance of vegetative communities whether by wildfire or controlled burning could have short-term adverse effects to places such as the South Pass Historic Landscape. However, vegetative communities are continually changing and the communities visible in an area like the South Pass Historic Landscape are not necessarily those that were there during the location's most significant historic period of use.

Archaeological remains of wooden structures such as wickiups, antelope traps, and drive lines could be destroyed if in the path of a fire whether wildfire or controlled burn. Efforts should be taken to identify these and other flammable kinds of cultural resources, protect them from wildfire, and prevent them from being burned during any controlled burn operation.

Actions to prevent accidents and spills of hazardous materials would usually positively benefit cultural resources. Mitigation and cleanup of spills could adversely impact most kinds of cultural resources by altering their contextual setting whether that setting is a soil matrix, a viewshed, or a structure.

Seasonal restrictions and other mitigative measures applied to lands and realty actions generally have beneficial effects to cultural resources by limiting or otherwise controlling surface disturbing activities. Special management pre-

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scriptions for Areas of Critical Environmental Concern, such as the South Pass Historic Landscape and White Mountain Petroglyphs are generally protective in nature and tend to benefit cultural resources.

Rights-of-way authorizations could impact cultural resources either directly by destroying them outright, or indirectly by changing the context and setting in which they occur. Usually pre-authorization inventory and evaluation for cultural resources enables BLM to avoidance significant cultural resources. Occasionally, erosion resulting from activities authorized by lands actions can damage cultural resources.

Sometimes, cultural resources that were not identified during inventory are damaged by implementation of rights-of-way and other lands authorizations. The most common situation in which this happens is when a buried archaeological resource, which had no surface manifestation is damaged by pipeline trenching operations. In some cases, when authorizations cross areas with soils considered to have high potential for holding buried cultural resources monitoring or inspection of the open trench is required to ensure that any buried cultural resources are identified and properly treated.

Native American traditional elders would be invited into the consultation process whenever potentials exist to affect places they identify as respected places. BLM would use geographic information systems, and other appropriate technologies to place surface disturbing activities in areas where they are the least intrusive upon cultural resources, including areas identified as respected places by Native Americans. Some negative effects from surface disturbing activities may still be visible in some places. However, the BLM would make a positive attempt to minimize intrusions in the most critical areas.

Closure of Steamboat Mountain ACEC, Oregon Buttes ACEC and Continental Peak to communication sites would likely protect cultural resources, including areas identified as respected places by Native Americans, in those areas. Allowing communications sites on Essex Mountain and Pacific Butte may have some negative effects on visual resources in those areas which in turn may have negative effects on areas identified as respected places by Native Americans. These negative effects may be partially or completely mitigated by restrictions identified in the plan, and by selecting sites that are not adverse to visual and cultural resources sensitivities.

Restricting actions on Pacific Butte to conform to the management prescriptions in place for the South Pass Historic Landscape would protect critical cultural resources in that area.

Lands withdrawals are usually beneficial to cultural resources because they limit or prevent other many actions that could otherwise damage cultural resources. Additional withdrawals in the two northern elk calving areas and the top of Steamboat Mountain would generally enhance efforts to protect cultural resources of all kinds.

Acquiring easements to provide public access to cultural and historical resources would generally enhance public enjoyment of heritage resources and would facilitate better management of these resources, especially sites such as White

Mountain petroglyphs and the Crookston Ranch site. Acquiring public easements would enhance research opportunities for archaeologists, paleontologists and other scientists operating on public lands.

Livestock grazing management actions would generally be beneficial to cultural resources of all kinds. Actions taken to meet Wyoming Standards for Healthy Rangelands would generally be beneficial to cultural resources of all kinds. Generally, spring developments tend to be more detrimental than other kinds of water developments because the water source was often attractive to prehistoric and historic inhabitants of the region. Conversely, reservoirs are usually situated in drainage bottoms that tend to have been disturbed by alluvial action and are less likely to have soil deposits that could harbor intact archaeological materials. Limiting water developments would benefit cultural resources by limiting the surface disturbance involved with these developments. These impacts would be slightly greater than the No Action Alternative. Livestock rubbing against rock art panels, and historic structures such as those at Crookston Ranch and the Rock Cabin could severely damage, or completely destroy those resources.

In the planning area, the region of stabilized sand/silt sheet deposit north and west of White Mountain is especially vulnerable to surface disturbance because archaeological resources are known to be buried in the soil deposit with no surface expression. Surface disturbing activities in this area are especially prone to disturb buried archaeological sites. Furthermore, these kinds of sites as exemplified by the Finley and Krmpotich Sites are tremendously important to archaeological science. This is because those sites are very intact manifestations of some of the earliest cultures (e.g., Folsom, Goshen, et al.) in North America. The proximity of this region to the Pinedale Glaciation (the last of the great Pleistocene glacial advances) undoubtedly has some association with the preservation of these very ancient cultural materials in this area. Add to this the presence of skeletal remains of several species of extinct Pleistocene fauna (*Bison bison antiquus* and *Camelops* sp.), in the area and the tremendous scientific potential of the region becomes readily apparent.

The development of 85 projected oil and gas wells and associated facilities with enhanced management prescriptions, including enhanced consultation with Native American traditional elders and enlarged protective zones of up to 2-1/2 miles around areas identified by Native Americans as respected places would significantly increase protection of cultural resources of all kinds.

Mitigation prescriptions for salable minerals in Preferred Alternative would generally enhance protection of cultural resources of all kinds.

Prescriptions for geophysical exploration would generally enhance protection of cultural resources of all kinds.

Monitoring of activities on BLM-administered lands significantly enhances protection of heritage resources of all kinds. Efforts to monitor reclamation and enhance the efficacy of reclamation efforts would generally enhance protection of heritage resources of all kinds.

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Few impacts are expected from off-road vehicles under current management. ORVs could cause significant localized damage to archaeological or historical sites, or to Native American respected places when operated outside management prescriptions. Given ORV industry projections that a fourfold increase in “4-wheeler” sales would occur in the next five years, additional adverse effects to cultural resources from unauthorized use of these vehicles is likely. Designation of areas as “open”, “limited”, or “closed” to ORV travel would enhance protection of heritage resources of all kinds.

Outdoor recreation in accordance with current management prescriptions and within existing laws should not adversely impact cultural resources. However, the simple increased numbers of people recreating on the public lands would inevitably place greater pressures upon the BLM to protect resources such as the White Mountain Petroglyphs and the Crookston Ranch Historic Site from unauthorized and illegal uses. Additional site specific planning at these sites is needed.

The protection in place for special status species management would generally have little effect upon cultural resources. In some cases, actions such as the closures associated with protection of plant species, management would have beneficial effects for cultural resources simply because these more intensive management prescriptions would also tend to protect all types of heritage resources.

It could be that special status species protection would be in keeping with generalized Native American concerns for environmental protection. Conversely, if a special status plant happened to be a Native American medicinal plant then BLM protection could preclude their use of the plant. Without more specific information both in terms of the species considered for special management, and data about traditional plant and animal uses it is difficult to make more definitive projections regarding Native American concerns with special status species management.

Increasing the areas managed under NSO prescription would provide greater protection for heritage resources of all kinds. Intensified transportation planning would additionally enhance efforts to protect heritage resources of all kinds.

Vegetative manipulation that is surface disturbing, such as chaining, could adversely affect cultural resources by destroying archaeological and historical sites. Manipulations such as chemical treatment could affect places such as South Pass Historic Landscape and the viewsheds associated with Native American respected places by changing the visual setting of the cultural resources. If the changes were short term and tended to engender enhancement of ‘native’ plant species, the resulting effect would be beneficial for cultural resources (see also Fire Management).

Changing the VRM Class in the Steamboat Mountain ACEC from Class III to Class II partially in recognition of the increased heritage resource values of those areas brought to our attention by Native American traditional elders would significantly improve BLM management of heritage resources of all kinds. Additionally, including a portion of White Mountain as Class II VRM would significantly improve BLM management of heritage resources of all kinds in that area.

Additional watershed management prescriptions concerning surface protection and erosion abatement would enhance protection of heritage resources of all kinds.

Grazing over-use by wild horses can impact cultural resources both directly by destroying archaeological sites, historic trails and associated viewsheds, and indirectly by accelerating erosion which can eventually destroy some of these resources.

Few negative impacts are anticipated as a result of wild horse management. Occasionally, horse trapping facilities could be placed on an archaeological sites resulting in destruction of the site. This could be prevented by prior inventory and evaluation for cultural resources.

Horses, wild and otherwise, are very important in the cultures of Plains and Great Basin Native Americans. Indeed, many unique cultural traits having to do with horses have developed among these peoples. The presence of wild horses on BLM-administered lands is important to Native Americans. The horses evident in the Native American rock art at White Mountain Petroglyphs illustrate this fact. Wild horses, for these reasons, are to a degree a heritage resource.

Efforts to prevent fragmentation of wildlife habitat and adverse effects to riparian habitats would enhance appreciation of heritage resources within their environmental context.

Core Area

Leasing in part of the core area would somewhat limit BLM’s capability to manage heritage resources. Heritage resources would be one of the concerns considered in the portion of the core that would be evaluated for 4 years. Most adverse effects of subsequent leasing could be mitigated; however, leasing could potentially adversely affect BLM’s ability to manage Native American respected places.

NSO restrictions would enhance protection of all kinds of heritage resources; however, off-site development could somewhat impact BLM’s ability to manage heritage resources. Limitations on road density would generally enhance efforts to protect heritage resources of all kinds.

Desired Plant Community objectives would generally enhance efforts to manage heritage resources, and particularly Native American respected places. The ability to protect and manage heritage resources would be greatly enhanced by expanding Class II VRM areas. Efforts to enhance wildlife and riparian habitats would generally enhance heritage resource management efforts.

Cumulative Impacts

In most cases it should be possible to avoid effects to cultural resources which is the BLM’s preferred way to manage cultural resources relative to other activities. There may be rare cases where it is not possible to avoid effecting cultural resources. In cases where the resource that would be effected is an archaeological site it may be possible to mitigate the adverse effect by retrieving a significant portion of the scientific data that the site contains. However, data recovery mitigation can be expensive and time consuming. Since data

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recovery would need to occur prior to activities that would destroy the archaeological resource in question this approach is usually an impediment to development efforts. With two exceptions standard avoidance and mitigation strategies should result in little impact to most kinds of heritage resources under the No Action Alternative.

Avoidance of surface disturbing activities within the paleosol deposition area, and within 1/2 mile viewshed of all rock art sites would enhance protection of those kinds of heritage resources. Avoidance of Native American respected places would enhance protection of those heritage resources, however failure to define avoidance radii, or viewshed may leave those resources vulnerable to some kinds of impacts. Additional case specific consultation with Native American traditional elders concerning activities proposed in the vicinity of those resources may result in greater protection (up to 2-1/2 mile radius), or less protection (minimum 100-foot radius) of those resources. Additional consultation may, or may not improve BLM's ongoing dialog with tribal governments and traditional elders.

Paleontological Impacts

Oil and gas and coalbed methane development, pipeline construction, road building, and other types of surface disturbance have two types of direct impact on *undiscovered scientifically significant fossils*. First, these activities may inadvertently damage or destroy significant fossil sites buried below the surface. Such an impact is considered unavoidable. Second, discovery of significant fossil sites may occur during preconstruction field surveys or during monitoring of construction. Upon discovery, a mitigation plan would be developed for the recovery, study, and housing of the fossils.

New roads associated with development make access to public land easier for the general public. Better access facilitates the discovery and study of additional fossils but may also provide opportunities for unauthorized collection. At this time, unauthorized collection does not appear to be a problem within the planning area. Any future problems would be dealt with on a case-by-case basis.

The most important difference between alternatives relates to the amount of projected development and whether or not known significant fossil site(s) have been protected. Under the Preferred Alternative, the projected development is less than projected for Alternative A and the No Action Alternative but greater than that projected for Alternative B. Under the Preferred Alternative, *known scientifically significant fossil sites* within the planning area would be closed to surface disturbing activity. The magnitude of the impacts described above would be less compared to the No Action Alternative and Alternative A but greater than Alternative B.

Core Area

The level of projected development within the core and connectivity area is greater than in Alternative B and the No Action Alternative but less than in Alternative A. The types of direct and indirect impacts described for the general area would be the same. The magnitude of the impacts would be

greater compared to the No Action Alternative and Alternative B and less than Alternative A.

Cumulative Impacts

Paleontological information is gathered slowly, because most is obtained from fossils that become naturally exposed at the surface and from fossil recovery, which is a slow, meticulous work. The anticipated surface disturbing activities offer an opportunity to examine bedrock below the surface. Construction may expose fossils that would otherwise remain buried for hundreds if not thousands of years, or never be exposed. Over the planning period, the additional information gathered from development would contribute more to our cumulative knowledge of the resource in a shorter time frame than would naturally occur. At the same time, the anticipated surface disturbance and improved access may result in a loss of knowledge due to accidental damage of fossils during construction and loss due to unauthorized collection. The cumulative loss due to inadvertent damage or destruction is unavoidable, however, the cumulative loss due to unauthorized collection can be reduced, particularly for known scientifically significant sites, through area closure and proper transportation planning.

Fire Impacts

Fire management activities associated with both wildfire and prescribed burns would create or provide a variety of benefits and impacts for numerous resources. Examples of benefits would include increased forage for livestock, wild horses, and wildlife. Examples of impacts would include cultural sites or special status plant species damaged or destroyed through fire line construction and/or vehicle operations, the loss of cultural rock art through the application of dye-impregnated fire retardant or smoke damage, the loss of sage grouse nesting habitat, the loss of soil stabilizing vegetative cover on unstable/erosive soils, or the damage or destruction of human-made facilities, such as fences, oil and gas wells and pipelines, and campgrounds. Refer to the other resource sections in this chapter for additional fire related impacts.

The primary impact to the fire management program would be increased prescribed burn and wildfire suppression costs and reduced opportunity for prescribed burning. Increased costs would result from increased fire frequency, increased fire size and/or intensity, and increased costs of doing business. Providing full suppression to sagebrush-scurfpea vegetation types would increase the costs of fire management.

Factors affecting fire frequency are off-road vehicle use, recreational activity, mineral exploration and development.

Off-road vehicle use frequently occurs in remote, difficult to access areas. While the off-road vehicle trails do provide access to those remote areas, the time required to get fire suppression equipment to fires is considerable. Off-road use contributes to wildfire activity in two ways: 1) escaped camp fires, and 2) fires ignited from the off-road vehicle (i.e., the catalytic converter).

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Recreational activity (i.e., camping, picnicking, hunting, fishing, backpacking) also frequently occur in remote, difficult to access areas. Wildfire activity from recreational activity occurs the same as off-road vehicle use. The designation of special recreation management areas would invite more public use and would increase the probability of wildfire occurrences.

Mineral exploration, development, and production add to potential wildfire occurrence through an increased number of ignition sources, i.e., catalytic converters; surface explosives; welding equipment and operations; and sparks from heavy equipment operations, etc.

Factors affecting fire size and/or intensity include restrictions on equipment use and activities that increase or decrease fuel loading. For example, the use of fire suppression vehicles would be restricted to existing roads and trails in known cultural resource sites and areas containing special status plant species and known plant habitat. The use of fire retardants and other suppression equipment is restricted in several special management areas. Fire intensity due to increased or decreased fuel loading are attributable to livestock grazing. Livestock grazing generally reduces the amount of fine fuels which decrease fire intensity. However, excessive removal of fine fuels can result in increased brush production which would increase fire intensity. Use of prescribed fire to decrease fuel-loading and promote vegetative composition may decrease the occurrence, severity, and duration of wild fire.

Factors affecting the cost of doing business are an increased frequency of unauthorized hazardous material sites and the increase of the number of wildland/industrial and wildland/urban interface areas.

Hazardous material areas present a serious health hazard to fire fighters who come in contact with them. Increased fire activity may develop greater exposure of firefighters to incidental hazardous waste during suppression activities, consequently creating a greater threat to firefighter safety. To promote safety, additional training and specialized equipment may be needed.

As the number of wildland/industrial and wildland/urban interface areas increase, so does the demand for fire protection and the expectancy for immediate response. The BLM would only provide wildland protection on BLM-administered public lands.

Factors affecting prescribed burn costs are restrictions on the use of vehicles or other equipment, establishing or constructing black lines or control lines around sensitive resource values or areas such as cultural resource or special status plant species sites, and requirements to burn some sensitive watersheds in the spring. Spring burning requires roughly twice as much fine fuels as fall burning requiring more time and effort in obtaining desired ignitions.

Increased activity that would result in the use or assembling of people on wildlands would increase the probability that a wildfire would occur. Prolonged lack of prescribed burns or wildfires would reduce the grass/forb component of the system and increase brush occurrence.

Cumulative Impacts

Short- and long-term impacts could occur from additional costs for wildfire suppression and prescribed fire, accrued from restrictions imposed by other resource management requirements.

Lands Impacts

Right-of-way holders would have some flexibility and opportunity for locating and routing rights-of-way under this alternative. However, right-of-way placement would be impacted by exclusion, avoidance areas, areas closed to surface occupancy, and those areas with seasonal restrictions. These effects would be less than Alternative B but greater than the No Action Alternative as more acres would be considered avoidance or exclusion areas. Non-federal lands could be affected by the routing of rights-of-way around avoidance and exclusion areas; however, this effect should be minor since most of the planning area consists of federal lands.

The exclusion of rights-of-way within the South Pass Historic Landscape vista (about 23,640 acres) would have a major impact if activity should increase in this area since rights-of-way in exclusion areas would not be allowed unless mandated by law. Large avoidance areas would have a similar impact, as avoidance of these areas may require a longer route which would affect other offsite areas and increase costs to the applicant. About 75 percent of the planning area would be avoidance areas for rights-of-way and about 5 percent of the planning area would exclude right-of-way activity. Long linear facilities such as pipelines and powerlines would be affected the most by these restrictions, as extensive reroutes would be necessary. Additional mitigation may also be applied to activities that may occur in all avoidance areas, also increasing project costs and the amount of time needed to complete projects (Table 4-3).

No surface occupancy restrictions, affecting about 56,040 acres would preclude placement of rights-of-way because surface disturbing and disrupting activities would not be allowed. Most of these areas are small and scattered throughout the planning area and can be easily avoided. However, this effect increases when combined with avoidance and exclusion areas. Large areas with NSO restrictions have the same effect as large exclusion areas.

Areas closed to communication site location (about 43,400 acres) preclude placement of these types of facilities. If alternate locations cannot be found, this can cause gaps in communication signals and inefficient communication coverage of areas. More areas would be open to communication sites than under Alternative B, but more would be closed than under the No Action Alternative.

Seasonal restrictions and other mitigation measures to protect resource values and threatened and endangered species (T&E) would impact rights-of-way by restricting location and/or timing of construction.

The possibility of high dust levels resulting from use of unpaved access roads would necessitate stipulations to control dust. All construction rights-of-way as well as access road

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rights-of-way would include a stipulation requiring that the holder meet Federal and State air quality standards.

Land tenure adjustments would occur only if the benefits outweigh any adverse impacts, and if there are no significant impacts which cannot be mitigated. About 4,721 acres have been identified as possibly suitable for disposal/acquisition (USDI 1997).

The withdrawal of about 9,000 acres proposed for the JMHCAP and the 37,290 acres identified for withdrawal in the Green River RMP (Table 4-4), would preclude disposal, entry, and mineral location in those areas. Withdrawals for more than 5,000 acres would require notification of Congress. Existing withdrawals such as those for oil shale and coal, would be reviewed and those which no longer serve the purpose for which they were withdrawn, would be revoked. These lands would then be open for disposal, entry, and mineral location. About 211,130 acres would open to mineral location that previously were not available for this activity. Potential for mining claim activity is low except in the South Pass Area. This action would benefit mining claimants by allowing mining claim activity on areas that were previously closed.

There is adequate vehicle access on the existing roads and trails to the lands in the planning area. Closing or restricting specific areas to protect public health and safety and the implementation of transportation planning should not cause severe adverse effects to vehicle users because so much of the area is currently accessible and such closures would likely be few. Implementing the ORV designations would keep vehicles on designated routes which could result in traveling further to get to a destination, but should not preclude accessing an area. Foot and horse traffic would not be affected.

Impacts to rights-of-way and other lands actions for the South Pass Historic Landscape would be the same as discussed in the general impact section. The impacts to rights-of-way for the Oregon Buttes and White Mountain Petroglyphs ACECs would be the same as discussed for exclusion areas and areas closed to surface disturbing activities. The impacts to other lands actions would be the same as discussed for the general area.

Core Area

The core area, including the Greater Sand Dunes and Steamboat Mountain ACECs, would be an avoidance area for rights-of-way. The face of Steamboat Mountain (about 9,400 acres) would be excluded from rights-of-way requiring reroutes of linear facilities. Large avoidance areas such as this would require routing facilities around these areas. This would affect other offsite areas and increase costs to the applicant. Land tenure, withdrawal, and access impacts would be the same as described for the general area. Communication sites would be excluded from the Steamboat Mountain ACEC which could cause inefficient communication coverage in some areas.

Cumulative Impacts

The combined actions of large areas of avoidance (about 416,660 acres), much of it connecting, and about 37,210 acres of exclusion area (and about 43,400 acres excluded from communication sites) would affect right-of-way placement. Long linear rights-of-way particularly would be affected by potentially longer routes increasing construction costs. Fewer rights-of-way would be needed as less acreage would be leased and fewer gas wells would be drilled.

Withdrawal of 46,270 acres would preclude disposal, entry, and mineral location. Revocation of about 211,130 withdrawn acres would allow for entry and mineral location, and consideration of land disposal.

Lands would be irreversibly lost to the public land base when sold or exchanged. However, under exchanges, lands of comparable value would be obtained.

Livestock Grazing Impacts

Livestock would not be adversely affected by air quality actions and if reduced emissions occur, may benefit the environment for domestic livestock.

Cultural and paleontological management would only affect livestock grazing if cultural sites are fenced from livestock use, causing a loss of available forage. Since most cultural sites are small, the amount of impact would be minimal.

Under this alternative it is assumed that 70 gas wells and 15 shallow coalbed methane wells would be drilled in the Reasonable Foreseeable Development scenario (RFD). This would mean that there would be up to 2,100 acres of surface disturbance. This amount of disturbance would have only a minimal impact. Net long-term disturbance would be about 365 acres.

Mining claim activity would not affect livestock production considering the small amount of forage disturbance predicted over the long term. However, if a locatable mineral was found and in sufficient quantities and size to warrant production facilities, the disturbance could result in minor livestock reductions over the long term. This is not likely to occur.

Gravel or other material pits provided for improvement of roads, pipelines, or other facilities, would not pose a concern for livestock production and management. Coal or sodium exploration and development would not affect livestock grazing.

Chemicals such as caustic soda, acids, drilling fluid, reservoir fluid and other materials may be spilled unintentionally on roadways and ditches and ultimately water sources. The use of hazardous materials poses a threat to livestock if they come into contact with them or consume contaminated forage or water. However, it is not likely that this would occur.

Actions concerning rights-of-ways, pipelines, roads, utilities and other surface disturbing actions such as well pads, water diversions, etc., can adversely affect livestock by reduc-

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ing available forage. About 70,520 acres would be closed to rights-of-way (including communication sites)) which would benefit livestock by protecting available forage. Reclamation of linear rights-of-way that do not include permanent roads would mitigate these forage related impacts under all alternatives.

Effects to livestock grazing could occur from implementing standards and guidelines, reviews, and making related adjustments prior to the next grazing season. While adjustments would benefit long-term forage production and vigor, they could result in short-term impacts to livestock operators. This impact would result from the need to remove livestock from allotments when appropriate levels of utilization have been reached.

With the implementation of the Wyoming Standards and Guidelines for Healthy Rangelands in 1998, it was determined that all public lands located within the planning area be assessed in 1999. As of the end of the 1999 grazing season, nine allotments had been assessed for conformance with the Wyoming standards for rangeland health. Where the standards are not being met and it has been determined that livestock management is the cause, appropriate measures would be developed using the guidelines in the Jack Morrow Hills Coordinated Activity Plan.

Suitability of the planning area would mostly affect the class of livestock. Some areas are more suitable for cattle while other areas are more appropriate for sheep. Slopes greater than 20 percent are usually only accessible to sheep while the lower lying areas are more accessible to cattle grazing. Distance to water is also more critical for cattle than for sheep. Omitting areas of little or no productivity or very steep slopes might have an impact on the livestock operators by a reduction in adjudicated AUMs. However, this would decrease the potential overutilization of the vegetation in other areas. With sheep and cattle there is a diverse range of forage needs which separates each class of livestock. One area may indeed be unsuitable for one class of livestock but very suitable to another.

Salting for distribution of livestock could require some effort in planning and proper placement but would aid in the distribution of forage utilization and reduce impacts to other resources such as wildlife, water quality, and riparian resources.

Vegetative treatments beneficial to wildlife would also be beneficial to livestock. Burning or using chemicals to reduce sagebrush would only increase the forage for both livestock and some species of wildlife. Benefits would be greater than for the No Action Alternative.

Up to 11 new livestock management water facilities could be developed. New livestock waters would benefit livestock grazing management. Limiting the numbers and locations of new livestock watering sources would provide more benefits than the No Action Alternative. Limiting water developments could increase competition between domestic livestock and wild horses for available water.

Authorized grazing use would not exceed the recognized permitted use. For analysis purposes, anticipated actual use

would range from approximately 9,851 AUMs (5-year average 1994-1998) to the total permitted use of 26,032 AUMs. The average between the two amounts is 17,941 AUMs (15,814 cattle and 2,127 sheep). Again for analysis purposes, this grazing level was held constant throughout the planning period.

Livestock operators would have the flexibility to manage their livestock in a way that would be beneficial to the resource. Allowing a range of stocking levels gives an operator the chance to adjust to the changing complexities of resource management. Therefore there would be no effect from this alternative to livestock. Benefits would be increased flexibility to rest portions of the planning area for resource concerns while allowing a voluntary reduction in numbers, allowing for improvement in both riparian and upland vegetation.

Ensuring growing season rest and no livestock use before range readiness would ensure healthy forage. However, this would place constraints on the flexibility of grazing plans and livestock operators could need other options for grazing their livestock until they can turn out their cattle on public lands within the planning area. This could mean a change in the livestock operations.

A change in operations to accommodate the changes in grazing seasons, would provide some benefits. The quality and vigor of the plants would improve, causing an increase in growth rate of calves and lambs. This could generate more revenue from sales depending upon livestock market conditions.

Grazing plans would be prepared for all areas and address riparian desired plant community objectives and proper functioning condition. Generally, riparian area pastures have been established as mitigation for some types of grazing use. Flexibility in management would be reduced due to fewer riparian pastures that would be developed. Riparian pastures would only be developed to enhance watershed values and wildlife habitat, not necessarily to facilitate livestock grazing.

Livestock use limits would be established not to exceed 30 percent on riparian shrubs and 40 percent on key riparian herbaceous species. This may increase operating costs. However, by setting utilization levels, an increase in productivity can be assumed. With this increase in productivity, the increased vegetation, increased weaning weights, and less work involved moving livestock would ultimately increase the productivity of the rangeland, livestock health, and decrease operating costs with the potential to improve profitability.

Constraints on water development placement could result in an increased use of riparian areas and utilization limits could be reached within a short time frame. The operators would find it increasingly difficult to hold their livestock in areas of little or no water, causing an increase in riding time, trucking and increased operating costs.

Monitoring and reclamation activities would benefit livestock grazing by providing information on forage use and distribution, and by reclaiming disturbed areas to provide forage for livestock grazing. Monitoring information can be

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used to identify problem areas and direct management changes to mitigate or eliminate resource concerns.

With the ever growing popularity of ORVs, livestock could be adversely affected by being chased or harassed. Gates could be left open interfering with or preventing compliance with livestock management requirements. Moving livestock from camping areas, water sources, or other areas could cause serious injury or in rare cases even death of the animals.

There would be more flexibility in livestock management opportunities for riparian and wetlands under the Preferred Alternative than under Alternative B, but less than in Alternative A. Livestock would be moved from riparian areas (and in some cases, may need to be removed from an entire allotment) if utilization levels are reached prior to the end of the authorized use period. Riparian management actions (use levels, DPC, etc.) and other management prescriptions (i.e., limiting water developments in crucial habitats, managing riparian pastures for wildlife and watershed resources, use levels on upland species, etc.) would increase the intensity of livestock management. However, improved riparian areas would benefit livestock grazing by providing improved forage.

For a detailed socioeconomic impacts discussion of the livestock industry, see Socioeconomic Impacts. Under the Preferred Alternative, 316,280 cattle AUMs and 42,540 sheep AUMs would be available for livestock grazing during the 20-year life of the project. The total economic impact of livestock grazing would be \$22.3 million. Employment in the livestock sector would be 252 annual job equivalents earning \$16,353 average per year. The AUMs of livestock grazing are 92 percent of the No Action Alternative. AUMs available for livestock grazing on an annual basis under the Preferred Alternative represent an increase over the baseline year 1998 and the 5-year average of 1994-1998.

No surface occupancy stipulations applied to areas such as the South Pass Historic Landscape, Oregon Buttes ACEC, and White Mountain Petroglyphs ACEC could prevent construction of livestock management facilities; therefore, livestock distribution patterns may not improve in those areas.

Under the Preferred Alternative, there is one special status plant species located in the planning area, the large-fruited bladderpod (*Lesquerella macrocarpa*). There seems to be no conflict between livestock and this special status plant.

There are no listed threatened or endangered species located within the planning area. If a survey revealed the presence of a threatened and endangered species, mitigation measures would be developed to ensure that habitat for the species was protected or enhanced.

Transportation planning could benefit livestock grazing activity by limiting forage lost from development activity. In particular, defining transportation routes and corridors and establishing road densities would reduce surface disturbance. Access would still be provided for livestock activities such as repairing improvements or moving livestock in various allotments.

Poisonous plants pose a problem to livestock through ingestion of toxic chemicals located in the plants themselves.

Control of these species would decrease the likelihood of infection or death from noxious weeds.

Under the Preferred Alternative, wild horses would not impact livestock grazing as long as horses are kept at the appropriate management level (AML). For the most part, the wild horse use is located on the fringes of the planning area. There are some wild horses located outside the wild horse herd area; however, there appears to be no impact with them being outside the area. Horses have a tendency to haze livestock away from water sources during drought years. They have been known to keep livestock away from watering sources for a period of time. There could be some competition between livestock and horses due to the same dietary overlap in food sources.

Livestock would not be affected by current wilderness management. Continued closure of wilderness study areas to vehicle use could affect the livestock operators in gathering their livestock for market or moving them to another area.

This alternative, although not as restrictive as Alternative B is still more restrictive than Alternative A. Although this alternative is restrictive to livestock grazing management and the livestock industry, it allows for some use of management tools to lessen the severity outlined in Alternative B.

Restrictions on range improvements, watering sources and or areas, utilization levels, upland and riparian management objectives, and use limits have been analyzed in earlier chapters and would not be discussed further.

Under the Preferred Alternative, potential competition with wildlife for forage and shade would continue. Development of additional water sources in the core would not be allowed which would affect livestock distribution. This may cause the livestock operators to move livestock, depending on water availability to areas of lower grazing productivity. However, through management practices such as water hauling and other permitted activities the operator may be able to stay in a more productive area longer because of increased management activities. These activities may be beneficial because of increased forage available due to better management practices.

Limiting placement of water sources and establishing utilization limits upon sage grouse leks and nesting areas may pose additional management constraints and may be more costly. This may also affect livestock distribution. Limiting use in areas that contain waters, such as the flocks, may cause livestock operators to find alternative watering sources.

Constraints on the construction of additional livestock water and distribution facilities could result in concentrated use of the remaining areas. In combination with the standards for healthy rangelands, these constraints could result in changes to livestock operations.

Core Area

Impacts to the core area would be the same as described for the general planning areas. In particular, surface use constraints and management practices precluding construction of rangeland improvements may prevent improvement of live-

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stock distribution patterns. This would affect the Pacific Creek, Steamboat Mountain, Sands, Bush Rim, and Fourth of July allotments.

Cumulative Impacts

Actions taken under this alternative could result in a short-term reduction in use as the area and time available for grazing would be limited. This impact would be greater for this alternative than for Alternative A and the No Action Alternative but less than under Alternative B. The projected increase in forage production could help to offset this loss in the long term.

Minerals Impacts

Leasables - Oil and Gas and Coalbed Methane Resources

Oil and gas and coalbed methane development would be restricted or prohibited as the result of conflicts with environmentally related resource values. This cumulative impact is due to the restriction categories:

- no leasing,
- no surface occupancy,
- seasonal access restrictions, and
- controlled surface use restrictions.

Approximately 27 percent of the planning area would be closed to leasing. Leasing would be prohibited parts of the core area and connectivity areas in addition to the non-discretionary closures in wilderness study areas.

In areas of no surface occupancy, surface disturbing activities are prohibited. About 10 percent of the planning area would be affected by this restriction (Map 10 and Table 2-4). Access to hydrocarbon resources located beneath these areas must be accomplished by drilling deviated or horizontal wells, which may not always be economically feasible. Directional drilling would increase well cost.

About 60 percent of the planning area is affected by seasonal restrictions (Map 11). Seasonal restrictions limit oil and gas activities to certain time periods during the year. Activities can be prohibited from between 2 and 9 months out of the year depending on the purpose of the time limitation, and number and kind of overlapping seasonal restrictions. This restriction is applied to leases to protect, big game winter ranges, certain calving and parturition areas, raptor habitat, mountain plover nesting, and sage grouse nesting areas (Table 2-4). Most of the seasonal restriction overlaps occur during the spring and early summer. The recent addition of a requirement for mountain plover nesting surveys would increase costs for new proposed wells or construction activities.

Controls on surface disturbing activities are applied to leases to mitigate adverse impacts. The effect of surface use restrictions can range from no effect, to added mitigation and reclamation requirements, to moving well locations, all the way to prohibiting exploration and development activity. The magnitude of the impact is generally not known until a well has been proposed. About 72 percent of the planning area

would be affected by these controlled surface use restrictions (Table 2-4 and Map 12).

The reasonable foreseeable development scenario projected that 202 wells (includes five coalbed methane wells) could be drilled in the planning area if the entire area were open to exploration and development. The impacts of restrictions on this projection are:

1. five of the coalbed methane wells expected to be drilled under the No Action Alternative would not be drilled due to additional restrictions resulting from staged leasing, no surface occupancy, and controlled surface use mitigation and reclamation requirements being added for this alternative,
2. an estimated direct loss of 29 percent of the potentially drilled wells (55 wells) through no leasing,
3. an estimated indirect loss of 35 percent of the potentially drilled oil and gas wells (67 wells) because restrictions (staged leasing, no leasing, surface occupancy stipulations, and mitigation and reclamation requirements) over almost all of the planning area could discourage industry from initiating exploration and development activities,
4. increased operating costs related to trying to get access for drilling those available well locations and transporting production obtained,
5. in the short term (through 2007), the number of producing wells could increase from 48 wells (46 oil and gas wells and 2 coalbed methane wells) to 58 wells (55 oil and gas wells and 3 coalbed methane wells),
6. in the long term (through 2017), the number of producing wells could decrease to 41 wells (38 oil and gas wells and 3 coalbed methane wells).

Impacts of Fewer Wells

About 70 wells (34 producing oil and gas wells and three producing coalbed methane wells) are expected to be drilled and 122 wells would not be drilled during the 20-year analysis period. The new producing wells would account for additional royalty and tax revenue to the government. The 34 new oil and gas wells would have a total reserve of 74.8 billion cubic feet of gas. The projected reserves of the expected three new producing coalbed methane wells is not known.

The unavailable production from the oil and gas wells not drilled represents unrealized royalty and tax revenue. Sixty-five of the 122 wells would be expected to produce and they could recover 143 billion cubic feet of gas. A loss of opportunity for revenue and royalty would occur if wells could not be drilled to obtain hydrocarbons under no leasing and no surface operations areas. Where leasing is deferred, the opportunity to recover hydrocarbon reserves would also be deferred for some period longer than 20 years. The amount of potential revenue from undrilled coalbed methane wells is unknown, since the number of potential undrilled coalbed methane wells could not be determined. Opportunities for direct and indirect employment would also be reduced with fewer producing wells.

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Significance of Impacts to Oil and Gas Activities

Significance criteria 1, 2, and 3 would be exceeded for the Preferred Alternative. Two fields (Nitchie Gulch and Pine Canyon) lie in or partially in the planning area. They both exceed the 5 billion cubic feet of gas criteria. The Nitchie Gulch Field contains 48 wells (see RFD) and the Pine Canyon Field contains 22 wells (George 1992). The well average per field in this area is 35. Diedrich (1999) has indicated that field sizes are likely to range from 20 to 25 wells. In comparison, a natural gas field in southwestern Wyoming typically includes 30 to 200+ wells (Barlow and Haun 1994). It appears that at least one average field would not be developed due to direct impacts of staged leasing and due to indirect impacts of applying no surface occupancy and surface use restrictions. Possibly as many as three fields would not be developed due to these restrictions.

About 64 percent of expected potential exploration and development activity could not occur due to restrictions. Potential direct losses were determined to be 29 percent and indirect losses 35 percent. Collectively and individually these two types of losses exceed the threshold loss of 25 percent which was determined to be significant.

About 64 percent of expected reserve additions would not occur due to restrictions. The significance threshold was determined to be a loss of 25 percent of the potential reserves.

The total number of producing wells would decrease by 15 percent over the 20-year study period. This did not meet the significance criteria of a reduction of 25 percent in the number of producing wells.

Impacts in the Core Area and Connectivity Area

Staged leasing would be implemented in these areas. Some areas would become no surface occupancy while others would be withdrawn from leasing for an unknown period of time. Impacts as a result of restrictions in the Greater Sand Dunes ACEC and Steamboat Mountain ACEC would be the same as for the core area since they lie within it. Types of impacts determined for the planning area as a whole, also apply to this area.

The core and connectivity areas make up about 38 percent of the planning area. Much of the Nitchie Gulch Field lies within the core area. Some wells would be drilled as development wells within the Nitchie Gulch Field and some could be drilled as part of another field (possibly as extensions of one or more of the small one- or two-well fields already present). Development of an entire field may be precluded at least for the life of this plan. The criteria #1 impact threshold may be exceeded.

Forty-seven (47) wells have been completed as gas producers in the core area and connectivity area. Thirty-five (35) wells still produce. Over the long term, 33 of these wells are expected to be abandoned, leaving only 2 producing well(s). Approximately 18 of the 35 new wells projected under the RFD are expected to be productive. The significant impact threshold for criteria #4 would be exceeded since the total number of producers could decrease from 35 to 20 over the life of this plan. This impact would be partly due to depletion of

reservoir rocks in the area and partly due to the restrictions placed on exploration and development activity.

Cumulative Impacts

Impacts include those expected from all oil and gas development. Present impacts are due to 48 existing producing wells. Short-term impacts (1998-2007) expected are: 10 new exploratory unit proposals; 36 new wells; 19 new producing wells; 17 drilled and abandoned wells; and 7 abandoned producing wells. At the end of 2007 there would be 58 producing wells in the planning area. This would be an increase of 10 wells (nine conventional and one coalbed methane well) over the December 1997 total of 48 wells.

Long-term impacts (1998-2017) expected are: 20 new exploratory unit proposals; 70 new wells; 37 new producing wells; 33 drilled and abandoned wells; and 42 abandoned producing wells. At the end of 2017 there would be 43 producing wells in the planning area. This would be a decrease of seven wells (an increase of 3 coalbed methane wells and a decrease of eight conventional wells) over the December 1997 total of 48 wells.

Leasables (Other than Oil and Gas and Coalbed Methane), Locatables, and Salables

Leasables - Coal

A limited amount (10 to 15 acres) of exploration drilling is projected within the coal potential area during the latter part of the planning period (Map 47). The coal potential area is located in the extreme southern portion of the planning area and includes portions of the general and core areas. Access limitations would be less than the No Action Alternative and Alternative B, and similar to Alternative A. Under this alternative, exploration within the core would be reviewed on a case-by-case basis and would be open except as described as follows. About 42,500 acres would be closed to coal exploration. Avoidance of Native American respected sites would range from 100 feet to 2.5 miles. Sensitive areas would be avoided, including elk calving areas, big sagebrush, mountain shrubs, and special status plant species habitat. Also, areas with an NSO restriction for oil and gas development would be closed to exploration, except that exploration could occur on existing roads and trails in accordance with transportation planning (Table 4-5).

The effects to coal exploration under this alternative would be similar to that described for Alternative A and Alternative B. Avoidance areas may cause portions of the coal potential area to not be evaluated; therefore, isolated coal bodies may not be developed. Access to the remaining area would likely be enough for a preliminary exploratory program but not for a detailed exploratory program during the planning period.

Cumulative Impacts Same as described for the general impact discussion.

Leasables - Sodium

The sodium brine potential area occurs outside the core area, so no impacts to the resources in the core area are

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anticipated. Exploration and development for sodium would be reviewed on a case-by-case basis, with appropriate mitigation applied. Activity would avoid sensitive areas as described for coal exploration. Areas with an NSO restriction for oil and gas development would be closed to exploration, except that exploration could occur on existing roads and trails in accordance with transportation planning (Table 4-5). Also, no facilities related to development would be located within the planning area. Well locations would be permitted on a case-by-case basis. The impact to exploration and development would be an increased cost of doing business, but would not likely preclude activities.

Cumulative Impacts Same as described for the general impact discussion.

Locatables

The impacts to locatable minerals development under this alternative would be the same as that described for the No Action Alternative; however, the magnitude of the impacts would be greater due to an increase in withdrawal areas. In addition to the Green River RMP withdrawals, the two northern elk calving areas and one Native American respected site would be withdrawn from mineral entry. The northern elk calving areas lie within historical gold placer claim locations. Withdrawal of these lands from mineral location would exclude them from any additional locatable minerals exploration and development, other than on claims already existing in these areas at the time of withdrawal. The BLM has the option of pursuing validity exams on any existing claims. Should they be found invalid, they would be declared null and void on that basis. And, should they be found valid, such claims could be mined and/or patented.

Core Area The impacts to locatable minerals development under this alternative would be the same as that described for the No Action Alternative; however, the magnitude of the impacts would be greater due to an increase in withdrawal areas but this would be less than described for Alternative B. In addition to the Green River RMP withdrawals, the top of Steamboat Mountain (about 960 acres) and two Native American respected sites would be withdrawn from mineral entry. The same procedures for dealing with existing claims at the time of withdrawal as described for the general area would be applied.

Cumulative Impacts Same as described for the general impact discussion.

Salables

The Green River RMP (USDI 1997) closed 207,850 acres or about 33 percent of the public land within the planning area to the sale of mineral materials (Table 4-6). Areas that remain open to development of mineral materials contain primarily shale, claystone, and sandstone and very little, if any, sand and gravel. Where construction requirements specify a certain type of material not found within the planning area, alternative sources outside the planning area are mined and hauled to the construction site. In addition to the areas closed or restricted to development of mineral materials under the No Action Alternative, activities would avoid sensitive areas as de-

scribed for coal exploration. The remainder of the area would be open to development on a case-by-case basis.

The Green River RMP FEIS also describes areas where surface disturbance is constrained (in Table 2-8). These controlled surface use areas would adversely impact the access to and use of the surface for recovery of mineral materials. Mitigation measures would increase the cost of doing business, limit timing of activities, and may preclude some activities in both the short and long term.

The disposal of mineral materials from the existing Wyoming Department of Transportation pit along Wyoming Highway 28 would eventually result in the depletion of materials at this site, necessitating the establishment of a new site(s).

Also under this alternative, development of mineral materials is restricted to support of other development occurring in the planning area. No sales contracts or free use permits would be issued to support projects outside the planning area. Though mineral materials are in short supply within the general area, this restriction protects small localized sources for localized use. This reduces construction costs associated with long haul distances from other mineral material sources outside the planning area.

Core Area This alternative closes the lava rock portion of Steamboat Mountain to development of mineral materials, but leaves the remainder of the Steamboat Mountain ACEC open to development. Again, as described for the general area, development of mineral materials could only occur as an activity in support of other development within the planning area. Compared to the No Action Alternative, which closed Steamboat Mountain ACEC to all mineral materials activities, this alternative provides for some level of development to occur. Construction costs associated with oil and gas and other development within the core would decrease.

Cumulative Impacts The cumulative effects on mineral materials would be an increase in the total amount of materials available from within the planning area compared to the No Action Alternative.

Geophysical

Under this alternative, the direct and indirect impacts described for the other alternatives would be the same, although to a lesser degree than Alternative B but more than the No Action Alternative and Alternative A. An interdisciplinary team review would be initiated for all geophysical proposals within the JMHCAP area on a case-by-case basis. Detailed analysis of the potential restrictions would not be available prior to development of exploration proposals. Geophysical exploration could occur within the core area, areas with NSO restrictions, and other areas (active sand dunes, slopes greater than 20 percent, ACEC values, key habitat - unique vegetation and plant communities, key habitat - escape cover, cultural/historical/Native American concerns, connectivity area, inaccessibility, special status species, stabilized dunes, and VRM Class II areas) but would be limited to use of existing roads and trails. Given the potential resource conflicts between geophysical activities and wildlife, cultural, vegetation, and recreation resources, the direct impact

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would be an increase in the cost of operations from mitigation of impacts to these resources. The cost of geophysical activities would increase due to controlled surface use restrictions, time delays, and seasonal restrictions.

Also carried forward from the Green River RMP, restrictions, such as limiting the use of vehicles and explosive charges (Table 4-7) in sensitive resource areas inside and outside the core. Sensitive resources include Boars Tusk, a portion of White Mountain Petroglyphs, Crookston Ranch, developed recreation sites and the ORV parking lot in the Greater Sand Dunes ACEC, raptor nesting sites, portions of South Pass Historic Landscape, Oregon Buttes ACEC, special status plant species habitat, Tri-Territory Marker, Native American respected sites, Wilderness Study Areas, and recreation interpretive sites. Some of these areas, such as the WSAs, would be open to foot traffic only.

The Green River RMP identified certain areas that would remain open to leasing but closed or restricted to geophysical activities. This alternative adds to this list of areas as described above. Such a situation may indirectly affect overall development of oil and gas resources in these areas and potentially increase the amount of surface disturbance associated with development. If subsurface information can not be retrieved through conventional geophysical means, then operators assume a higher risk during exploration and development of these areas. The presence or absence of geophysical data can mean the difference between more efficient development, with fewer, more productive wells and missing the reservoir entirely. Areas that would remain open to leasing but closed or restricted to geophysical activities may incur less efficient development resulting in more surface disturbance than would otherwise occur were geophysical data available.

Core Area

Under this alternative, oil and gas development and the issuance of new leases would occur within portions of the core area. Geophysical activities would be allowed, but restricted to use of exiting roads and trails in conformance with the transportation plan. The use of explosive charges would not be permitted. The impacts to geophysical operations would be the same as that described above for the general area, except that geophysical operations, such as 3-D seismic, would not be permitted within an oil and gas high potential area. If subsurface information can not be retrieved through conventional geophysical means, then operators assume a higher risk during exploration and development of these areas. The presence or absence of geophysical data can mean the difference between more efficient development, with fewer, more productive wells and missing the reservoir entirely. Areas that would remain open to leasing but closed or restricted to geophysical activities may incur less efficient development resulting in more surface disturbance than would otherwise occur were geophysical data available.

Cumulative Impacts

The cumulative impact of the this alternative on geophysical operations would be similar although somewhat less than under Alternative B. Less area could be explored, creating

data gaps. There would be an overall increase in costs to the operator from mitigation. There is the potential for more surface disturbance as more gas wells may be drilled to delineate a reservoir due to a lack of geophysical data.

Off-Road Vehicle Impacts

ORV use would be restricted under this alternative by limiting winter access to county roads. Over-the snow vehicles would follow ORV designations. Additional ORV seasonal closures could be pursued in critical habitats. Roads in sensitive areas would be seasonally gated from general public use.

Approximately 80 percent of the planning area is available for off-road vehicle (ORV) use. Wilderness Study Areas, candidate plant sites, and some cultural sites or about 20 percent of the planning area is closed to ORV use creating a small impact to this type of recreation.

There are hundreds of miles of roads and trails available for the public to use. All-terrain vehicle (ATV) use, specifically four wheelers, has been increasing and is anticipated to continue to increase. A leader in the Utah BlueRibbon Coalition has predicted that in the next three to five years ATV use will increase 300 to 400 percent.

The Sand Dunes ORV open area would continue to operate as an open off-road vehicle play area. It is anticipated that the existing small, one-hole vault toilet would be replaced with a bigger toilet. The existing parking lot would be expanded to accommodate the increased use the area is receiving. This would relieve congestion and make the site more user friendly. There is a possibility that more improvements to the site could be made such as an off loading ramp, picnic tables, fire rings, and wind shelters. However, all this would be subject to appropriated dollars which have not been available in recent years.

The Sand Dunes ORV open area lies in the eastern third of the Sand Dunes Area of Critical Environmental Concern (see write-ups for Special Management Areas). ATV users (i.e., sand rails, all-terrain vehicles) are allowed to drive anywhere on the 10,500-acre active sand dune area. Presently, there are 17 producing gas wells, two pipelines, storage tanks, and numerous access roads in the area creating health and safety issues. See the impact analysis for the Greater Sand Dunes ACEC.

Cumulative Impacts

Long-term beneficial effects would result from the large number of existing roads and trails available for vehicle use, and from newly constructed roads anticipated with additional development which would provide access to new areas. The areas closed or limited to designated roads and trails are small in comparison.

Recreation Impacts

Existing wildlife populations would be maintained or increased and a slight increase in recreation user days would

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be anticipated over Alternative A for hunting. Non-consumptive recreation days are projected to increase by two percent per year during the planning period. About 1.18 million resident and nonresident non-consumptive recreation days would be used in the 20-year analysis period.

Visitor use in the planning area will continue to grow based on population increases in the Intermountain West. Visitation to Wyoming's National Parks and Forests is increasing and the public would be looking to the BLM-administered lands to get away from the crowds. It is anticipated that as developments occur, populations increase, and other traditional recreation use areas become saturated, the integrity of setting and opportunity for unconfined and solitary recreation experiences would diminish. Non-consumptive recreation days are projected to increase by two percent per year during the planning period. About 1.18 million resident and nonresident non-consumptive recreation days would be used in the 20-year analysis period.

The BLM-administered lands in the planning area are noted for the undeveloped, wild nature of recreation opportunities. The only developed sites are the Sand Dunes Off-Road Vehicle Area and the interpretive sites along the Oregon/Mormon Pioneer/California/and Pony Express National Historic Trails. The White Mountain Petroglyphs cultural site is in need of a site plan to control visitor use. This site could be developed within the life of the plan.

Managing for the continued availability of outdoor recreational opportunities, meeting legal requirements for health and safety of visitors, and mitigating conflicts between different types of resource users would solve many of the current problems. Meeting the long-range needs of the public and utilization of recreation resources would be pursued.

Low-investment, resource-dependent opportunities such as backcountry byways, watchable wildlife, and wild horse viewing would be pursued in the area.

Cumulative Impacts

Recreation demand and uses could increase to a point where conflicts would occur for unconfined dispersed recreation opportunities. However, management prescriptions would mitigate these impacts somewhat, to lessen the effects identified in Alternative A.

Some hunting opportunities may diminish for the general public in areas where development occurs due to the displacement of animals and because of measures applied to protect public health and safety. The ability of some pristine habitat areas to support wildlife may also be diminished due to increased recreation uses and access into these areas.

Socioeconomic Impacts

The JMHCAP economic analysis was based on a 20-year planning period (1998-2017) with 1998 as the base year. In addition to looking at economic impacts by affected resource by alternative, cumulative economic effects are summarized for the short-term (1998-2007) and the long-term (1998-2017) portions of the planning period. The short-term and

long-term cumulative effects for Alternative A, Alternative B, and the Preferred Alternative were compared with the impacts for the No Action Alternative on a percentage basis. All dollar figures used for evaluating impacts in the socioeconomic analysis are in current dollars. Economic tables which were used for the analysis in the document are on file at the Rock Springs Field Office.

Oil and Gas

The economic impact of oil and gas activities in the Jack Morrow Hills area was analyzed in two parts. The first was the development phase, which considered the economic impacts associated with drilling and completion of oil and gas wells in the study area. The second was the production phase, which considered the economic impacts associated with the production of crude oil and natural gas from the completed wells. Only the development phase was considered for coalbed methane wells, since production estimates for these wells were not available due to a lack of production history in the area.

Development Phase

Table 4-8 summarizes the economic assumptions used in the analysis for oil and gas development (the drilling and completion of oil and gas wells). Development costs were separated into wells that were drilled and completed and wells that were drilled and abandoned. Development costs were estimated for three types of wells: 1) Standard oil and gas wells (7,000-9,000 feet), 2) Deep coalbed methane wells (greater than 1,200 feet), and 3) Shallow coalbed methane wells (less than 1,200 feet). BLM's Reasonable Foreseeable Development Scenario report (RFD) assumed that all shallow coalbed methane wells were completed, so no costs were estimated for drilled and abandoned shallow wells. Most of the drilling and completion cost information was taken or adapted from the *Southwest Wyoming Resource Evaluation, Socio/Economic Evaluation (SWRE)* report. For some types of wells this information was supplemented with information from other sources.

Table 4-8 indicates that the estimated total cost of drilling and completing an oil and gas well was \$567,600. This expenditure generated total economic impacts (direct and secondary) of \$774,600 per well in the Southwest Wyoming economy. The total economic impact per well included \$119,500 of labor earnings in the region. Drilling one oil and gas well supported the equivalent of 4.4 annual jobs in the region. A similar explanation applies to the other types of oil and gas wells shown in Table 4-8.

The estimated costs for standard oil and gas wells were taken from the SWRE report. The estimated cost for shallow coalbed methane wells was based on reported costs for similar wells in Northeast Wyoming. The cost breakdown for deep and shallow coalbed methane wells was assumed to be proportional to that for a standard oil and gas well.

Estimates of the economic impacts of oil and gas development on the Southwest Wyoming economy in terms of total economic impact, earnings, and jobs were based on the

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updated model from the SWRE report. The employment estimates were expressed as annual (12 month) job equivalents.

Information on the number and type of wells for the JMHCAP was taken from the BLM's RFD report. Table 4-9 summarizes projected drilling activity by type of well. The RFD assumed that the success rate for standard oil and gas wells and deep coalbed methane wells would be approximately 53 percent and that the success rate for shallow coalbed methane wells would be 100 percent.

Production Phase

Table 4-10 summarizes the economic assumptions used in the analysis for oil and gas production. Crude oil production was analyzed separately from natural gas production. Natural gas is the predominate form of production in the Jack Morrow Hills area. Most of the production information was taken or updated from the SWRE report.

In Table 4-10, the price of oil was assumed to be \$15.00 per barrel. At that price level one barrel of oil would generate \$23.16 of total economic activity (direct and secondary) in the Southwest Wyoming economy. The total economic activity per barrel included \$2.50 of labor earnings in the region. One barrel of oil supported 0.000072 direct and secondary jobs in the region or the equivalent of one annual job for about every 13,900 barrels. One barrel of oil also generated \$1.00 of direct revenue for local governments in the region. A similar explanation applies to the per MMCF amounts for natural gas production. The value of natural gas production is based on a price of \$1.75 per MCF.

The price of oil has varied substantially in Wyoming during recent years, ranging from a high of \$19.56 in 1996 to a low of \$9.50 in 1999 (Wyoming Geo-notes 1999). As a result, forecasting future oil price is very difficult. The Wyoming State Government Revenue Forecast (January 1999) of \$15.00 per barrel for 2002-2005 was used in the analysis. This price level was comparable to the average for 1996 through 1999. In 1998 oil production represented about one percent of the total value of oil and gas production in the Jack Morrow Hills. The Wyoming State Government Revenue Forecast of \$1.75 per MCF for 1999-2005 was used for natural gas production in the analysis. In 1998 natural gas production represented nearly 99 percent of the total value of oil and gas production in the Jack Morrow Hills.

Estimates of the economic impacts of oil and gas production on the Southwest Wyoming economy in terms of total economic impact, earnings, and jobs were based on the updated model from the SWRE. The employment estimates were expressed as annual (12 month) job equivalents. Estimates of local government revenue for oil and gas production were also taken from the SWRE report.

Information on the amount of oil and gas production for the JMHCAP was taken from the BLM's RFD report. Table 4-11 summarizes production by alternative. The RFD projected 117 barrels of oil/condensate and 84.6 MMCF of natural gas per well per year, respectively, over a 26-year producing life for each.

Sixty-five oil and gas wells and 20 coalbed methane wells would be drilled over the 20-year period of 1998 to 2017. Almost 116 thousand barrels of oil and 83,669.4 MMCF of natural gas would be produced. The total economic impact for drilling and production would be approximately \$242 million. Employment produced by the oil and gas activity over the life of the project would be 770 annual job equivalents with a total earnings of about \$22.5 million. On an annual basis, about 37 jobs earning a range of salaries of \$27,180 to \$34,921 would be supported. Economic impacts from oil and gas activities under the Preferred Alternative are basically comparable to the No Action Alternative, less than Alternative A, and more than Alternative B.

Livestock Grazing

Livestock grazing was separated into cattle and sheep animal unit months (AUMs) with each type of livestock grazing analyzed separately. Direct fiscal revenues to local government from livestock grazing were estimated based on the proportion of production taxes and Federal grazing fees received or returned to Southwest Wyoming. Table 4-12 summarizes the economic assumptions used in the analysis for livestock grazing.

Table 4-12 indicates that gross receipts for cattle production in Wyoming have averaged \$33.27 per AUM over the last five years (1993-97). At that price level, cattle production would generate \$65.07 of total economic impact (direct and secondary) in the Southwest Wyoming economy. The total economic impact per AUM included \$11.81 of labor earnings in the region. One AUM of cattle production supported 0.000710 direct and secondary jobs in the region or the equivalent of one annual job for every 1,408 AUMs. One AUM of cattle production also generated \$1.88 of direct revenue for local governments in the region. A similar explanation applies to the per AUM amounts for sheep production in Table 4-12.

Gross receipts per AUM for cattle and sheep production were estimated from five-year average prices (1993-97) reported in the *Wyoming Agricultural Statistics* (1998). A five-year average was used in the analysis due to the variability in livestock price in recent years. Livestock prices were held constant throughout the planning period.

Estimates of the economic impact of livestock grazing in terms of earnings and jobs were based on the updated model from the SWRE report. The employment estimates were expressed as annual (12 month) job equivalents. Direct local government revenue estimates were based on local tax rates and state and Federal government legislation regarding the distribution of tax revenue to cities, towns, counties, and special districts.

Information on the number and type of AUMs for the JMHCAP was provided by the BLM. Due to changes in available forage, environmental conditions, business decisions by operators, and livestock prices, livestock grazing in the Jack Morrow Hills area has varied over time. Total permitted use for the area was 26,032 AUMs (22,767 cattle and 3,265 sheep). Yet the actual use for the last five years

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(1993-97) averaged 9,851 AUMs (8,861 cattle and 990 sheep). However, grazing use has trended up since 1997 with actual use for the baseline year of 1998 at 13,038 AUMs (11,991 cattle and 1,047 sheep). Given this variability in livestock grazing the following grazing assumption was used in the analysis.

Annual grazing AUMs were based on the average of the five-year average actual use (9,851 AUMs) and the total permitted use (26,032 AUMs). The average of the two amounts was 17,941 AUMs (15,814 cattle and 2,127 sheep). This grazing level was held constant throughout the planning period.

Under the Preferred Alternative 316,280 cattle AUMs and 42,540 sheep AUMs would be available for livestock grazing during the 20-year life of the project. The total economic impact of livestock grazing would be \$22.3 million. Employment in the livestock sector would be 252 annual job equivalents earning \$16,353 average per year. The AUMS of livestock grazing are 92 percent of the No Action Alternative.

Recreation Activities

As previously noted, recreation activities in the JMHCAP were separated into nonresident and resident use. Nonresident use was valued based on the economic impact from expenditures by nonresidents in the region. Resident use was valued based on the net economic value to the user. Direct fiscal revenues to local government from recreation were estimated based on the proportion nonresident sales, lodging, and gas tax revenues returned to local government in Southwest Wyoming. Table 4-13 summarizes the economic assumptions used in the analysis for recreation.

Table 4-13 indicates that on average nonresident elk hunters spent an estimated \$239.40 per recreation day in Southwest Wyoming. This spending generated a total economic impact (direct and secondary) of \$330.69 in the regional economy. The total economic impact per hunter day included \$47.28 of labor earnings in the region. One nonresident elk hunter day supported 0.003307 direct and secondary jobs in the region or the equivalent of one annual job for every 302 hunter recreation days. One nonresident elk hunter day also generates \$3.69 in direct revenue for local governments in Southwest Wyoming. The net economic value of one resident elk hunter day was estimated to have been \$41.46. A similar explanation applies to the other recreation activities shown in Table 4-13.

Estimated per recreation day expenditures for elk, deer, and antelope nonresident hunters for 1997 were developed from the *Wyoming Game and Fish Department's Annual Report* (1998). They represent average statewide nonresident expenditure estimates. Per day expenditures for non-consumptive, nonresident recreation were adapted from *Report on the Economic Impact of the Travel Industry in Wyoming* (1997) prepared for the Wyoming Division of Tourism by Morey and Associates. The estimates were for Region 2, which includes Uinta, Sweetwater, Carbon, Albany, and Laramie counties. All visitor expenditures were assumed to occur in Southwest Wyoming and were expressed in constant 1997 dollars throughout the planning period.

Estimates of the economic impacts of nonresident recreation expenditures on the Southwest Wyoming economy in terms of total economic impact, earnings, and jobs were based on the updated model from the SWRE report. The employment estimates were expressed as annual (12 month) job equivalents. Direct local government revenue estimates were based on local tax rates and state government legislation regarding distributions of sales tax, lodging tax, and gas tax revenues to cities, towns, counties, and special districts. Estimates of the net economic value of resident recreation days were taken from a draft report for the USDA Forest Service (Rosenberger, et al. 1999). The estimates used in the analysis were for big game hunting and various non-consumptive recreation activities in the intermountain region of the United States. The report did not provide separate estimates for elk, deer, and antelope.

Information on the number and type of recreation days for the JMHCAP was provided by the BLM. For hunter days, the BLM estimates were developed in consultation with the Wyoming Game and Fish Department. Hunting days estimates represent the 10-year average for the Jack Morrow Hills area. Non-consumptive days were based on 19 percent of total Green River Extensive Recreation Area days from RMIS. Since the BLM and the Wyoming Game and Fish Department measure recreation days differently hunting and non-consumptive estimates may not be strictly comparable.

A total of 48,700 non-consumptive recreation days were estimated for 1998. The 48,700 recreation days included 31,950 nonresident days (65.6 percent) and 16,750 resident days (34.4 percent). Non-consumptive recreation days were projected to increase by two percent per year during the planning period. Under this alternative non-consumptive recreation days are projected to increase to 70,947 days in 2017. The proportion of nonresident and resident recreation days was assumed to remain constant.

Under the Preferred Alternative, 1.18 million resident and nonresident non-consumptive recreation days would be used in the 20-year life of the project. The total economic impact of the non-consumptive nonresident recreation days would be \$62.7 million. Some 19,070 nonresident hunting days (elk, deer, and antelope) with a total economic impact of \$6 million would be realized over the life of the project. Employment in the recreation sector would be 875 annual job equivalents earning approximately \$12,521 average per year.

Elk displacement would occur as habitat is fragmented. Average elk hunter days would increase in the short term from 424 in 1998 to 524 days by 2005. There would then be a gradual decrease for the remainder of the planning period to 324 hunter days by 2017. The average elk hunter days over the planning period would be 424. The proportion of nonresident and resident hunter days was assumed to remain constant.

Average deer hunter days would remain constant over the planning period at 1,830 hunter days per year. The 1,830 hunter days would include 75 nonresident days (4.1 percent) and 1,755 resident days (95.9 percent).

Average antelope hunter days would remain constant over the planning period at 2,274 hunter days per year. The 2,274

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hunter days would include 812 nonresident days (35.7 percent) and 1,462 resident days (64.3 percent).

Short-Term Cumulative Impacts (1998-2007) and Comparison of Alternatives

Table 4-14 summarizes the cumulative short-term physical outputs by alternative for the JMHCAP. The top half of the table shows the physical units of output for each alternative. The bottom half of the table indicates how the alternatives compare to the No Action Alternative on a percentage basis.

The Preferred Alternative is basically comparable to the No Action Alternative and represents a midpoint between Alternative A and Alternative B. Standard oil and gas drilling and production activities are about 97 to 98 percent of the No Action Alternative. Coalbed methane drilling activity is 80 percent of the No Action Alternative. The AUMs of livestock grazing are 92 percent of the No Action Alternative. Hunting days and non-consumptive recreation days are comparable to the No Action Alternative.

Economic Effects by Alternative

Table 4-15 summarizes the cumulative short-term economic effects of the JMHCAP alternatives on the Southwest Wyoming economy. The top half of the table shows the dollars amounts for each alternative. The bottom half of the table indicates how the alternatives compare to the No Action Alternative on a percentage basis.

The Preferred Alternative is basically comparable to the No Action Alternative and represents a midpoint between Alternative A and Alternative B. Direct and total impacts for the Preferred Alternative are 98 percent of the No Action Alternative. Total earnings and employment are 96 to 97 percent of the No Action Alternative. Local government revenue is 98 percent of the No Action Alternative. Resident recreation benefits are comparable to the No Action Alternative.

Long-Term Cumulative Impacts (1998-2017) and Comparison of Alternatives

Table 4-16 summarizes the cumulative long-term physical outputs by alternative for the JMHCAP. The top half of the table shows the physical units of output for each alternative. The bottom half of the table indicates how the alternatives compare to the No Action Alternative on a percentage basis.

The Preferred Alternative is basically comparable to the No Action Alternative and represents a midpoint between Alternative A and Alternative B. Standard oil and gas drilling and production activities are similar to the No Action Alternative. Coalbed methane drilling activity is 80 percent of the No Action Alternative. The AUMs of livestock grazing are 92 percent of the No Action Alternative. Hunting days and non-consumptive recreation days are comparable to the No Action Alternative.

Economic Effects by Alternative

Table 4-17 summarizes the cumulative long-term economic effects of the JMHCAP alternatives on the Southwest Wyoming economy. The top half of the table shows the dollar amounts for each alternative. The bottom half of the table indicates how the alternatives compare to the No Action Alternative on a percentage basis.

The Preferred Alternative is basically comparable to the No Action Alternative and represents a midpoint between Alternative A and Alternative B. Direct impacts, total impacts, total earnings, total employment, local government revenue, and resident recreation benefits are all 99 to 100 percent of the No Action Alternative.

Special Status Plant Species Impacts

Factors that adversely affect air quality (e.g., emissions from industrial sites, airborne particulate, etc.) may also affect special status plant species, especially if source areas are located near, upwind, or adjacent to actual plant locations or potential habitat areas. Generally, mitigation and management actions associated with air quality management would benefit and protect special status plant locations and potential habitat areas.

Generally, mitigation and management actions associated with cultural and paleontological resource management would benefit and protect special status plant locations and potential habitat areas in the same vicinity as the protected sites. Avoidance by surface disturbing activities is one commonly applied mitigating measure; however, avoidance of cultural sites could create a conflict with special status plants by displacing surface disturbing activities onto plant habitat to avoid the cultural site. Under all alternatives, special status plant locations are closed to surface disturbing activities. In cases where protection of special status plants may conflict with cultural site protection, the mitigation measures for cultural resources could include data recovery of the site, avoiding special status plant habitat. Data recovery of cultural sites that are occupied by special status plants on the surface could cause conflict between these resources. Such conflict could result in disturbance to plant habitat or prevention of subsurface cultural data recovery.

Searches for special status plant species would be done prior to data recovery (excavation) and would prevent unintentional harm to these species. Data recovery of cultural sites which occurs within special status plant habitats could impact these plants by direct removal if searches were not performed, or if avoidance of the plants and their habitats was not used as a mitigating measure. Avoidance of paleosols would provide additional protection to special status plant species inhabiting these areas.

In addition, most surface disturbing activities are not permitted within the special status plant populations, thus no impacts from cultural site excavations or related surface disturbing activities are expected.

Under this alternative, special status plant species habitat would be closed to all surface disturbing fire suppression

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activities unless necessary for species survival. Vehicle use for wildfire suppression activities would be limited to existing roads and trails in actual special status plant species locations and potential habitat areas; therefore, impacts to plant species would be insignificant.

While most of the known special status plant species habitats are not generally dependent on fire, prescribed fire could be used to treat these ecosystems if required to maintain quality habitat.

Impacts from fire suppression in the special status plant species locations should be avoided through site specific fire suppression design. Activities would not be permitted that disturb the habitat unless necessary for species survival. Vehicle use for fire suppression would be consistent with the ORV designations for the area, generally keeping to existing roads and trails.

In general, hazardous waste management activities would have insignificant impacts to special status species and their habitat. Avoidance of known special status plant locations by surface disturbing activities would prevent impacts from most permitted activities, however developmental activity in the vicinity of special status plants could increase the risk of introducing hazardous materials on special status plants and their habitat through spills or unauthorized dumping.

Land exchanges would have no impacts to special status plant species populations or potential habitat areas. Any significant vegetative resources on lands identified for disposal would probably be discovered in site specific investigations that would be conducted during evaluation of sale proposals. In such cases, effects on special status plant species would be mitigated by appropriate wording in the patent or the sale would be denied.

Management of actual special status plant species locations as right-of-way avoidance areas and potential habitat areas as special status plant species survey areas would ensure that damage to these species would be minimized. Insignificant amounts of damage would occur to special status plant species populations due to issuance of rights-of-way and permits.

Consideration for exchanges for lands in Wilderness Study Areas and ACECs would provide increased protection for special status plant species in those areas. Land exchanges to include lands within Wilderness Study Areas would be inventoried for special status plant species prior to exchange. Plant inventories of the WSAs would be performed to determine the presence of special status plant species. Such inventories would increase the protective management actions allowable for them under all alternatives.

Activities such as chemical control of weeds along rights-of-way could contribute to an irreversible and irretrievable loss of the plant populations if their habitat is located on or adjacent to the right-of-way.

Searches for special status plants prior to disturbing activities, such as construction of communication sites and other rights-of-way would locate any new populations. Surface disturbance would not occur on these populations and adverse effects to plants would not occur.

Concentrating activities in certain areas, and especially concentrating pipelines and other linear facilities along already disturbed roads in the area, would provide additional protection for special status plant species by limiting the amount of surface disturbance. Additional ROW avoidance and exclusion areas would benefit potential special status plant species by limiting the amount of native plant habitat disturbed.

Closure of certain sensitive areas, including areas with special status plants to public access would increase protection by preventing unintentional impacts. Closure of certain areas to communication sites would also increase protection.

Additional withdrawals in elk calving areas, and on Steamboat Mountain would provide additional protection for potential special status plant species habitat.

Taking appropriate measures to meet the standards and guidelines for healthy rangelands would have a beneficial impact to special status plants by improving the general ecological condition of the range, providing potential habitat for these species to expand their populations into the area, or within the area.

Attaining optimal rangeland biodiversity and health would be accelerated by taking appropriate measures to meet the rangeland standards and guidelines. The impacts of this to special status plant species would be beneficial by providing more favorable habitat in a shorter amount of time.

Limiting upland livestock utilization levels and developing grazing plans for riparian and upland habitats would be desirable, as special status plant impacts would decrease from either less livestock numbers or shorter durations of use.

Locating salt licks as far as 1/4 mile from special status plant locations would benefit these populations, protecting them from trailing and livestock congregating.

Under this alternative, 65 new wells would be drilled plus an additional 20 coalbed methane wells. Impacts would be somewhat greater than under Alternative B as more areas would be leased and developed. However, special status plant locations are closed to surface disturbing activities, and to coal and sodium exploration. If searches are conducted prior to any surface disturbing activity, and avoidance measures employed, impacts to special status plant species from exploration and development activities would be insignificant.

Activities that would avoid slopes would potentially benefit special status plants as many of them are located on rims, slopes and windswept uplands. Unintentional uprooting and squashing damage from vehicular use, and physiological effects of associated dust settling on the plants would contribute to negative impacts.

Special status plant species locations would be closed to mineral material sales. These actions would prevent damage to plant populations already inventoried. Potential special status plant habitat would be searched; and if plants are found, would be avoided, reducing these impacts to an insignificant level.

Maintaining the closure of the Steamboat Mountain ACEC to mineral material sales would aid in ensuring that this area

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remains viable as special status plant habitat. In addition, the big sagebrush/scurfpea communities would be protected under a no surface occupancy restriction.

Public land withdrawals and seasonal road closures would have beneficial impacts to special status plants and their habitat by removing known and potential special status plant habitat from mineral location and year-round road use. This alternative would provide more protection of special status plant species than the No Action Alternative or Alternative A, but less than Alternative B.

Actual special status plant locations would be favorably impacted by their closure to geophysical vehicle use and explosive charges. In these areas, vehicles would be restricted to existing roads and trails where they are consistent with the transportation plan, avoiding special status plant locations. In addition, impacts would be lessened by conducting searches for these species prior to surface disturbance in potential habitat. Special status plant species are closed to off-road vehicle use, as well as to the use of explosives and blasting, providing protection of these plants from these activities.

Performance of field monitoring after surface disturbing activities to ensure successful reclamation, and on-going monitoring of land use by wildlife, livestock, minerals, and other resource programs would help maintain healthy ecosystems that could support special status plant populations.

Specifying roads and trails to be designated would potentially provide benefits to special status plants by allowing more land to be reclaimed and return to native plant communities.

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. Use of containerized shrub stock would hasten the re-establishment of important shrub communities after disturbance.

Plans to provide Backcountry Byway interpretive sites and turnouts would not impact known special status plant species populations, as their habitat is closed to surface disturbing activities. Interpretive sites and turnouts would not be placed where special status plant species are located. Increased incidental use such as undeveloped campsites could impact the special status plant species. Anticipated increased recreational use such as mountain biking could also threaten special status plant populations due to off-trail biking and creation of new trails.

Plans to protect Crookston Ranch and its riparian area could provide expansion territory for Ute ladies'-tresses (*Spiranthes diluvialis*), although it is not known to occur at the site currently. A recent survey of the area revealed that the site provides good potential habitat for this species.

Management actions described to protect visual quality, wilderness areas, and special management areas would generally benefit or not impact special status plant species populations or potential habitat. This alternative would provide a

greater benefit than the No Action Alternative as more areas would be managed for Class II visual values.

Additional riparian management actions including establishment of grazing plans, limiting roads and crossings and limiting livestock use would provide healthy, diverse native plant habitat.

Transportation plans would be beneficial to special status plant populations by incorporating known locations and conducting clearance surveys prior to designating access routes. Rehabilitation of unused roads and trails and limiting the number of road miles in sensitive habitats would prevent loss of actual and potential special status plant habitat by reducing the amount of vehicular access across cushion plant communities, rims, slopes and other sensitive areas where special status plants are commonly found. In addition, limiting the number of stream and riparian area crossings could maintain the integrity of these areas which are potential habitat for the Ute ladies'-tresses.

Management activities implemented in woodland communities would have no impact on special status plant species or potential habitat areas as searches would be required prior to treatments such as prescribed fire, chaining or thinning. If a special status plant species were found, treatments would not be allowed unless they were beneficial to the species. Searches would also be conducted prior to treatments in any vegetation type; if special status plants are located, the treatments would not be allowed unless they would benefit the species. Therefore, adverse effects would not occur to special status plants species.

In general, practices to conserve and stabilize soils would help maintain healthy ecosystems which can support special status plant species. Energy-dissipating structures designed to protect steep slopes and highly erosive soils could benefit special status plant species that are off-site but within the area of impact by preventing loss of habitat. Establishment of road and well pad densities would allow more native plant communities to remain undisturbed, and capable of sustaining healthy special status plant species populations.

Managing for wild horses is not likely to impact special status plant species, unless horse traps, helicopter pads or other associated round-up facilities were constructed on or near their habitat. Plant searches in these proposed project areas prior to disturbance would provide additional protection for these species. Trampling by wild horses has been listed as a threat to existing populations of large fruited bladderpod (*Lesquerella macrocarpa*); however, potential impacts appear to be minimal. Horse trampling around water holes can and does have an impact to vegetation, and could affect special status plant species located there.

Management actions described to protect wildlife habitat would generally benefit or not impact special status plant species populations or potential habitat. Managing riparian exclosures for all wildlife species would benefit special status plants by maintaining native riparian plant communities, allowing natural processes of succession to thrive, providing habitat for a diversity of plant species.

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Core Area

Conducting a resource evaluation prior to considering oil and gas leasing or other developments would benefit special status plant species populations but not as much as for the No Action Alternative. Continued protective actions specific to ACECs would also reduce potential impacts to special status plant populations. Known locations of the large-fruited bladderpod (*Lesquerella macrocarpa*) would be evaluated on a case-by-case basis to determine if they meet the relevance and importance criteria to be considered for inclusion with the Special Status Plant Species ACEC.

Cumulative Impacts

Management prescriptions would provide benefits to the special status (candidate) plant species and their habitat. Additional restrictions on geophysical activity, off-road vehicle use, fire suppression activities, and a proposed withdrawal would further reduce the level of impact. Management actions that prevent species from being listed as T&E species would benefit all parties. Threatened and endangered species are more universally protected, and private or other agency administered lands could be affected. Prevention of listing would therefore be beneficial to all parties. Development activities, such as those associated with recreation sites and minerals actions, could have an impact on special status plant species in areas where several different resource concerns may limit options for placement of mineral development facilities. However, increased inventory for these species in areas projected for development could provide more information about rare plant species and their status.

Generally, mitigation and management actions associated with cultural and paleontological resource management would benefit and protect special status plant locations and potential habitat areas. Limitations imposed within the visual horizon of designated and non-designated historic roads and trails would benefit and protect special status plant species locations and potential habitat areas.

Vehicle use for wildfire suppression activities would be limited to existing roads and trails in actual special status plant species locations and potential habitat areas; therefore, impacts to plant species would be insignificant.

Pursuit of withdrawals in actual special status plant species locations would prevent impact to special status plant species from mining activity. Management of actual special status plant species locations as right-of-way avoidance areas and potential habitat areas as special status plant species survey areas would ensure no damage would occur to special status plant species populations due to issuance of rights-of-way and permits. Special status plant species locations would be closed to mineral material sales, surface disturbance, and geophysical vehicles. These actions would prevent damage to plant populations already inventoried. Plant and habitat searches would be conducted and, if plants are found, avoidance would be designated, prior to geophysical activity or surface disturbance; therefore, there would also be no impact to special status plants in areas that have not been inventoried.

Management prescriptions, including no surface occupancy requirements in actual plant locations, would prevent impacts to special status plant species from range improvement projects such as wells, reservoirs, and fences. Limiting upland livestock utilization levels and developing grazing plans for riparian and upland habitats would be desirable, as special status plant impacts would decrease from either less livestock numbers or shorter durations of use. Taking appropriate measures to meet the standards and guidelines for healthy rangelands would have a beneficial impact to special status plants by improving the general ecological condition of the range, providing potential habitat for these species to expand their populations into the area, or within the area.

Management actions described to protect visual quality, watershed values, wilderness areas, wildlife habitat, and special management areas would generally benefit or not impact special status plant species populations or potential habitat. Specifying roads and trails to be designated would potentially provide benefits to special status plants by allowing more land to be reclaimed and return to native plant communities.

Vegetation/Woodlands/Weeds and Riparian/Wetland Resources Impacts

Impacts to Vegetation/Woodlands/Weeds

Management actions implemented to control dust along dirt roads would permit vegetation to be more productive and vigorous. Selective requirements imposed on prescribed burns in order to avoid violation of ambient air quality standards could increase burn costs and alter prescribed burn plans. Industrial plant stack emissions could alter plant communities in the immediate vicinity and downwind from the emission source; however, none are anticipated at this time.

Generally, stipulations and management actions implemented to protect cultural and paleontological resources would prevent surface disturbance and vegetation removal. Limitations imposed within the visual horizon of designated and nondesignated historic trails could alter areas considered for prescribed burning and range improvement construction thereby facilitating localized overuse of vegetation due to poor livestock distribution. Concentrated fossil collection causes surface disturbance and results in removal of vegetation from those areas; however, these effects should be minimal.

Prescribed burning would cause a long-term decrease in sagebrush species, a short-term increase in annual weeds, and a long-term increase in grass species. Total vegetative production would decline for the first two growing seasons following a prescribed burn. After the second year, livestock and certain wildlife forage would increase, and range condition and total forage production would improve in the third year after a prescribed burn. No prescribed fires are currently planned but it is anticipated that they would occur during this plan.

Prescribed burns in decadent aspen stands would, with proper grazing management, stimulate sprouting and repro-

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duction of aspen and alter age class structure. Prescribed burns conducted during the hot season or during low soil moisture conditions would limit sprouting and regeneration of certain mountain shrub species, primarily antelope bitterbrush, and could cause less diverse species composition and longer post-burn recovery periods. Cool season burns or burns conducted during periods of high soil moisture would provide greater opportunity for mountain shrub regeneration and sprouting, and would provide greater species diversity and shorter recovery periods.

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 types. Within three years, livestock and wildlife forage would generally exceed original levels 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.

There would be a short-term increase of annual weeds and a short-term decrease in vegetation production on prescribed burn acreage. However, there would be a long-term increase in grass species and vegetation production. Wildfire would create a similar effect for both the short and long term. The effects of wildlife on vegetation are not anticipated to be significant.

Additional prescriptions for managing fire would include full suppression in the big sagebrush/scurfpea plant communities, providing protection for this unique vegetation association. The increase in full suppression areas for wildfires would provide additional benefits by decreasing acreage burned, in areas where wildfire would be detrimental. However, for those plant communities where wildfire would be beneficial, an increase in acreage receiving full suppression would produce additional negative impacts.

Generally, hazardous waste management activities would not impact vegetative resources, although illegal hazardous waste dumping or spills could damage or totally remove vegetation from the immediate vicinity of the dump or spill.

Implementation of the range standards (applied to all uses) and guidelines (for livestock grazing) as the minimum acceptable conditions for public rangelands would increase the health and diversity of the planning area vegetation. By ensuring that all activities conducted on the public lands within the planning area are designed to maintain and enhance native vegetation and promote properly functioning watersheds, negative impacts to plants and their habitat would be minimized to an acceptable level. Monitoring and evaluation of rangeland uses and impacts is mandatory. Results of these evaluations would determine if the objectives of this plan are being met, and if not, then adaptive management actions would be required to improve the conditions of native vegetation.

The possible sale of public land would generally result in the loss of vegetative resources as most disposals would be in support of urban and industrial expansion. No significant rare plants are known to exist on lands identified as potentially

suitable for disposal. Any significant vegetative resources on these lands would probably be discovered in site specific investigations that would be conducted during evaluation of sale proposals. In such cases, effects on vegetation would be mitigated by appropriate wording in the patent, or the sale would be denied if necessary.

Most of the impacts to vegetation from lands and realty actions would result from industry-associated rights of ways, such as pipelines, access roads and utility lines. These would remove vegetation in the short term, but reestablishment of desirable grass and forb species would be anticipated within 3 to 5 years after reclamation. With proper reclamation, there would be no significant loss of vegetation in the long term, except for tall shrub species which may require up to 70 to 150 years to grow back to pre-disturbance height and cover values.

Designated ROW avoidance areas that include the big sagebrush/scurfpea communities would have beneficial impacts on this rare plant association. Rights-of-way corridors or windows (concentration areas) and avoidance areas would be identified that would minimize the impacts to a larger area. This should serve to decrease erosion and other impacts to sensitive resources.

This alternative has more acres considered for withdrawal from mineral entry than does the No Action Alternative. There is potential for more exceptions to the rights-of-way windows allowing for more surface disturbance which could produce greater impacts to vegetation than for the No Action Alternative.

For purposes of analysis, the anticipated actual use would not exceed the recognized active permitted use and would range from 9,851 to 26,032 AUMs or an average of 17,941 AUMs. Less intensive grazing would promote healthier, more biologically diverse native plant communities. Implementation of more restrictive riparian utilization standards would directly benefit willows, grasses, and sedges by maintaining plant vigor, community structure, and diversity. However, more grazing (up to 16,181 additional AUMs) could occur than under Alternative B, which could result in some areas being grazed too long, too close, or too frequently. This could have a negative effect on plant growth and vigor.

Livestock grazing systems would be designed to achieve desired plant communities. These actions would probably have a long-term positive impact on uplands and riparian areas. The vegetation types that would be most affected by livestock grazing would include the saltbush, low density sagebrush, high density sagebrush, aspen, riparian, grassland, and greasewood classifications.

Locating salt licks as far as 1/4 mile from special status plant locations and riparian areas would benefit these populations and vegetation types by protecting them from livestock trailing and congregation impacts. Delaying livestock turnout until native range grasses are in the boot would promote healthy, vigorous stands which could repel weed invasions easier, and would be capable of withstanding drought.

Proposed reconstruction of 11 stock ponds in the planning area would encourage livestock congregation in these areas,

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causing negative effects to surrounding vegetation. However, water developments, including wells, springs, and pipelines should improve livestock and wild horse distribution patterns, encouraging more uniform utilization of forage and causing less damage to certain vegetation types.

The impacts under this alternative would basically be the same as Alternative B but may not provide as quick of a recovery for degraded riparian areas, although progress would still occur. Implementation of livestock grazing standards would be sufficient to recover degraded riparian areas and improve water quality.

Trampling and use of dune ponds and adjacent riparian habitat would be reduced. These areas are ecologically fragile and can easily deteriorate from sustained surface disturbing activities, livestock watering, and from livestock grazing.

Mechanical manipulation of vegetation (chaining, chemicals, contour furrowing, ripping, etc.) has not been identified but has not been ruled out. These activities would result in a change in vegetation composition and would temporarily remove target species. Chemicals used to remove sagebrush and noxious weeds could impact nontarget vegetation on localized areas.

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 AMPs or better distribute livestock. In wetlands, fencing would control livestock use and improve habitat and watershed condition. More diverse vegetation would result and soil erosion would be reduced.

Conversions in class of livestock would be considered on a case-by-case basis and would only be approved where such a conversion would aid in achieving the JMHCAP objectives. Conversions from cattle to sheep would generally result in greater utilization of upland areas and shrub species. Conversions from sheep to cattle would generally result in greater use of riparian and grassland areas. Any impacts from future conversions would be analyzed in site specific documents.

Allocation of unallotted forage, or changes in season of use would open new areas to livestock grazing and forage utilization. Increased utilization in these areas could result in species composition changes or a decrease in vegetative production and vigor.

Season of use changes or use of areas previously unused could result in reductions in existing forage bases used by wildlife. In addition, use in stabilized dune areas could cause blowouts and destabilization of the dunes by removing vegetation needed to hold down the sand.

Oil and gas activity would be less than anticipated in Alternative A and almost the same as the No Action Alternative (4 wells less than No Action) and more than Alternative B. Short- and long-term disturbance would be similar to the No Action Alternative.

Under this alternative it is assumed that 85 wells would be drilled in the Reasonable Foreseeable Development scenario (RFD). This would mean there would be up to 2,100 acres of

surface disturbance. This amount of disturbance would only have a minimal impact if stringent mitigation measures were followed (as described in the RMP and the No Action Alternative). Some mitigation measures (such as directional drilling and limiting the number of well pads per section) may not be applied if costs are unreasonable on existing leases. Restricting the types of mitigation to be applied could increase impacts. The acres of disturbance shown above assumes that each well would have a pad, road, and pipeline.

Coal exploration activities should be minimal and would avoid sensitive plant communities including the big sagebrush/scurfpea, reducing impacts on this vegetation type. Areas of sensitive vegetation, such as the big sagebrush/scurfpea communities would be closed to sodium exploration which would reduce the potential for the disturbance of these plant communities and have beneficial impacts on these communities. Big sagebrush/scurfpea and other sensitive plant communities would be closed to mineral material sales, thus maintaining the health and diversity of these communities.

Known rare plant communities such as the only known community of big sagebrush/lemon scurfpea and good representative areas of sagebrush-grass communities could be lost to mining claim activity as mineral withdrawals would not be pursued and no special protection currently exists for them. The majority of the few aspen communities in the planning area would be open to location, resulting in direct removal of the trees, and conversion of the habitat to non-woodlands. Location of mining claims on Steamboat Mountain (within the ACEC) would cause potential destruction of the springs and seeps located in these areas, and direct loss of the significant vegetative resources they support. Protection would be somewhat less than the No Action Alternative or Alternative B because fewer withdrawals would be pursued.

Geophysical exploration activities would usually disturb less than one acre of vegetation per mile of operation. All new disturbance would be reclaimed after exploration. 3-D vibroseis techniques are known to crush the vegetation, leaving the roots and most aboveground biomass intact. Most herbaceous vegetation would not be severely impacted by this method; however, shrub species would generally be damaged. Impacts to vegetation communities would be reduced due to management actions that limit vehicle use and explosive charges.

Monitoring is an essential part of natural resource management because it provides information on the relative success of management strategies. Implementation of monitoring would be performed to determine if the prescribed management actions are being followed (compliance monitoring), verify if they are achieving the desired results (effectiveness monitoring), and determine if underlying assumptions are sound (validation monitoring). Monitoring results provide the information to determine whether a goal has been met, and whether to continue or to modify the management direction. The concept of adaptive management acknowledges the need to manage resources under circumstances that contain varying degrees of uncertainty, and the need to adjust to new information. Adaptive management is based on monitoring that is sufficiently sensitive to detect relevant ecological changes.

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Findings obtained through monitoring, together with research and other new information would provide a basis for adaptive management changes to the selected alternative.

The current RMP and other project-specific and site-specific NEPA documents require monitoring of resources, activities, or effects, and would continue to do so under all alternatives. The monitoring items or elements of the current plans include soil, water, air, vegetation, visual resources, cultural resources, lands, minerals, range, wildlife and fisheries habitat, timber, special areas, and wild horses. The health and diversity of vegetation in the planning area depends on the ability to adaptively manage the proposed activities within the limits of the resource.

Repeated off-road vehicle use would damage vegetation because vehicle tires crush and tear plant tissues and eventually destroy plant cover. Off-road vehicle activity often occurs in areas that are too steep or erosive for road construction. The combination of vegetation loss and activity on steep erosive soils produces excessive soil erosion and causes further impacts associated with sedimentation on adjacent areas. All vegetation classifications would be damaged by off-road vehicle use, but such damage would be most common on badlands, high and low density sagebrush, juniper, salt-bush, and sand dune vegetation classifications.

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 re-establish shrubs in sensitive areas under this alternative, decreasing impacts in the short term.

Retaining the seasonal road closure would provide short- and long-term benefits to important big sagebrush communities due to reduced vehicle use (including ORV use), particularly when the road would be impassable due to wet or muddy conditions.

A long-term loss of native vegetation due to weed invasions would be expected to increase with the higher rate of activity in the area, especially with unauthorized use of ORVs through previously undisturbed areas. Although weeds would increase due to surface disturbing activities, the impacts would be less than under the No Action Alternative as less area would be disturbed.

Recreation area support facility construction would remove vegetation. Concentrated recreational activities, especially around and near riparian areas, can damage vegetation through trampling, digging, cutting, or pulling. Off-road vehicle rallies, cross country races, and other such events would damage or totally remove vegetation from the event route.

The protective measures in place in the Green River RMP for special status plant species would have positive benefits to riparian areas. Any management to protect threatened and endangered or sensitive aquatic species (fish, frogs, etc.) would most likely result in improvements or enhancement of riparian areas.

Proposed mitigation measures such as directional drilling, combining facilities, and multiple-hole, single pad drilling on currently leased areas would reduce negative impacts to vegetation in some critical areas, where these measures would be applied. These measures would not be applied in all cases.

Surface disturbing activities such as those associated with roads, pipelines, well pads, coal and sodium exploration, locatable mineral exploration and development, and mineral material sales, would disturb about 2,500 acres in the long term. Reclamation practices would restore vegetation to all but about 600 acres in the long term. Although vegetative reestablishment would occur, some original plant communities would not be reestablished for more than 20 years. This particularly applies to shrubland communities and the big sagebrush/scurfpea communities and stabilized sand dunes. Impacts are not expected to be significant because few of these communities would be disturbed with management actions.

A transportation plan would be developed to design the best use of existing roads in the planning area. This planning would benefit sensitive vegetation resources, such as riparian areas, mountain shrubs, big sagebrush/scurfpea and cushion plant communities, by channelling access to certain areas, allowing other areas to remain undisturbed or to revegetate. This would benefit the vegetation resource. In addition, seasonal road closures and limitations on riparian area crossing would reduce impacts to vegetation.

Management activities implemented in woodland communities would benefit vegetation in these areas. Conversions of woodlands from one type to another would not be permitted. There would be no impacts to the plants requiring specific woodland habitat types.

Woodlands in the project area consist primarily of aspen and limber pine stands scattered throughout the Steamboat Mountain and Oregon Buttes area. These stands are not of commercial quality, and generally are in steep or rugged areas that are not conducive to surface disturbing activities. They provide important thermal and safety cover, and nesting habitat for wildlife. Woodland forest acreage would be maintained. Treatments may be implemented that influence successional stages, but such treatments would not permanently convert the areas to other vegetation types. Juniper stands may be replaced where they are encroaching into other vegetation types. Woodland conifer management would be limited to activities designed to control insects and disease in the Steamboat Mountain ACEC. Because woodland areas are limited, removal of aspen and limber pine stands would have a negative effect on woodlands.

Generally any management action that would preserve visual resources would also benefit vegetation. This alternative would provide a greater benefit than the No Action Alternative as more areas would be managed for Class II visual values.

Watershed analysis is a systematic procedure to characterize the aquatic, riparian, and terrestrial features within a watershed. Its purpose is to develop and document a scientifically-based understanding of the ecological structure, functions, processes, and interactions occurring within a water-

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shed. Watershed analysis would provide information about patterns and processes within a watershed and provide information for monitoring at that scale. Watershed analysis would provide benefits to native vegetation by maintaining, or restoring, healthy and diverse plant communities, through the establishment of Desired Plant Communities. Actions that would maintain or improve watershed conditions would generally benefit vegetation communities.

Watershed activities are aimed at the restoration and enhancement of watersheds, including riparian areas. These activities generally are a positive benefit to riparian areas. Negative impacts, if they occur, usually come as a result of inadequate design of dams or instream structures, or other watershed practices. No specific activities of this nature are planned, but site specific stipulations would be developed and applied if needed.

Proposed wild horse numbers would be managed at a level that would not adversely affect vegetation. However, continued concentration of wild horses and other large animals near water sources could damage vegetation in localized areas through trampling, trailing, and overgrazing.

Management actions described to protect wildlife habitat would generally benefit or not impact vegetation communities or potential habitat. Managing riparian enclosures for all wildlife species would benefit vegetation communities by maintaining native riparian plant communities, allowing natural processes of succession to thrive, providing habitat for a diversity of plant species.

Only positive long-term benefits are anticipated from wildlife management activities. Prescribed fire impacts to benefit watershed, vegetation, and habitat are described in the other sections. There are no specific fisheries activities planned. Stipulations to protect and enhance wildlife habitat including riparian areas and streams result in positive impacts (e.g., increased plant species diversity and age structure, increased density, better production, decreased erosion, runoff and sedimentation, more available habitat, better water quality, etc.) to the vegetation resource.

Actions and objectives for vegetation management in the ACECs would provide beneficial impacts to vegetation. Native vegetation would be maintained and protected on the BLM-administered public lands to allow natural plant succession to continue. Revegetation of disturbed areas with big sagebrush and other native shrubs would be required to maintain and or improve big game habitat. Grazing systems would be designed to achieve desired plant communities in all the ACECs.

Impacts to Riparian/Wetland Resources

Actions to maintain or enhance air quality and monitoring of air quality would in most cases positively benefit riparian/wetland resources in the long term.

The mitigation measures applied to protect cultural sites are expanded in most cases under this alternative. Many cultural sites occur near riparian areas. Where this occurs, the expanded mitigations would positively benefit riparian areas by restricting surface disturbance for a greater area around the

sites. Impacts from excavations of cultural sites as described in the No Action Alternative would apply for this alternative also.

Prescribed fire actions benefit watersheds in the long term by providing for plant diversity and health. Healthy watersheds benefit riparian areas and water quality. There are short-term negative impacts to water due to sedimentation, erosion, nutrient enrichment of the water (could be beneficial in some low productivity waters), shade removal, particulate emissions, etc. Short- and long-term benefits include nutrient recycling in soils, increased age and species diversity of plants, improved water quality (after 2 to 3 years), etc. No prescribed fires are currently planned but it is anticipated that they would occur during this plan.

Wildfire and resultant suppression activities generally have greater negative impacts to watersheds and streams. Usually areas burned in these cases are greater in extent, more "solid block" (less mosaic), hotter burning (causing much more vegetation to be eliminated), etc. This could cause greater erosion, sedimentation of streams, and a possible change from a desired plant community. The increase in full suppression areas for wildfires would provide additional benefits by decreasing acreage burned.

Actions to prevent accidents and spills of hazardous materials would positively benefit riparian areas. The fact that hazardous materials (i.e., oil and gas) would be developed in this area presents a threat of such accidents or spills occurring. Until such occurs there is no negative impact to riparian areas. Mitigation and cleanup of spills rarely are able to recover a riparian area to its original condition in a short period of time.

Implementation of the range standards (applied to all uses) and guidelines (for livestock grazing) as the minimum acceptable conditions for public rangelands would increase the health and diversity of the area vegetation. By ensuring that all activities conducted on the public lands within the planning area are designed to maintain and enhance native vegetation and promote properly functioning watersheds, negative impacts to riparian plants and their habitat would be minimized to an acceptable level. Monitoring and evaluation of rangeland uses and impacts is mandatory. Results of these evaluations would determine if the objectives of this plan are being met, and if not, then adaptive management actions would be required to improve the conditions of native riparian vegetation.

Lands actions such as rights-of-way for linear actions such as pipelines, roads, utilities and other surface disturbing actions such as well pads, water diversions, etc., can adversely affect watershed resources and riparian areas. This is because of the increased erosion and sedimentation from surface disturbance or the removal of water from public land streams. Adequate mitigation (barriers, culverts, re-vegetation, instream flows, etc.) would be implemented in order to keep the negative impacts short term.

Rights-of-way corridors or windows (concentration areas) and avoidance areas would be identified that would minimize the impacts to a larger area. This should serve to decrease erosion and other impacts to sensitive resources. However,

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the potential for more exceptions to right-of-way windows could allow for activity outside these windows.

Wetland and riparian habitats are not suitable for disposal unless opportunities exist for land exchange for lands of equal or better value (functional and dollar value). Functional value of these resources would be determined by the appropriate wildlife, fisheries, and watershed personnel. In an exchange, there should be no impact (positive or negative) unless it allows for better management of the resource. In this circumstance the impact would be positive.

Mineral withdrawals would serve to protect riparian/wetland and aquatic areas from degradation, destruction and sedimentation.

Water diversions have had negative impacts to riparian/wetland areas in the past, particularly on Pacific Creek. In some cases, streams have been completely dewatered for periods of time rendering the stream unusable and in some cases making the riparian area non-functional. There are no plans for new diversions in the future but should proposals be presented they would take into consideration the functionality of the stream and riparian area.

For wetlands and riparian areas, the minimum standard is Proper Functioning Condition (PFC). Stream (lotic) inventories began in 1995 and were completed in 1999. The ratings for lentic riparian areas (bogs, marshes, ponds, wetlands, and wet meadows) have not been completed. Twenty percent (16.5 miles out of 79.95 miles) of the stream (lotic) riparian areas in the Jack Morrow Hills planning area are in proper functioning condition. A significant portion (40 percent) is in upward trend and an equally significant portion (40 percent) is in downward or "not apparent" trend. These data were collected in 1995-6 when a adverse amount of non-use by livestock was occurring. Not all of the poor conditions in riparian areas are due to livestock grazing; however, livestock grazing, roads, and water diversions create the most significant impacts to the riparian areas in the planning area. It is known that season-long use by livestock concentrates use around riparian areas during the hot season, and that later fall use tends to be adverse to riparian plants.

Formulation of new management plans for grazing, including riparian objectives and desired plant communities (required under the Preferred Alternative of the Green River RMP for areas with riparian resources, page 11, ROD) could include such things as rest or deferred rotations, short duration grazing, reduction in active permitted use, forage use levels on herbaceous and woody species, off site watering, herding, fencing, salting a quarter mile or more from water, etc., may reverse the downward or static trends and achieve, at a minimum, proper functioning condition. The setting of "desired plant community" objectives (e.g., percent composition of particular species and age classes) for each allotment is crucial for the recovery and monitoring of riparian areas within the planning area. Many of these items would be addressed during the evaluation of the Standards for Rangeland Health and implementation of the Guidelines for Grazing Management (S&Gs).

Guidelines for appropriate turn out dates (boot stage on plants), an active permitted use level of an average of 17,941

AUMs (which is the 5-year average), riparian vegetation utilization not to exceed levels of 40 percent on shrubs, 35 percent "relative use" on herbaceous plants or an 8-inch stubble height, eliminating any season long grazing, conducting suitability reviews, taking aggressive appropriate actions for Standards and Guidelines that would bring riparian health to proper functioning condition, all would benefit riparian health and productivity. It is assumed that under the actions substantial progress toward riparian health and Desired Plant Communities would be achieved.

Under this alternative it is assumed that 70 deep oil and gas wells would be drilled in the Reasonable Foreseeable Development scenario (RFD). This would mean there would be up to 2,100 acres of surface disturbance. This amount of disturbance would only have a minimal impact if stringent mitigation measures were followed (as described in the RMP and the No Action Alternative). Some mitigation measures (such as directional drilling and limiting the number of well pads per section) may not be able to be applied if costs are unreasonable on existing leases. Restricting the types of mitigation to be applied could increase impacts. The acres of disturbance shown above assumes that each well would have a pad, road and pipeline. Transportation planning within the area would serve to limit or mitigate the impacts to streams and riparian areas as would directional drilling (decreases the number of pads) and other possible mitigation measures (NSO and CSU stipulations, etc.).

In addition, 15 coalbed methane wells would be drilled on existing leases. They would be clustered in the sand dunes area. These are shallow wells (900 to 1,000 feet deep). In the process of coalbed methane production, large volumes of water are pumped from the aquifer at that level. It is unknown at this time if the aquifer at this level is directly connected to the surface water in the dunal ponds and wet meadows. If it is, there may be an adverse effect of drying up the riparian zone locally. This would not only affect the riparian plants but all of the wildlife that depends on those plants, insects and surface water.

Hard rock mining (locatables) could pose significant threats to aquatic resources, especially when involving dredging or placer mining. The highest potential for this type of activity is in the Oregon Gulch area. Though there is no commercial activity anticipated at this time there is active prospecting in the area with the potential to create accelerated erosion. The areas that are proposed for withdrawal would not be subject to impacts from this activity.

Demand for other types of mineral development (salables) such as gravel pits, etc., would increase with gas development but these areas would be located away from riparian areas and streams and should have negligible impact to these resources. No coal or sodium extraction is expected; thus, no impacts are anticipated

Geophysical activities currently have sufficient protective stipulations in the Green River RMP to eliminate impacts to riparian areas and streams (fisheries).

No impacts are expected from off-road vehicles under current management. ORVs do cause significant localized damage to wetlands and riparian areas when operated outside

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of management prescriptions (i.e., existing roads and trails, designated roads and trails, and closed areas). Industry personnel predict a four-fold increase in “4-wheeler” sales in the next 5 years and additional negative impacts may occur if that holds true.

Outdoor recreation centered around water bodies can affect bank stability along lakes and streams. Lack of channel stability can affect the stability of the riparian zone on which most camping and other activities occur. Compaction and or loss of the riparian area greatly reduces streambank stability which in turn increases sediment, salt, and phosphate loads. Use of the 200-foot buffer strip between perennial water and camping may eliminate some of the impacts. Sewage near streams from recreational activities can also pose a threat to aquatic resources but under current management this should not occur. Enforcement of the 200-foot buffer is key for no impacts to occur.

The protective measures in place in the Green River RMP for special status plant species would have positive benefits to riparian areas. Any management to protect threatened and endangered or sensitive aquatic species (fish, frogs, etc.) would most likely be an improvement or enhancement of riparian areas.

Impacts of prescribed fire on vegetation are described in Fire Management in this section. Other types of vegetation manipulation (chemical and mechanical) would have similar impacts as fire management. Generally, riparian areas are buffered by 100 feet or so to help offset the short-term increase in erosion. Long-term benefits are expected if management and mitigation stipulations are followed as prescribed in the Green River RMP.

Since the minimum acceptable condition for riparian areas is Proper Functioning Condition (PFC), and most of this planning area is not in this condition, increased attention to this could only benefit riparian areas.

Weed management activities could have positive or negative effects. Positive effects would occur by decreasing competition with riparian plants as long as key riparian plants are not accidentally targeted. Biological or mechanical methods of weed control usually have no long-term adverse effect. Adequate protections and stipulations are present in the Green River RMP.

Watershed activities are aimed at restoration and enhancement of watersheds, including riparian areas. These activities generally are a positive benefit to riparian areas. Negative impacts, if they occur, usually come as a result of inadequate design of dams or instream structures, or other watershed practice. No specific activities of this nature are planned, but site specific stipulations would be developed and applied if needed.

As stated in other sections, the 500-foot buffer from the edge of riparian areas, wetlands, and 100-year floodplains applies to surface disturbing activities unless specifically designed and mitigated to benefit these areas. All other management stipulations as developed in the Green River

RMP apply. This should result in positive impacts to riparian areas.

Proposed wild horse numbers would be managed at a level that would not adversely affect vegetation. However, continued concentration of wild horses and other large animals near water sources could damage vegetation in localized areas through trampling, trailing, and overgrazing.

Only positive long-term benefits are anticipated from wildlife habitat management activities. Prescribed fire impacts to benefit watershed, vegetation, and habitat are described in the other sections. There are no specific fisheries activities planned in the planning area. Stipulations to protect and enhance wildlife habitat include riparian areas and streams should result in positive impacts (e.g., increased plant species diversity and age structure, increased density, better production, decreased erosion, runoff and sedimentation, more available habitat, better water quality, etc.) to the vegetation resource.

All other management stipulations as developed in the Green River RMP apply. This should result in positive impacts for riparian areas and fisheries.

Core Area

Fewer surface disturbing activities in the Core Area would reduce both short- and long-term impacts to vegetation. Protective measures designed for vegetation in the ACECs would have short- and long-term benefits to native plant communities. Establishment of maximum road densities would decrease the loss of critical vegetation types to surface disturbing activities. Livestock grazing on stabilized dunes would be detrimental to native plant species, and would likely cause areas of destabilization, loss of native plants and acceleration of weed invasions. Implementation of use levels and assessment of standards and implementation of guidelines would reduce this effect. Quick recovery of riparian/wetland areas from degraded states would be expected.

The relatively pristine portion of the eastern area of the Greater Sand Dunes ACEC that has no development, including the base of Steamboat Rim, would be managed to protect big game habitat and vegetation communities. In the Steamboat ACEC, vegetation management would be designed to maintain, preserve or enhance biological diversity while providing big game forage and cover requirements. Reseeding and reforestation within the ACEC would be done with native species. Shrub species may be included in all seed mixes. The vegetation and habitat objectives described for the Steamboat ACEC would apply. These objectives include, but are not limited to: maintaining the unique diverse habitats (big sagebrush, aspen, limber pine, and mountain shrub communities) in the Steamboat Mountain area, especially on stabilized sand dunes along Steamboat Rim, Indian Gap, and in the Johnson, Lafonte, and Box Canyon areas. There would, however, be a long-term loss of some vegetation due to surface disturbing activities. Even with reclamation, some shrub species, in particular the big sagebrush/lemon scurfpea, could take more than 20 years to re-establish.

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Cumulative Impacts

Management actions implemented to control dust along dirt roads would permit vegetation to be more productive and vigorous. Selective requirements imposed on prescribed burns to avoid violation of ambient air quality standards could increase burn costs and alter prescribed burn plans. Industrial plant stack emissions could alter plant communities in the immediate vicinity and downwind from the emission source. Full suppression of wildfire in the big sagebrush/lemon scurfpea plant communities would provide for protection for this unique vegetation association. The increase in full suppression areas for wildfires would provide additional benefits by decreasing acreage burned.

Assessment of standards and implementation of guidelines for all uses would increase the health and diversity of the planning area vegetation. By ensuring that all activities conducted on the public lands within the planning area are designed to maintain and enhance native vegetation and promote properly functioning watersheds, negative impacts to plants and their habitat would be minimized to an acceptable level. Monitoring results would determine if the objectives of this plan are being met, and if not, then adaptive management actions would be required to improve the conditions of native vegetation.

Management actions implemented would benefit vegetation communities and habitat, especially the unique big sagebrush/lemon scurfpea association and other sensitive species. Desired plant community (DPC) objectives would be established to enhance wildlife habitat, watershed, and biodiversity values. Vegetation treatments would be designed to protect water and stream quality, dissipate erosion, and maintain or enhance mountain shrub and woodland communities to achieve a healthy and productive condition for long-term benefits and values in concert with range condition, watershed, and wildlife needs. Chemicals used to remove sagebrush and noxious weeds could impact nontarget vegetation on localized areas.

Transportation planning would benefit sensitive vegetation resources, such as riparian areas, mountain shrubs, big sagebrush/scurfpea and cushion plant communities, by channeling access to certain areas, allowing other areas to remain undisturbed, or to revegetate. Seasonal road closures and limitations on riparian area crossing would reduce impacts to vegetation. Habitat degradation and deterioration of healthy native plant communities that promotes noxious weed invasions would be kept to a minimum.

Closing areas to mineral entry and to surface disturbance would benefit vegetation communities

(Table 2-4 and Table 4-4). An estimated 1,900 acres would be reclaimed. After reclamation, roughly 600 acres would be disturbed for the long term, slightly greater than the No Action Alternative but less than Alternative A. There is a potential for more exceptions to the placement of rights-of-way outside of rights-of-way windows, allowing for more surface disturbance in currently undisturbed areas. The amount of disturbance would only have a minimal impact if stringent mitigation measures were followed. Conducting a resource evalu-

ation to acquire additional information on resource activities would benefit vegetation communities.

Livestock grazing systems would be designed to achieve desired plant communities. These actions would probably have a long-term positive impact on uplands and riparian areas. The vegetation types that would be most affected by livestock grazing would include the saltbush, low density sagebrush, high density sagebrush, aspen, riparian, and greasewood classifications. Management to achieve proper functioning condition on all riparian areas would benefit vegetation and lead to healthier and more diverse riparian plant communities. Trampling and use of dune ponds and adjacent riparian habitat would be reduced. Season of use changes or use in areas previously unused could result in reductions in existing forage bases used by wildlife. In addition, use in stabilized dune areas could cause blowouts and destabilization of the dunes by removing vegetation needed to hold down the sand. 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 with better distribution of livestock. In wetlands, fencing would control livestock use and improve habitat and watershed condition. More diverse vegetation would be produced and soil erosion would be reduced. Delaying grazing livestock turnout until native range grasses are in the boot stage of phenological development would promote healthy, vigorous stands which could repel weed invasions, and are more capable of withstanding drought.

The impacts under this alternative may not provide as quick of a recovery for degraded riparian areas as in Alternative B, though progress would still occur.

Visual Resource Management Impacts

There are potential visual impacts on Essex Mountain and Pacific Butte by allowing communication sites. However, this should only be a slight impact if the applied mitigation measures are followed.

Under this alternative, the Red Desert Watershed area would remain a VRM Class III. VRM Class III stipulations should protect the open space vistas of this area.

The initiation of a program to improve the visual quality of the oil fields would benefit the visual resources in those areas and, in many cases, would benefit other resources such as soil, watershed, and vegetation. The avoidance of identified areas which are not suitable for linear rights-of-way would protect the sensitive visual resources in these areas.

Protecting National Historic Trails and other trails by not allowing visual disturbance, by applying surface constraints to important cultural sites, and limiting geophysical vehicles to designated roads and trails in the South Pass Historic Landscape would enhance visual values and protect the visual sensitivity of these resources and areas.

Not allowing surface mining activities and surface occupancy areas around the Boars Tusk and the Steamboat Mountain-Killpecker Dune Fields, including the wild horse viewing area, would retain and enhance visual resources found in the area.

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As more oil and gas development occurs, more effects to the visual quality of the Greater Sand Dunes ACEC would occur.

Cumulative Impacts

Same as described for the general impact discussion.

Watershed/Water Quality Impacts

The actions taken to protect air quality would also help watershed resources. Air pollution generated from within the planning area would most likely have limited impacts on watershed values and water quality as a result of direct air/water contact.

Cultural activities have limited direct effects on water quality. Effects can occur when avoidance of cultural sites directs activities to other areas and may affect watershed resources and water quality. This could have a positive or detrimental effect depending on the location of the diverted activity. Cultural resource data recovery excavations, although of limited spatial extent, can have negative impacts to soil and watershed stability if not properly conducted. The larger areas of protection around cultural sites would make a difference in the amount and location of disturbances in the immediate area but it is unknown how this would change the activity outside the areas of concern.

Fire can have both positive and negative effects on watershed resources and water quality. Fire suppression activities could cause soil erosion as a result of fire line construction, vehicle and/or equipment traffic. Prescribed/controlled burns generally affect soil stability less than wildfire suppression efforts. In the short term, fire increases the potential for erosion. Over the long term, properly managed burns can create and maintain conditions that promote thicker growth of vegetation, reducing erosion. Under this alternative fire would be suppressed in the big sagebrush/scurfpea areas, slightly increasing the potential for suppression efforts to cause soil erosion.

Hazardous materials within the planning area are generally confined to areas such as drilling sites and within the transportation systems (roads and pipelines). Hazardous materials may also be contained in motorized equipment and unauthorized dump sites but would generally be of smaller volumes in these locations.

Soil contamination from drilling fluids and accompanying chemicals for production drilling threaten area soils. Unlined reserve pits offer no protection from contamination to surrounding soils; therefore, unlined reserve pits should be avoided in any area where there is a potential for groundwater contamination.

Application of standards (for health rangelands) and implementation of guidelines (for livestock grazing) would reduce the effects to watersheds and water quality from surface disturbing activities, recreation uses, and livestock grazing. The differences between the alternatives can be expressed in the level of conflict that could occur between the actions that would take place under each alternative and the goals set forth by Standards and Guidelines.

The actions proposed under the Preferred Alternative would aid in meeting standards and guidelines. Site specific progress to achieve water quality and vegetation goals would be more rapid under Alternative B than the other proposed alternatives; however, the Preferred Alternative provides more flexibility in applying various management options to aid in reaching standards and guidelines.

Realty actions such as rights-of-ways for linear disturbances such as pipelines and roads can adversely affect soils especially in areas of vegetated sand dunes which could be impacted by wind erosion when the vegetation is removed. Uncontrolled runoff from roads can create gulying in adjacent drainages. Successful reclamation and maintenance of linear disturbances limits the impact of these actions. The location of communication sites and transportation corridors would be limited in the Preferred Alternative (similar to Alternative B); however, exceptions might be granted if just cause could be shown. The overall disturbance would most likely be closer to Alternative B than Alternative A.

As most of the disturbances associated with communication sites would be away from riparian areas and streams, the effects of the creation and maintenance of communication sites would be less than an equivalent disturbance located closer to water courses. The disturbance created by the creation and maintenance of communication sites has the potential to affect watershed values and water quality, as does any disturbance. Of primary concern is the potential for increased traffic during periods of inclement weather along portions of travel routes to and from the sites, where conditions can create an increased potential for erosion close to water bodies. Also of concern is the increased potential for erosion from the steeper portion of the access roads. While such sections of road would most likely have a larger average particle size and thus be more resistant to erosion than areas with finer average soil particle sizes, the concentration of the flow of water associated with the creation and maintenance of the road would increase the potential for flow concentration and sediment production.

Livestock grazing has a major influence on land and stream conditions and thus erosion and water quality. Implementation of existing programs (primarily standards for healthy rangelands and guidelines for livestock grazing management), as well as the management actions in this alternative would aid in improving watershed condition.

Livestock grazing, roads, and water diversions can alter conditions in riparian areas. For riparian impacts, see Vegetation Impacts.

Impacts to soils from grazing can be caused by overutilization of riparian and upland areas leading to soil compaction and vegetative removal. This can lead to loss of the soil surface, rill, and gully formation which could impact water quality through more rapid runoff and higher sediment loads. Livestock could contribute to the degradation of areas that might cause further concern depending on their location. Areas in very erodible soil structure could have the possibility of washing, blowing, or being removed from further beneficial purposes.

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Activities that decrease plant vigor can increase erosion and decrease water quality. Depending on the actions taken, specific areas may show some changes, positive or adverse, but the overall trend would be closely related to the level of surface disturbing activities.

Overall progress to achieve water quality and vegetation goals would be less rapid under the Preferred Alternative than under Alternative B, but would still be desirable. Site specific progress might be more rapid than Alternative B because the greater range of management options which would help customize individual grazing programs.

Development activities such as roads and well pads affect overland flow and groundwater infiltration. Roads and well pads interrupt natural surface flow patterns and reduce groundwater infiltration by compacting the soil. This can increase the erosive potential of runoff events by creating a shorter period of runoff and an increased volume. Drainage ditches, culverts, and surfacing can channelize surface flows and direct them away from the road surface. While this helps protect the road surface, it can also increase erosive potential along the path of concentrated flow. Proper design, construction, and maintenance reduce the erosive potential for road and well pad areas but do not fully compensate for the concentration of flows.

Impacts to surface water quality from oil and gas development are generally the result of unsuccessful reclamation and/or increased runoff from pads and roads, destabilizing drainages. With effective monitoring, most individual well sites and mines should have only a short-term impact on watershed stability.

Other concerns which could arise include: sedimentation, soil contamination, salt and phosphate loading, groundwater contamination, bank and channel instability, loss of aquifers, augmented flows, and water disposal.

A greater amount of area would be available for development under the Preferred Alternative than under the No Action Alternative. This could result in a greater number of wells being drilled; however, management prescriptions such as transportation and reclamation planning would help to offset this level of disturbance. The proposed evaluation period and creation of an unleased corridor could reduce activity in some of the steeper regions of the area which would help reduce erosion.

In addition to the roads and other surface disturbances that would be required for coalbed methane production there is the additional concern of water disposal. Any discharge into a surface channel that is unaccustomed to having similar flows creates the potential for increased erosion.

If the water obtained from coalbed methane production is of a high quality and discharged, there may be some controversy at the end of the project when the water is no longer available for use as livestock or wildlife water. If the produced water contains high levels of salts there is a potential for creating conditions similar to those surrounding the evaporation ponds associated with trona production. Reinjection of the water may solve some of these problems but care should

be taken to avoid creating new ones. It is assumed that the primary means of water disposal would be through reinjection.

The level of disturbance that can be associated with coalbed methane production would largely be determined by the area of development. Current technology requires relatively close well spacing and a road network for maintenance. Even with total reinjection of the produced water this road and well network would increase the potential of erosion in the area of development. Because the level of development would be approximately the same per unit area within a production zone, an estimate of the potential level of disturbance and subsequent erosion and threat to water quality can be related to the areas that would be made available for leasing under each alternative.

It is unknown whether there is a connection between the surface waters and the waters that would be removed to stimulate gas production. Investigations to determine if there is a connection and application of appropriate mitigation to protect water quality and quantity would be needed prior to production.

The region with the greatest coalbed methane production has a surface of stabilized sand dunes, a condition that makes the area vulnerable to disturbance of the vegetation cover. Given the road and well density that would be required, this is a concern. Proper land management would reduce the level of disturbance but not eliminate it. Maintenance of the vegetative community and the transportation network would be a primary concern on any development in the area.

The road network would create additional recreation access into the area of stabilized sand dunes. Given the sensitive nature of the soils in the area, this is a concern. A transportation and recreation management plan should be part of any development.

The potential level of disturbance associated with coalbed methane in the Preferred Alternative lies somewhere between the No Action Alternative and Alternative B. Given the erosive nature of the surface, the potential levels of erosion within the stabilized sand dunes area is dependent on the level of development. The overall erosion potential from proposed management actions in the Preferred Alternative would be closest to Alternative B. However, concentrated development in localized areas would have the same affect under all alternatives.

The mineral material resource with the greatest potential for development in the area is sand and gravel. As most of the potential sites within the planning area are located away from streams and wetlands, the primary effect of their development on water and vegetation quality would come from increased activity on the roads. There could be some additional runoff from the mine areas but the effect that they would have on downstream water quality would be difficult to determine. Surfacing of roads with hard surfaces or gravel has the potential to reduce watershed impacts.

The closing of big game calving, big sagebrush, and other sensitive areas to development as well as conformance with

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the transportation plan would reduce the potential for erosion but does not eliminate it.

Coal exploration can be related to surface water quality through the amount of surface disturbed. Coal exploration activities would disturb about 15 acres over 20 years, and with the application of mitigation measures, causing minimal impacts. About 227,600 acres would be closed to coal exploration activity. Activities would avoid areas with sensitive resources unless a plan could be developed to mitigate adverse impacts.

Sodium development could occur on about 2.5 acres of the planning area. About 227,600 acres would be closed to sodium prospecting. Because there are no planned sodium processing facilities within the planning area there will be no direct affect. Potential sodium processing facilities adjacent to the planning area could have secondary affects but the size and extent of such affects is unknown.

Monitoring has no direct effect on water quality but would help in the early detection of potential watershed concerns and subsequent correction of problems. The level of monitoring would be approximately the same under all alternatives and may increase or decrease depending on the perceived needs of a project or area. The more rapid and complete the reclamation of a disturbed site the lower the potential erosion and potential water quality degradation. Monitoring is essential in the reclamation of disturbed sites. Without efficient reclamation techniques and timely monitoring by the BLM and industry, long-term landscape disruption such as linear scars, sand deflation and deposition, surface erosion, and drainage degradation could result.

Off-road vehicle use impacts soil stability as a result of compaction of travel surfaces, disruption of vegetative cover, and disruption of the soil surface. Recreation within the planning area consists primarily of activities that require motorized vehicles. Thus, it is closely tied to transportation and reclamation, as well as any activities that create new roads of any sort. Because of the nature of much of the planning area new roads are easily created and road closures rely primarily on the public's willingness to comply. The maintaining of existing seasonal closures and the establishment of seasonal closures for new roads would help mitigate the disturbance caused by road use during wet and muddy periods.

While difficult to quantify, the economic benefits of watershed and water quality improvements are far reaching. Clean water is the basis for many agricultural, recreational, and industrial activities. Healthy watersheds help capture, filter, and regulate water flow. This is of particular importance in high desert environments where precipitation is seasonal and later season water flow is vital for many social and economic activities. Agriculture is based upon the nutrients stored within the topsoil. If this soil is eroded, the nutrients are no longer available for production and the downstream users have the added expenses of increased sediment, as well as salt and nutrient loading.

The actions taken for special status species would be the same under all alternatives. The effect that such actions would have upon water and vegetation would depend upon the

species and locations of the habitat. Actions taken for the benefit of aquatic or riparian species would have a more noticeable positive effect on water quality than those for upland species.

Surface disturbance is closely tied to water quality. The greater the disturbance in time and area and the closer to places where the flow of water is concentrated, the greater the potential for erosion. Because the amount of development and actual location is unknown, the exact amount of disturbance is difficult to forecast.

A greater amount of area is available for development under the Preferred Alternative than under the No Action Alternative. This could result in a greater amount of surface disturbance, but the development plan, as well as the associated transportation and reclamation plans, would help to offset this level of disturbance. The higher levels of activity would produce greater levels of disturbance but the proposed mitigation would most likely help to moderate the effects and allow the natural process of healing to occur. The proposed evaluation period and creation of an unleased corridor could reduce activity in some of the steeper regions of the planning area which would help reduce erosion. About 2,450 acres would be disturbed over the long term from various activities. Most of this disturbance would be reclaimed with a net long-term disturbance of about 600 acres.

Disturbance from road activity would be similar to that which would occur under Alternative B. Maintaining the existing seasonal closure and the consideration of seasonal closures for new roads would help mitigate the disturbance caused by roads and their use during periods when soil moisture and runoff may be high. This would reduce adverse effects to soils from rutting and damage to roads from vehicle use.

Implementing transportation planning and establishing road densities in crucial habitats would benefit water resources. Roads are one of the primary sources of erosion in the planning area. They tend to concentrate the overland flow and reduce infiltration. They can often be thought of as a set of superimposed ephemeral stream channels. As roads become more numerous, their effects become cumulative and may even work in combination to create greater levels of erosion. Road maintenance is also important. Timely maintenance of road surfaces can reduce erosion. Maintaining as much of the right-of-way in an undisturbed or revegetated state as possible would reduce both maintenance cost and erosion. Surfacing of major arterial roads with appropriate materials would also help limit the potential for soil erosion and reduced water quality. The greater detail that would be given to road design and dissipation of runoff would assist in the reduction of erosive forces and help reduce nonpoint pollution.

Planning the roads in terms of number, location, and season of use should have a marked effect on reducing the level of disturbance. Individual projects may be expanded beyond the immediate need but the overall disturbance would be less. Planning other linear facilities, pipelines, power lines, cables, etc., in conjunction with roads would help localize disturbance and reduce the use of linear rights-of-way as access

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routes. Travel on rights-of-way, not designed for such use, can increase erosion by creating additional disturbance. When this occurs, vegetation, and soil stability are reduced and the potential for water quality degradation increases. The level of disturbance would be slightly greater in this alternative than in Alternative B, but less than for Alternatives A and No Action.

Impacts from sedimentation or direct physical alteration of stream channels would not be considered significant if BLM's Mitigation Guidelines (see Appendix 2), relevant storm water BMPs, and appropriate mitigation measures are applied. If significant impacts to area waters from sedimentation are to be avoided, attention to control of non-point sources of sediment would be necessary.

There is a potential impact (increased sedimentation) to water quality from discharge of hydrostatic test water during pipeline testing. This is not expected to produce significant impacts because it is short term in nature and the operators would be required to comply with WDEQ/WQD regulations. There could be water quality impacts from accidental spills. Depending on where such a spill occurred, the impacts could be significant.

As a general rule, the greater the vegetation cover, the less erosion and the better the water quality. A more diverse community is generally healthier. Implementation of standards (for healthy rangeland) and guidelines (for livestock grazing) would have an effect upon the vegetative communities. The differences between alternatives may not vary dramatically.

Vegetation removal can adversely impact stream hydraulics. Vegetation removal can cause an augmented flow regime which forces the stream channel to readjust its width and depth to accommodate larger flows where vegetative conditions are impaired. Sedimentation would increase, due to a lack of filtering ability of the vegetation.

Vegetation manipulation to enhance wildlife habitat such as controlled burns, mowing, and chemical applications could cause short-term impacts to physical and chemical characteristics of soils, increasing erosion susceptibility through the loss of both ground cover and litter accumulation. Over the long term, areas of treated vegetation should increase over pretreatment production levels which would decrease the erosion hazard.

Wildlife habitat management has some effect on land, water, and vegetation quality. Sufficient wildlife habitat creates a more varied environment that is better able to slow and filter overland flow, reduce erosive forces, and recover from disturbances. Because wildlife require a wide range of vegetation, managing for wildlife habitat would produce more diverse communities and a greater chance to reduce erosion and improve water quality than either the No Action Alternative or Alternative A. Although the level of activity under the Preferred Alternative is slightly greater than Alternative B, the amount of protection should be sufficient to provide a good diversity of habitats and their associated resistance to erosion.

Preventing fragmentation of habitat would provide for undisturbed vegetation communities covering fairly large

areas. This would continue the natural buffering capability of the vegetation communities and result in less runoff, erosion, and sedimentation.

Some long-term impacts may occur to soils, slopes, and visual values on public lands due to activities on adjacent private lands and vice versa. Silt production and sedimentation could occur; however, this would be minor. Measures to control erosion, such as restricting surface disturbance on slopes greater than 20 percent and on erosive soils and travel management prescriptions, should lessen these impacts and should benefit watershed and vegetation resources.

The wild horse appropriate management levels are within the what the land can support, so the management of wild horses should have a limited effect if any on water quality or erosion. However, increased population size can adversely affect watershed resources in a similar fashion as described for livestock grazing.

Groundwater

The types of disturbances having potential to impact groundwater include oil and gas and coalbed methane drilling, completion, and plugging operations and the plugging of water wells. Current BLM (43 CFR 3160 - Onshore Oil and Gas Operations) and State of Wyoming (Department of Environmental Quality's Water Quality Rules and Regulations) guidelines provide for the protection of groundwater resources. With adherence to these rules and regulations, it is unlikely that groundwater quality would be impacted. The volume of some groundwater aquifers and possibly some surface waters would be impacted during production of coalbed methane. The possibility exists for groundwater contamination from spills, and leachate from evaporation ponds and/or produced fluid pits. Oil-based drilling mud can contain benzene or other hazardous chemicals. To prevent endangering human health and/or further environmental damage, spills and/or leachate would be cleaned up by the responsible party (43 CFR 3160).

Coalbed methane development involves dewatering the coalbed containing the methane to stimulate gas production. Dewatering of the aquifer would be a direct impact, that would last until methane production ceased and the aquifer is recharged. Water wells and surface waters connected to the impacted aquifer could be impacted by the drawdown of the water table. It is unknown whether there is a connection between surface waters and the shallow groundwater aquifers that would be dewatered to stimulate gas production. A hydrological investigation would be conducted by the proponent to determine if there is a connection prior to development. Appropriate mitigation would be applied to protect water quality and quantity.

Due to increased restrictions on development, the Preferred Alternative would have less potential to impact groundwater than Alternatives A and No Action. However, this alternative would allow more development than Alternative B, and would therefore have a higher potential for impacting groundwater.

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Core Area

New oil and gas leases would not be issued within the Greater Sand Dunes ACEC, however, existing leases could be developed. Portions of the remaining core area, including the connectivity area, would be open to issuance of new oil and gas leases. Existing leases within these areas could be developed as well. The type of impacts described for the general area would be similar within the areas open for development.

Coalbed methane development within the core, especially on existing leases within the Greater Sand Dunes ACEC, would impact certain groundwater aquifers. Dewatering of the aquifer would be a direct impact, that would last until methane production ceased and the aquifer is recharged. Water wells and surface waters connected to the impacted aquifer could be impacted by the drawdown of the water table. It is unknown whether there is a connection between surface waters and the shallow groundwater aquifers that would be dewatered to stimulate gas production. A hydrological investigation would be conducted by the proponent to determine if there is a connection prior to development. Appropriate mitigation would be applied to protect water quality and quantity.

The Preferred Alternative would have a greater potential for impacting groundwater within the core and connectivity areas than in Alternatives B and the No Action, because the amount of development allowed in this alternative is greater. However, the Preferred Alternative would have less potential for impacting groundwater than in Alternative A.

Cumulative Impacts

Based on the information in Appendix 10, the watersheds listed in Table 4-18 appear to have a greater potential for cumulative impacts than other streams examined. They are listed in no particular order.

Livestock grazing related erosion would most likely be influenced by both the management actions in this alternative and livestock grazing use and other activities that influence the distribution and timing of livestock use. The grazing practices under this alternative would provide an opportunity for vegetative recovery and expansion. This could result in a reduced potential for erosion. Stream banks and riparian areas would most likely continue to be the focus of erosion reduction related activities. The greatest potential for erosion would occur along streams that had not achieved the minimally acceptable standard of proper functioning condition.

The potential level of cumulative disturbance to watershed values is directly related to the amount, timing, and location of surface disturbance. The primary causes of surface disturbance within the planning area are mineral development and livestock grazing improvements. Under the Preferred Alternative, the overall level of disturbance would be moderate overall, but there could still be areas of concentrated activity causing elevated levels of erosion that would need to be addressed.

The potential level of total surface disturbance is greater for the Preferred Alternative than the No Action Alternative.

However the incremental opening of sensitive areas and the time allowed for recovery from disturbance would reduce the potential erosion by allowing time for surface disturbances to heal.

The cumulative impact on groundwater resources over the planning period for oil and gas development is likely to be minimal and insignificant given the projected yearly drilling rate of 3 to 4 wells per year. Due to the lack of information, the cumulative impact on groundwater aquifers due to coalbed methane development cannot be determined. Investigation of aquifers and their possible connection to surface waters prior to development would provide the information necessary for determining cumulative impacts and any necessary mitigation.

Wild Horse Impacts

Actions to maintain or enhance air quality and monitoring of air quality would in most cases have no impact on wild horses or their management. Some minor positive benefits to wild horses may result from improved air quality.

The types of impacts from cultural resource management under this alternative are similar to those for the No Action Alternative; however the magnitude of the impacts could be greater. As the intensity level of cultural resource management increases so does the likelihood that more sites would be protected by fencing. Fencing would exclude wild horses from habitat located within the fenced area. Such fencing would have to be designed so as not to limit the free-roaming nature of the wild horses. The total area that could potentially be fenced is so small as to provide no net or cumulative impacts to wild horses, their habitat, or management.

Prescribed fire, either natural or human-caused, has the potential to improve the forage production capacity of sagebrush dominated communities throughout occupied wild horse habitat in the planning area. The major short- to mid-term impact of fire in wild horse habitats is the conversion of shrub dominated sites to grass dominated sites. Horses generally prefer grasses and most fire in the planning area would be beneficial to wild horses. The frequency of natural fire in this area is very low and therefore the potential for lightning-caused ignitions that meet resource objectives is also very low.

Planned ignitions have the potential to improve some of the planning area for wild horses. Limitations due to rare plant communities, unstable soils, low fuel-loading, greater incidence of non-burnable sites in the portion of the planning area included within the Great Divide Basin Wild Horse Herd Management Area, and considerations of potential impacts to other animal and plant species would probably render any impact due to fire management on wild horses negligible.

The use of materials designated as or considered to be hazardous in the exploration and development of oil and gas poses a threat to wild horses should they come in direct contact with them or consume contaminated forage or water. The severity of the impact and whether it would be isolated to one or two animals or some larger number is largely dependent upon the specific toxins(s) involved. Although the risk that

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wild horses may be impacted by hazardous materials exists, planned actions under this alternative eliminate this potential.

The development of a transportation plan, location of linear facilities adjacent to existing areas of disturbance (roads), less anticipated oil and gas activity requiring linear facilities, and the opportunity to plan for utility corridors that avoid critical areas, mitigate any impacts to wild horses from land and realty actions.

Impacts from livestock grazing under this alternative are similar to those for Alternative B except that the level of beneficial impact for wild horses and their habitat is lessened. Assessment of grazing allotments for conformance with Standards for Healthy Rangelands and implementation of appropriate actions to address non-conformance would be beneficial to wild horses and their habitat. Continuing current seasons of use, allowing for sheep to cattle conversion, increasing use limits, and reducing stubble height targets from those prescribed under Alternative B render the Preferred Alternative less beneficial to wild horses than Alternative B.

Additional water development inside the Great Divide Basin Wild Horse Herd Management Area would benefit wild horses as long as greater forage use by domestic livestock does not occur. Additional water developments outside the wild horse herd management area may serve as an 'attractive nuisance' drawing horses to areas outside the wild horse herd management area exacerbating wild horse management challenges.

Removal of areas unsuitable for livestock grazing from the forage base for domestic livestock would benefit wild horses and their habitat. Other beneficial actions under this alternative include the establishment of use limits of 50 percent on key upland and riparian forage species, establishing PFC as minimum acceptable level for stream function, and the inclusion of riparian desired plant communities in grazing management plans.

The minimal amount of surface disturbance expected to result from predicted oil and gas activity would cause negligible impact to wild horse habitat. Some temporary or permanent displacement from areas experiencing increased human activity due to mineral development would occur. Most of the wild horse herd management area is located in areas of low potential for hydrocarbon development and wild horses tend to adapt to human presence over time; however, exactly where development would occur could have a major influence on the level of impact on wild horses. If activity is located outside the wild horse herd management area and away from critical habitats, there would be negligible impact to wild horses. Should activity be increased inside the wild horse herd management area and be located on critical habitats, impacts to wild horses due to oil and gas development could occur.

Determination of new leasing on a case-by case basis considering the needs of wild horses and their habitat would produce benefits to wild horses over Alternative A and the No Action Alternative. Closing certain areas to new leasing and development activity would provide a beneficial effect to wild horses. However, much of the unleased acreage falls outside the wild horse herd management area.

Large-scale mining of locatable minerals would have the potential to negatively affect wild horses. Mines by their nature are very single use developments that are long term in nature. Once a pit is opened the area of the pit no longer provides habitat for wild horses. Dredging or placer mining causes negative impacts on streams which could pose serious threats to the long-term viability of wild horse habitat in the wild horse herd management area. Salable mineral activity is not expected to have any impact on wild horses. Proposed mineral withdrawals (locatable) would prevent negative impacts to wild horses or their habitat on the withdrawn areas.

Retaining the seasonal Steamboat Mountain closure is beneficial to wild horses. Off-road vehicles have the potential to seriously impact soil and vegetation in localized areas, and are loud and very disturbing to all wildlife including wild horses.

The greatest potential for impact to wild horses and their habitat is not from planned actions or legal ORV activity, but rather illegal use of all terrain vehicles and other four wheel drive vehicles. Any impacts to wild horses due to recreation management would be minor and consist of temporary displacement near the back country byway while it is being used. Viewing of wild horses in the free-roaming state is a recreational activity encouraged by BLM management of wild horses. Interpretive site development would aid in the public's use of wild horse viewing as a recreational activity.

Many of the planned actions to mitigate or limit impacts to surface resources from surface disturbing activities have been discussed above. Under all alternatives, controls on surface disturbance benefit wild horses and their habitat. The alternatives vary only in the degree of benefit. Alternative B and the Preferred Alternative are more beneficial than are the No Action Alternative or Alternative A.

Establishment of a 1/2-mile buffer around the proposed wild horse viewing area would protect the public's ability to enjoy their wild and free-roaming horses in a natural setting. It would also increase the likelihood that wild horses would be in the vicinity of the viewing area more often. Current reclamation standards are adequate to mitigate any potential impacts to wild horses from reclamation activities.

Management actions that improve wildlife habitat, particularly for elk, reduce soil erosion improve watershed health and promote biodiversity would benefit wild horse habitat quality.

Management actions to stabilize and conserve soils, increase vegetative production, maintain or improve surface and ground water quality, and to maintain or improve wetlands, floodplains, and riparian areas would benefit wild horses and their habitat. Under all alternatives, improvement of the soil, vegetation, and water resources benefit wild horses and their habitat. The alternatives vary only in the degree of benefit. Alternative B and the Preferred Alternative are more beneficial than are the No Action Alternative or Alternative A.

Planned actions in the wild horse program are presently in place and would produce no net impact to the managed wild horse population or their habitat within that portion of the planning area within the Great Divide Basin Wild Horse Herd

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Management Area. Maintaining the existing boundary would produce no additional impacts to wild horses. However, those horses that presently reside outside the wild horse herd management area are considered excess and are therefore to be totally removed. This does have an impact on the individual animals but would not affect the managed population within the wild horse herd management area.

The planned actions to improve habitat for wildlife and protection from human activity and habitat fragmentation would benefit wild horses and their habitat. This benefit is common to all alternatives.

Core Area

Only a very small portion of the Great Divide Horse Herd Management Area lies within the core area, connectivity areas, and the ACECs. Due to the limited area of overlap with the wild horse herd management area, it is anticipated that no impact to wild horses or their habitat would result from these activities.

Cumulative Impacts

Under all alternatives, no significant cumulative impacts to wild horses and wild horse management are anticipated.

Wildlife Impacts

Actions under the Preferred Alternative would provide the most protection to wildlife except for Alternative B.

Actions to maintain or enhance air quality and management for Special Status Species plants would generally benefit wildlife and their habitats. Activities aimed at restoring watersheds and riparian areas in the planning area would benefit all wildlife species.

Actions to protect cultural resources would generally benefit wildlife and their habitats. Avoidance of some cultural sites could cause negative impacts to wildlife if avoidance results in activity being located in crucial wildlife habitats.

Prescribed fire in the planning area would benefit many wildlife habitats. Treatment of aspen stands with prescribed fire has had negative impacts to wildlife in the past due to increased use by elk. Any future treatments in this habitat type would require fencing to protect this important habitat and to allow adequate rejuvenation of the stands.

Some long-term impacts (15 to 25 years) could occur to sage grouse nesting habitat and winter relief areas if large acreages are burned with no mosaic (a pattern with lots of burned and unburned patches) patterns or edge. Brood rearing habitat is generally improved by fires producing a highly detailed mosaic pattern. This is due to an increase of forbs and insects.

Increased development of oil, natural gas, and coalbed methane in the area would cause decreased opportunities to use fire in the planning area due to safety concerns. This could negatively affect wildlife.

Rights-of-ways (such as pipelines, power lines) could negatively affect wildlife populations due to the disturbance

of associated roads, increased access, and associated displacement caused by human presence. 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 seasons. Aboveground pipelines would cause less impacts to crucial wildlife habitats (big sagebrush, mountain shrubs, woodland habitats, stabilized sand dunes).

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 due to the lack of access and lack of snow removal. Closing roads during crucial winter periods helps limit disturbance to wildlife and retain the limited level of activity.

Communication sites, when located in or near crucial habitats, can have significant impacts on those habitats. Access to these sites occurs year-round, even during the crucial winter period. Year-round access can result in plowing of roads which displaces wintering wildlife and can add to their stressed condition, caused by winter conditions. Plowing of these roads also allows for more recreational traffic to use these areas year round.

Concentrating pipeline rights-of-ways and storage facilities for condensate and oil would reduce impacts from activities on wildlife and related habitats. Placement of pipelines along road corridors would benefit wildlife and would reduce impacts from access associated with these activities.

Displacement of big game during calving and crucial winter months due to tanker trucks accessing production locations could have significant impacts. Closing of roads (see transportation planning) during crucial periods would reduce these effects and benefit wildlife.

Pursuing mineral withdrawals for the Greater Sand Dunes ACEC, portions of the Steamboat Mountain ACEC, and the two northern parturition areas would benefit numerous wildlife species. Mining exploration activity is already occurring in and near the parturition areas and high potential exists for additional associated mining activity. Withdrawing these areas from mining activity would benefit wildlife and wildlife habitat.

Future livestock conversions (sheep to cattle or vice versa) would be carefully analyzed. Sustainability reviews would be required prior to conversions, which would benefit wildlife habitat.

Not allowing conversions unless it benefits planning objectives would benefit wildlife but not as much as Alternative B. Maintaining use levels and moving when levels are reached would reduce impacts to wildlife and riparian habitats.

Not allowing livestock water developments in the core, crucial winter ranges, and the connectivity areas would provide the most benefits to big game. Also, protecting waters

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with fences and developing offsite waters would benefit wildlife, especially waterfowl and sage grouse.

No water development within 1.5 miles of sage grouse leks (in addition to the 1/4-mile closure for the lek itself) would offer more protection for sage grouse than the No Action Alternative and Alternative A but not as much as Alternative B.

Limiting use of key shrub species to 30 percent and riparian herbaceous species to 40 percent would benefit wildlife. The Preferred Alternative does not benefit wildlife and related habitat as much as Alternative B; however, riparian areas should improve under this alternative. This would benefit a large array of wildlife species.

Next to Alternative B, this alternative would offer the most protection for elk and other big game. Under this alternative approximately 85 wells would be drilled. Important habitats would be protected with stipulations and some would not be leased. Depending on the development of existing leases, future leases can be withheld from leasing or may be leased with an NSO stipulation. Conducting an evaluation of all activities would provide necessary information to identify acceptable patterns for future leasing. This would ensure that objectives for the planning area would be met, habitat would be protected, and fragmentation of habitat minimized. Key habitat areas such as the core, connectivity, White Mountain, and Split Rock would continue to provide habitat for wildlife species. Although some abandonment of habitat may still occur, it would be minimized. Withholding leases in crucial habitats until after other areas have been explored, developed, or reclaimed would temporarily protect corridors. Once an area is leased, it would stay leased for 10 years unless it is relinquished. Producing leases stay leased until production ends (estimated 26 years).

No impacts are expected from off-road vehicles under current management. ORVs do cause localized problems; however, if they stay on existing roads and trails and continue to follow the seasonal closure, impacts would be minimal. Some two-track trails may be closed if new roads are built in the same general location to access wells or development activities. Seasons of use by ORV users in the Sand Dunes do not coincide with periods of use by wildlife species, so no adverse effects are anticipated.

No negative impacts to wildlife are expected from reclamation practices. Implementation of the district reclamation plan would benefit wildlife habitats. However, full restoration of habitats would not occur in some areas for more than 20 years. Alternative B and the Preferred Alternative would provide the most benefit to wildlife from reclamation activities as more intensive reclamation practices would be applied.

Increased access into the planning area due to development activities could result in an increase in recreationists also accessing the area. This in turn could result in the potential for increased poaching, "horn hunting", and harassment of wildlife. The backcountry byways and Continental Divide Scenic Hiking Trail in the planning area should have minimal impacts to wildlife if people stay on identified routes.

About 2,500 acres would be disturbed by various activities over 20 years. Impacts may be especially severe in areas where no physical barriers exist to provide cover and relief from the disturbance and where activity occurs year round during crucial periods. Conducting the evaluation and not leasing the entire planning area at one time would reduce impacts and fragmentation in key habitat such as the core, White Mountain, Split Rock, and connectivity areas, which would benefit wildlife in the area, particularly elk and mule deer.

Adverse impacts to raptors, such as nest abandonment, could occur when activity is adjacent to or within nesting areas. Measures to protect nests and the surrounding habitat area provide security for nesting raptors. These protection measures also encourage raptors to reuse these areas for nesting and raising their young in future years because the nests and surrounding habitats are undisturbed.

Permanent high profile facilities would avoid sage grouse leks and the area within 2 miles, eliminating perches for aerial predators, which would benefit sage grouse. No new live-stock water developments within 1.5 miles of leks (in addition to the 1/4-mile closure for the lek itself) would increase nesting success due to an increase in residual grass and forb cover. Studies have shown that the average distance to sage grouse nests from a lek is approximately two miles. Predation of nests with insufficient cover (residual grass and forbs) is extremely high near leks (Heath, et al. 1997). These benefits would be greater than under Alternative A but less than under No Action Alternative and Alternative B.

Most of the disturbed areas would be reclaimed with a long-term disturbance of about 365 acres. Reclamation could result in altered vegetation communities or introduction of undesirable plant species. This would cause negative impacts to sage grouse from the degradation of nesting and brood rearing habitat if it occurs in sage grouse habitat.

Application of road densities not greater than 2 miles of improved (all weather) road per square mile of habitat would provide more habitat benefit than the No Action Alternative and Alternative A but would not provide as much protection as Alternative B.

Vehicle-wildlife collisions may be numerous in areas of high wildlife use and high human activity. Increased vehicular use of the area would increase the likelihood of collisions. Wildlife's crepuscular (dawn and dusk) habits also increase the possibility of collisions during periods of poor visibility and peak traffic for commuting workers. Smaller wildlife such as rabbits and sage grouse would also experience higher mortality from vehicle-wildlife collisions.

Vegetation that provides adequate cover for parturition, nesting, protection from predators, and cover during severe winter conditions is limited within the planning area. Mountain shrub areas, aspen stands, and conifer/juniper stands are also limited and are generally sought out by wildlife. Mitigation (avoiding important wildlife habitats) may prevent the direct loss of these areas, but activities occurring directly adjacent to these habitats may make them unusable to wildlife.

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Stabilized sand dune areas in the planning area are used heavily and frequently by big game and other wildlife and offer some of the most preferred escape cover. Sagebrush found in these stabilized sand dune areas are known to reach over 6 feet in height and some have been estimated to be over 300 years old. These areas are also found in large gently undulating terrain rather than the narrow drainage bottoms (6-Mile and Alkali Draw). Allowing any surface disturbing activities to occur in these areas would result in these habitats being lost for many years beyond the life of this plan.

Populations of non-native vegetative species would increase as development occurs. More weed species would be brought into the area by vehicles, people, and equipment resulting in loss of native species in some areas. Due to localized surface disturbance in the planning area, weeds are primarily found along roads at this time.

Big game habitat loss results from road use, road construction, facility construction and placement, pipeline construction, field facility maintenance, and disturbance zones around these areas. Disturbed acreages would not be fully reclaimed and portions would remain unavailable as habitat for some wildlife for 20 years or more. Limited rainfall, poor soils, and severe winter conditions make reclamation difficult, increasing the time required to re-establish suitable vegetation to pre-disturbance composition and density.

There are no anticipated negative impacts from visual management activities. Providing protection for visual resources would generally benefit wildlife and their habitats. This alternative would provide benefit for wildlife and wildlife habitat due to the amount of area managed as VRM Class II (about 332,400 acres). These benefits would be greater than the No Action Alternative and Alternative A, but less than Alternative B.

Impacts in the planning area from wild horses would be minimal provided their numbers are kept at plan objective levels. Wild horses currently occur in the planning area outside of identified herd management areas. This compounds problems associated with limited water sources and big game crucial winter ranges. Horses concentrate in the core during the summer months and compete for available forage during winter months. With added livestock competition for available water and forage, significant negative impacts are expected. Use levels set for livestock would help minimize this problem; however, horse numbers would continue to grow until their scheduled removal and would continue to have negative impacts on crucial wildlife habitats.

Not leasing areas in the core and connectivity areas until migration corridors can be established provides the best opportunities to sustain big game populations in the planning area. Limiting the numbers of roads under this alternative would limit the amount of habitat fragmentation occurring in the planning area.

Riparian management actions under this alternative would provide the most benefits to wildlife. Managing the four enclosures on Pacific Creek for salmonids would benefit a large array of wildlife, especially sage grouse and waterfowl.

Management of upland and riparian habitats primarily for wildlife would provide long-term benefits to wildlife if proposed actions under other resources occurs. Management of the flockets for wildlife and vegetation enhancement would benefit wildlife, especially waterfowl, sage grouse, and amphibians.

Impacts to Fisheries Resources

Actions to maintain or enhance air quality and monitoring of air quality would in most cases positively benefit fisheries resources in the long term.

The mitigation measures applied to protect cultural sites are expanded in most cases under this alternative. Many cultural sites occur in riparian areas. Where this occurs, the expanded mitigations would positively benefit fisheries by restricting surface disturbance for a greater area around the sites. Excavations of cultural sites, however, if they occur at or near streams, can cause short- to long-term negative impacts to these areas. Erosion could increase and sedimentation of streams could occur if not adequately mitigated (e.g., seeding, protective barriers, etc.). No activity of this type is anticipated at this time but if it should occur a site specific mitigation plan must be developed to mitigate any negative impacts (i.e., reclamation, seeding, re-contouring, sediment barriers, etc.).

Prescribed fire actions benefit watersheds in the long term by providing for plant diversity and health. Healthy watersheds benefit riparian areas and in turn water quality and fisheries. There are short-term negative impacts to water due to sedimentation, erosion, nutrient enrichment of the water (could be beneficial in some low productivity waters), shade removal, particulate emissions, etc. Short- and long-term benefits include nutrient recycling in soils, increased age and species diversity of plants, improved water quality (after 2 to 3 years), etc. No prescribed fires are currently planned but it is anticipated that they would occur during this plan.

Wildfire and resultant suppression activities generally have greater negative impacts to watersheds and streams. Usually areas burned in these cases are greater in extent, more "solid block" (less mosaic), hotter burning (causing much more vegetation to be eliminated), etc. This would tend to cause greater erosion, sedimentation of streams, and a possible change from a desired plant community. The increase in full suppression areas for wildfires would provide additional benefits by decreasing acreage burned.

Actions to prevent accidents and spills of hazardous materials would positively benefit fisheries through protection of the riparian area and preventing direct contact with streams. The fact that hazardous materials (i.e., oil and gas) are being produced in this area presents a threat of such accidents or spills occurring. Until an accident occurs there is no negative impact to fisheries. Mitigation and cleanup of spills rarely are able to recover a riparian area to its original condition in a short period of time and damage to fisheries and water quality varies with the event.

Lands actions such as rights-of-way for linear actions (pipelines, roads, utilities) and other surface disturbing ac-

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tions such as well pads, etc., can adversely affect watershed resources, riparian areas, and fisheries. This is because of the increased erosion and sedimentation from surface disturbance. Aquatic habitats are not suitable for disposal unless opportunities exist for land exchange for lands of equal or better value (functional and dollar value). Functional value of these resources would be determined by the appropriate wildlife, fisheries, and watershed personnel. In an exchange there should be no impact (positive or negative) unless it allowed for better management of the resource. In this circumstance the impact would be positive.

Water diversions have had negative impacts to fisheries and fish habitat in the past. In some cases, streams have been completely dewatered for periods of time rendering the stream unusable as fish habitat and in some cases making the riparian area non-functional. There are no plans for new diversions in the future but should proposals be presented they would of necessity take into consideration the functionality of the stream, riparian area and associated fisheries habitat.

Rights-of-way concentration areas and avoidance areas would be identified that would minimize the impacts to a larger area. This should serve to decrease erosion and other impacts to sensitive resources. Areas identified for withdrawal from mineral development would also benefit aquatic areas by increasing the acreage prohibited from that type of surface disturbance. Streams in withdrawal areas would be protected from placer mining. Increased emphasis on proper planning of access to public lands would provide for decreased erosion and sedimentation to rivers, streams and riparian areas.

Fisheries are directly affected by the condition of riparian areas. Please refer to the Riparian/Wetland section under Vegetation Management in this chapter. Riparian condition influences the water quality and instream habitat. Not only are the fisheries affected within the boundary of the JMH but downstream as well, especially with respect to sedimentation effects in the Big Sandy River. As riparian condition declines, so to does fish habitat quality.

The RMP removed AUMs for grazing from special management exclosures. This should allow for the maintenance of the riparian area in the upper 4 exclosures (hay meadow) on Pacific Creek and maintain the fish habitat for trout. Managing these exclosures for the maintenance of suitable riparian and instream fish habitat would allow for the continuation and expansion of a fishable salmonid population. Implementation of Standards and Guidelines appropriate actions should benefit fisheries and fish habitat in and for the long term.

The impacts under this alternative may not provide as quick of a recovery for degraded riparian areas and fish habitat as in Alternative B, although it would still occur. Implementation of livestock grazing standards and appropriate actions would be sufficient to recover degraded riparian areas, maintain or improve fishery habitat and improve water quality.

Ponds for livestock watering could be installed where appropriate and allowable but there probably would not be as many as Alternative A. Water depletion effects to the endangered Colorado River fishes outside the project area are

covered in the Green River RMP (see also Alternative A).

Under this alternative it is assumed that 85 wells would be drilled in the Reasonable Foreseeable Development scenario (RFD). This would mean there would be up to 2,100 acres of surface disturbance. This amount of disturbance would only have a minimal impact if stringent mitigation measures were followed (as described in the RMP and the No Action Alternative in Chapter 2). Again, transportation planning within the area would serve to limit or mitigate the impacts to streams and riparian areas as would directional drilling (decreases the number of pads) and other possible mitigation measures (NSO and CSU stipulations, etc.).

Additionally, the drilling of these wells would require local water sources for drilling and completion. Water depletions are important because the water from portions of the planning area is part of the habitat for endangered fish 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 been part of the surface flows of the Colorado River or Platte River, respectively, or of its tributaries (though that would not always be the case). The estimate for the amount of water needed to drill and complete each well is 2.0 acre-feet. Of the 85 wells in this alternative, 15 are shallow coalbed methane (described below), 5 are deep coalbed methane wells located entirely within the Great Divide Basin (Red Desert), and the remaining 65 are standard deep gas wells. For these 65 wells it is estimated that 75 percent would be within the Green River Basin, 23 percent would be within the Great Divide Basin (Red Desert), and 2 percent would be within the Sweetwater River drainage (Platte River). Water use for these 65 wells would total 130 acre-feet in 20 years or 6.5 acre-feet/year. This would total 4.9 acre-feet/year in the Colorado River drainage and 0.13 acre-feet/year in the Platte River drainage.

There are 15 coalbed methane wells that may be drilled on existing leases within the planning area within the next 3 to 5 years. These are shallow wells (around 900 to 1,000 feet) that would be drilled in close proximity to each other in the sand dunes area (all within the Colorado River drainage). Drilling these at 5 wells per year would add approximately 2.5 acre-feet of depletion to the above total (shallow wells would use an estimated 0.5 acre-feet each) during the years they are drilled. Since they are to be drilled in a short time frame, their water use is not averaged out over the 20-year implementation of the JMH plan. The effect on surface waters in the Colorado River drainage created by water extraction from the aquifer in the process of coalbed methane production is unknown at this time. At the time of implementation of these wells that information would have to be provided so that adequate mitigation measures could be applied, if any are needed. (At the time the first well is drilled, it may provide sufficient "produced water" to drill all the rest of the wells.)

The depletion of water from the Colorado River drainage and its effect on threatened and endangered fish species downstream is described in the Green River RMP Record of Decision (see page 209, USDI 1997) and the Biological Assessment (Appendix 11) for this document.

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Hard rock mining (locatables) could pose significant threats to aquatic resources, especially when involving dredging or placer mining. The highest potential for this type of activity is in the Oregon Gulch area. Although there is no commercial activity anticipated at this time there is active prospecting in the area with the potential to create accelerated erosion. Fish habitats in the areas that are proposed for withdrawal would be protected from degradation, destruction, and sedimentation, and not be subject to impacts from this activity.

Surface disturbances can cause increased erosion and sedimentation in riparian areas and streams. Fisheries are directly affected by the condition of the riparian area as described under Livestock impacts. Portions of the core area and big game migration corridor areas would be closed to leasing; this would protect streams in those areas from any new surface disturbances due to drilling.

Demand for other types of mineral development (salables) such as gravel pits, etc., would increase with gas development but these areas would be located away from riparian areas and streams and should have negligible impact to these resources.

No coal or sodium extraction is expected, thus no impacts are anticipated. Effects from exploration activities would be minimal. Geophysical activities currently have sufficient protective stipulations in the Green River RMP to eliminate impacts to riparian areas and streams (fisheries).

No impacts are expected from off road vehicles under current management. ORVs do cause significant localized damage to wetlands and riparian areas when operated outside of management prescriptions (i.e., existing roads and trails, designated roads and trails, and closed areas). Industry personnel predict a four-fold increase in "4-wheeler" sales in the next 5 years and additional negative impacts may occur if that holds true.

Outdoor recreation centered around water bodies can affect bank stability along lakes and streams. Lack of channel stability can affect the stability of the riparian zone on which most camping and other activities occur. Compaction and or loss of the riparian area greatly reduces streambank stability which in turn increases sediment, salt, and phosphate loads.

The protective measures in place in the Green River RMP for special status plant species would only have positive benefits to riparian areas and fisheries. There are no T&E fish species within the planning area; however, any actions to benefit these species would also be of benefit to riparian areas. Water depletion in the Colorado River system affects habitat for T&E fish species downstream of the planning area. Information on this can be found in the Biological Assessment and is covered in the Green River RMP Record of Decision, October 1997 (see page 209; USDI 1997).

Types of vegetation manipulation other than fire (chemical and mechanical) would have similar impacts as fire management. Generally, riparian areas are buffered by 100 feet or so to help offset the short-term increase in erosion. Long-term benefits are expected if management and mitigation stipulations are followed as prescribed in the Green River RMP.

Since the minimum acceptable condition for riparian areas is Proper Functioning Condition (PFC), and most of this

planning area is not in this condition, increased attention to this could only benefit riparian areas and subsequently fisheries.

Weed management activities could have positive or negative effects. Positive effects would occur by decreasing competition with riparian plants as long as key riparian plants are not accidentally targeted. Adverse effects could occur if chemicals used for treatment are introduced into the water. Generally a buffer zone away from surface waters is used when chemicals are applied. Biological or mechanical methods of weed control usually have no long-term adverse effect. Adequate protection and stipulations are present in the Green River RMP.

There is no impact anticipated from visual management activities.

Most watershed/water quality management related activities are aimed at restoration and enhancement of watersheds, including riparian areas. These activities generally are a positive benefit to riparian areas and fisheries. Negative impacts, if they occur, usually come as a result of inadequate design of dams or instream structures, or other watershed practice. No specific activities of this nature are planned currently, but site specific stipulations would be developed and applied if they should occur.

As stated in other sections, the 500-foot buffer from the edge of riparian areas, wetlands, and 100-year floodplains applies to surface disturbing activities unless specifically designed and mitigated to benefit these areas. All other management stipulations as developed in the Green River RMP apply. This should result in positive impacts instead of negative.

No negative impacts are anticipated from wild horses with management under the Green River RMP. If horse population objectives are exceeded, then negative impacts to wildlife and wildlife habitat would occur.

Only positive long-term benefits are anticipated from wildlife management activities. Prescribed fire impacts to benefit watershed, vegetation, and habitat are described in the other sections. There are no specific fisheries activities planned in the planning area. Stipulations to protect and enhance wildlife habitat includes riparian areas and streams and result in positive impacts (e.g., increased plant species diversity and age structure, increased density, better production, decreased erosion, runoff and sedimentation, more available habitat, better water quality, etc.).

All other management actions and restrictions developed in the Green River RMP apply. This should result in positive impacts for riparian areas and fisheries. The four hay meadow enclosures on Pacific Creek would be managed for salmonids which would benefit fisheries.

Core Area

Closing portions of the core area to surface disturbing activities, oil and gas leasing, and other activities would reduce the negative effects of fragmenting habitat and displacing animals, and provide protection for some of the most

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crucial habitat, particularly elk and mule deer wintering and parturition areas. It would also provide the wildlife with some amount of refuge from the disturbance caused by increased road density and use by industry and recreationists.

The impacts to fisheries in the core area would be the same as described under the general impacts for the Preferred Alternative.

Cumulative Impacts

Management actions under this Alternative would result in fewer adverse impacts to wildlife habitats than the No Action Alternative and Alternative A but more than Alternative B.

Developments and human presence would continue to remove and fragment wildlife habitats to some degree. Demands on public lands from recreationists would continue to increase, resulting in less un-occupied and undisturbed habitats and more access into crucial habitats which would increase displacement over the long term, but to a smaller degree than would occur under Alternative A.

Seasonal constraints would be used to mitigate impacts to wildlife from human activities during crucial periods and provide short-term protection for wildlife. Long-term maintenance and operations activity in crucial wildlife habitats would continue to cause displacement of wildlife from crucial habitats, including disruption of nesting, fawning and calving areas, and crucial big game winter habitats. Increased access for recreationists due to development of new roads, especially all-weather roads that provide year-round access, would magnify the negative impacts to wildlife and their habitats for the life of the project. These impacts would be reduced by establishing road density limits for all-weather roads through transportation planning and closing 37,240 acres to leasing and 56,040 acres to surface occupancy. When added to nondiscretionary leasing closures, about 120,240 acres would be closed to leasing and development activity.

Surface disturbing activities would continue to cause long-term losses of wildlife habitat. Overall, less acreage would be disturbed than under the No Action Alternative and Alternative A.

Adverse impacts to crucial wildlife habitats (e.g., riparian areas, crucial winter ranges, parturition areas, game bird winter concentration areas, etc.) from livestock grazing would greatly increase if all current nonuse AUMs were activated. These adverse impacts would be severe in crucial winter ranges where other commodity uses such as mining or oil and gas development is taking place. Placement of livestock into these crucial habitats or concentrating livestock in crucial habitats where vegetation has been decreased due to commodity development would result in less forage available for big game animals during winter periods. This would be especially critical in severe winters. Not developing livestock water in crucial habitats or within 1.5 miles of sage grouse leks (in addition to the 1/4-mile closure for the lek itself) would benefit wildlife and wildlife habitat. Removal of forage in these crucial habitats from livestock water development would then not occur. These impacts could be further reduced through implementation of new AMPs and/or revision of

management in old AMPs to include riparian objectives, and implementation of actions associated with standards and guidelines assessments.

Limiting livestock use to 40 percent on upland key species, 30 percent on key riparian shrub species, and 40 percent (or 6-inch height) on riparian herbaceous species would further benefit wildlife use of riparian areas.

Potential exists for minor impacts to the migrational capabilities of the Sublette antelope herd. Fragmentation of habitat areas and displacement from existing migration corridors due to roads and activity would have the greatest effect. This could be especially significant when winter conditions are extremely severe (similar to the winters of 1978 and 1983). Conducting a resource evaluation and ensuring that leasing and development meet the resource objectives of maintaining habitat should minimize these adverse effects.

Management prescriptions for wildlife resources, watershed, visual resources, and off-road vehicle use would provide long-term benefits to wildlife populations and habitats. Fire (natural or prescribed) would result in a short-term loss of habitat, but would benefit habitat in the long run if it results in a detailed mosaic burn pattern. Fires (natural or prescribed) resulting in a more solid pattern burn could result in long-term (15-25 years) negative impacts to wildlife. Fire could result in a long-term loss of habitat and could be considered an unavoidable adverse impact to the habitat if livestock graze the burned area immediately after the fire.

Surface mining can result in an irreversible irretrievable loss of wetlands and springs, and although mitigation occurs, the original site is lost. Withdrawal of some of these areas would reduce this effect. Major road development also results in irretrievable losses of habitat as they are generally permanent structures; however, transportation planning would reduce these effects.

Habitat fragmentation, particularly for big game, would occur in some areas, especially 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 can also increase the accessibility to the general public into areas that have previously been somewhat inaccessible to vehicles. 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. Again, transportation planning and the establishment of road density limitations in some crucial habitats would help to reduce this overall effect.

Managing wildlife habitat to prevent fragmentation and allow continued use and access to crucial habitats through evaluation, timing and sequencing of activities would also reduce adverse effects.

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A summary of impacts to the individual species that may be affected by actions in the planning area follows.

Impacts to wintering antelope and antelope migration would be minimized under this alternative.

The Steamboat elk herd is very susceptible to displacement by human activities because of the lack of hiding and escape cover. Continued development proposals and other permanent uses in the Steamboat Mountain, Essex Mountain, and Jack Morrow Hills areas would affect this herd. Some displacement of elk would still occur; however, total abandonment of habitats, especially key habitat in the core, should not occur. Road construction and increased access into remote areas would also increase use by the general public adding to the adverse impacts to this desert elk herd. Mitigation such as remote or off-site facility placement, and seasonally restricting human activity to reduce access and traffic in crucial habitat and calving areas is critical to reducing adverse effects.

Studies have shown that there is direct competition for forage between mule deer and cattle for saltbush and winterfat on crucial winter range. Although use by cattle generally occurs in the spring or summer months, low plant vigor has generally resulted in little regrowth which makes these preferred vegetation types unavailable during winter months. Studies have also shown that sagebrush makes up a large component of the deer's winter diet; however, this does not mean deer prefer it over other shrub species such as serviceberry, mountain mahogany, and bitterbrush. Control of wild-fire is largely responsible for the loss of key shrub species and the even-aged condition of sagebrush communities.

Increasing amounts of vegetation removal in crucial winter range by development activity compounds the problem of poor crucial winter range condition. Although many acres are returned to production by reclamation practices, almost all of this acreage contains forage either unusable by deer or of a different composition that may not provide the same nutritional benefits as the original forage. Shrubs planted during reclamation may take many years to return these habitats to a condition that provides usable forage for the deer. Loss of vegetation due to development activities has resulted in a reduction in available habitat and can result in increasing competition between livestock and wildlife for remaining vegetation. Oil and gas and other developments (pipelines, powerlines) also result in decreased opportunities to use fire as a treatment tool to rejuvenate decadent plant communities, due to safety concerns.

Although mule deer are probably more tolerant of human activities than elk and impacts would be reduced in this alternative, it is still unlikely the population objective for this herd could be met. The habitat at this time is not capable of achieving the population objective for this herd, with the development that is occurring in this portion of the herd area. Also, because this herd area is predominantly a desert type environment, areas for good fawn rearing are very limited. Direct competition between elk and deer for these parturition and winter use areas is probably more prevalent here than in most herd areas. Therefore the capability of the habitat to meet the objectives for this herd could be affected.

With the management proposed in this alternative, the effects from surface disturbing and disrupting activities would be minimized; however, with the competition between deer and elk and the activity and uses already occurring in the area, population objectives may still not be met.

Fisheries

Assumptions under this alternative require very stringent mitigation measures and "tools" to be applied that protect and/or correct adverse conditions in riparian/wetland areas (and thus fishery habitat). Progress in reversing downward trends and achieving the Desired Plant Community objectives would be expected to be very rapid.

Withdrawal from mineral entry leasing eliminates impacts to those areas from mining claim activity. The stringent mitigation measures and guidelines that are assumed in this alternative for all other activities would allow riparian/wetland areas to recover or reach Desired Plant Community objectives very rapidly.

Special Management Areas

Greater Sand Dunes ACEC and Special Recreation Management Area

In the western portion, there may be residual adverse impacts to the dunal ponds or "flockets" from livestock grazing. The Preferred Alternative may restrict water development in over half of the planning area and in part of the grazing allotment in this area. Livestock would need to water somewhere which may increase use on the dunal ponds. This could be a significant impact if this use impairs the wilderness suitability of the area. Range management practices such as herding may need to intensify to move cows off these areas.

In the eastern portion, management prescriptions and restrictions would be designed to preserve and protect the geological, cultural, visual, and wildlife values associated with the Greater Sand Dunes ACEC. Implementation of the prescribed measures would reduce or minimize impacts associated with mineral development, lands actions, and off-road vehicle use. Residual impacts include:

Displacement of wildlife, predominantly elk and deer, would occur through off-road vehicle activity and oil and gas activities. Displacement from off-road vehicle activity would be most prevalent during the summer and fall. Displacement from oil and gas activity would be year round.

Loss of vegetation on stable dunes would potentially occur through development of oil and gas reserves and through facilities associated with oil and gas. Ten to 15 coalbed methane wells could be drilled on existing leases. In the process of coalbed methane production, large volumes of water are pumped from the aquifer at that level. It is unknown at this time if the aquifer at this level is directly connected to the surface water in the dunal ponds and wet meadows. If it is, there may be an adverse effect of drying up the riparian areas. This would not only affect the riparian plants but all of the wildlife that depends on those plants, insects, and surface water.

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Ten (10) to 15 coalbed methane wells has the potential to adversely affect the scenic quality of the area. Ten (10) to 15 new wells and the associated facilities could jeopardize the VRM class II management rating of the area. As more oil and gas development occurs, more effects to visual quality would occur. Mitigation efforts should intensify such as screening structures, use of environmentally acceptable colors on facilities, requiring off site facilities, placing pipelines and roads in existing right-of-ways, etc. Adverse effects would occur to oil and gas operations due to increased costs and lost drilling opportunities.

As development of the coalbed methane wells occur, BLM would monitor the health and safety issues associated with increase development in the ORV open area. Efforts would be made to mitigate hazards by working with industry to notify the ORV users of the location of hazards. Efforts would be made not to reduce the size of the open area, but that would be dictated by the level of new development. Surface facilities (e.g., pipelines, snow fencing, etc.) would create safety hazards to the off-road vehicle users. If the open area is reduced in size to 5,500 acres because of coalbed methane development this would be considered a significant adverse impact to the off-road vehicle program and the objective of the Special Recreation Management Area.

Dune ponds and related riparian habitat would continue to be affected by livestock and wildlife use.

The relatively pristine portion of the eastern area of the Greater Sand Dunes ACEC that has no development, including the base of Steamboat Rim, would be managed to protect big game habitat, vegetation communities, visual, and recreational resources.

Benefits that would be realized through the management prescriptions and restrictions include the protection of sensitive cultural resource sites, such as Crookston Ranch, and the protection of the Native American religious and important geological values associated with the Sand Dunes and the Boars Tusk, and about 23,980 acres closed to coal exploration.

Additional benefits would occur by expanding the Sand Dunes ORV parking area to accommodate the larger number of users using the area and providing user friendly facilities. Rights-of-way would avoid the ACEC which would reduce the effects of rights-of-way construction. Due to the shifting nature of the sand, pipelines in particular could become a hazard to recreation users as pipelines tend to become exposed. Impacts would be reduced through right-of-way avoidance.

Steamboat Mountain ACEC

Portions of the ACEC would be open to further consideration for oil and gas leasing and development provided adequate habitat and protection of sensitive resource values could be provided. This would benefit these resource values, however, costs of oil and gas operations would increase. Timing and sequencing of federal oil and gas leasing, exploration, and development may be required. Without specific mitigation such as remote monitoring, pad drilling, direc-

tional drilling, and centralized tank batteries the areas where activity occurs would be lost to elk use for the life of the activity.

Limitations on leasing would greatly enhance efforts to manage heritage resources of all kinds, and especially respected areas identified by Native American traditional elders. Case-by-case evaluation of areas for future leasing, and leasing with stipulations such as NSO would somewhat enhance BLM's ability to protect some kinds heritage resource values, especially respected areas identified by Native American traditional elders.

Additional prescriptions applied to development activities on existing leases would somewhat enhance BLM's ability to manage and protect all kinds of heritage resources, and especially areas identified as respected places by Native American traditional elders. Case-by-case consultation with Native American traditional elders would allow for enhanced protection of respected places. Additional consultation would likely enhance communication between BLM managers and Native American representatives, and BLM sensitivity to Native American resource protection needs.

Following the transportation plan and placing pipelines and other linear facilities above ground next to or in road corridors would be key to minimize effects to wildlife habitat and other management objectives. Other important mitigating measures would be locating operations next to the Freightier Gap County Road to minimize impacts from human disturbance in parturition and crucial winter periods. Not connecting roads and allowing pipelines and other linear facilities from Steamboat Rim down LaFonte and Johnson Canyons would minimize fragmenting habitats and protect parturition and crucial winter grounds.

New road development due to industry may directly increase 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 due to the lack of access and lack of snow removal. To protect wintering wildlife, roads would not be plowed. Over-the-snow vehicles would be required to access well locations to minimize stress to the animal during crucial periods.

Maintaining closure of Steamboat Mountain ACEC to communication sites would significantly enhance efforts to manage heritage resources, especially Native American respected places.

NSO requirements, seasonal restrictions and CSU constraints on additional acres would significantly enhance BLM's efforts to manage and protect heritage resources of all kinds. These prescriptions also benefit management of other sensitive resources.

Retaining the 16,000-acre off-road vehicle seasonal closure on Steamboat Mountain would benefit deer and elk populations by reducing or eliminating human disturbance during birthing periods. Limiting ORV traffic to designated roads and trails would significantly enhance BLM efforts to manage and protect heritage resources of all kinds.

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Closing a smaller area to mineral sales than that closed in the No Action Alternative would slightly diminish BLM's ability to manage and protect heritage resources of all kinds. Coal exploration activities would not appreciably affect BLM efforts to manage ACEC values. Pursuing mineral withdrawals on portions of Steamboat Mountain would benefit numerous wildlife species and cultural resources.

Livestock management would in the long term generally enhance efforts to manage wildlife resources and heritage resources of all kinds. However, short-term impacts would occur, particularly in riparian areas.

Managing the area for VRM class II values would mitigate some adverse effects from development and help retain the relevant and important ACEC value which include wildlife and cultural resource values.

Not expanding the wild horse herd management area would somewhat diminish BLM's ability to manage heritage values associated with this resource which have been identified by Native Americans and others.

South Pass Historic Landscape ACEC

Requiring proposed communication sites on Pacific Butte to conform with prescriptions in place for the South Pass Historic Landscape would enhance BLM efforts to manage and protect certain classes of heritage resources, especially the South Pass Historic Landscape viewshed. Additionally, the Green River RMP and other management document prescriptions would significantly enhance BLM efforts to manage and protect heritage resources of all kinds.

A complete assessment of the amount of exploration and development activity that could occur if restrictions were not in place can not be made. This is because very little is now known about the specific details about prospective locations of oil and gas traps in the area. An unknown number of potential drilling locations would not be available due to the proposed no surface occupancy restrictions in part of the ACEC. Extra drilling and development costs would be required to meet restrictions placed on activity in this area. Extra costs would include relocating well pads; redesigning access routes, well pads, and production facilities; and directionally drilling some wells to reach potential reservoirs from off-site locations. Impacts from leasing restrictions could be significant if future analysis indicates no surface occupancy areas have high exploratory drilling potential.

White Mountain Petroglyphs ACEC

Management actions would protect the rock art and surrounding 500 acres which would address Native American traditional cultural and religious concerns. No development would be allowed unless it were for the benefit of the cultural resource. Long-term benefits would be realized by restricting any activity that could degrade the site. Benefits would also be provided to the public and especially the local communities through the educational opportunities provided by the area. Unauthorized uses could damage rock art and impact area values. No impacts would occur to oil and gas development due to protecting this small area. Any development activity

that may occur could easily avoid this area. Preparing a recreation project plan would provide further protection of the petroglyph resources.

Red Desert Watershed Area

Livestock water developments would not be constructed in portions of the Red Desert Watershed Area that contain the core, connectivity areas, or big game winter ranges. This would reduce the effects of livestock water development construction and livestock use of the immediate and surrounding area. However, this would limit the use of such developments as a grazing management tool which could adversely affect livestock operations.

Portions of the core, connectivity areas, and the Split Rock area would be closed to fluid mineral leasing to protect important wildlife values. This would adversely affect oil and gas operations.

Geophysical activities in sensitive areas would be limited and measures would be applied to protect sensitive resources (timing limitations, avoidance, restrictions on vehicle use and explosive charges, etc.). In areas closed to surface disturbing activities, the core area, and sensitive areas, activity could occur on existing roads and trails in conformance with transportation planning.

Mineral material sales would not be allowed in big sagebrush/scurfpea vegetation communities which would protect this important habitat.

Important wildlife habitat in the core, connectivity areas, and big game crucial winter ranges would be protected by establishing road densities for all weather roads.

No surface occupancy restrictions would benefit the special status plant species found on Bush Rim.

The Red Desert Watershed Area would be managed for Class II and III VRM values which would help maintain the area's vast open space.

NO ACTION ALTERNATIVE

Cultural And Paleontological Impacts Analysis

Impacts on cultural resources from air quality management, fire management, hazardous material management, monitoring and reclamation practices, off-road and recreation uses, special status species management, vegetation management, and wild horses would be the same as described for the Preferred Alternative.

While it is relatively easy to avoid affecting many kinds of archaeological and historical sites it can be considerably more difficult to avoid effects to respected places. Consultation has taken place with traditional elders concerning several specific localities, and more generically concerning respected places in general. Traditional elders have made suggestions concerning avoidance of respected places. Viewshed is an important component of many respected places and efforts would be made to protect visual resources associated with

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respected places. While it may not always be possible to avoid all effects to respected places, the BLM would follow an orderly process of consultation with traditional elders, as well as with the Wyoming SHPO and the Advisory Council on Historic Preservation to arrive at the best alternative for managing all kinds of heritage resources on BLM lands.

The procedures for complying with the National Historic Preservation Act, and the Wyoming Protocol to the BLM National Programmatic Agreement with the Advisory Council on Historic Preservation are designed to take these factors into account when managing resources that are considered eligible for inclusion in the National Register of Historic Places. Resources that are not eligible for the National Register of Historic Places may still be important and require some level of management effort.

The impact on cultural resources from lands and realty management would be similar to those described for the Preferred Alternative. Seasonal restrictions and other mitigative measures applied to lands and realty actions generally have beneficial effects to cultural resources by limiting or otherwise controlling surface disturbing activities. Special management prescriptions for Areas of Critical Environmental Concern, such as the South Pass Historic Landscape and White Mountain Petroglyphs are generally protective in nature and tend to benefit cultural resources.

Cultural resources in general would be somewhat vulnerable to damage from rights-of-ways, permits and leases in certain areas including Indian Gap, Monument Ridge, White Mountain, and the face of Steamboat Mountain. Areas identified as respected places by Native Americans, and the surrounding terrain could suffer from surface disturbing activities. The negative effects of these changes in the landscape could be somewhat, but probably not totally, mitigated.

Withdrawals prescribed in the Green River RMP would slightly enhance efforts to protect heritage resources of all kinds. Locatable mineral development has a potential to impact efforts to manage heritage resources; this is especially so with regard to South Pass Historic Landscape and Native American respected areas.

Access acquisition prescribed in the Green River RMP would slightly improve efforts to manage heritage resources of all kinds.

Dispersed livestock grazing generally is fairly benign so far as impacts to cultural resources are concerned. Severe overgrazing can accelerate erosion and thus destroy the soil matrix in which archaeological resources are situated. Overgrazing could also adversely affect places such as the South Pass Historic Landscape by drastically changing the vegetative component of the viewshed. However, grazing within regulated limits usually would not adversely affect cultural resources.

Managing water for livestock operations can affect cultural resources. Spring improvements and construction of reservoirs can destroy archaeological resources because they disturb the soil matrix in which they are situated. Effects from construction of new livestock improvement facilities, such as

reservoirs and spring improvements, would not occur, which would benefit cultural resources. Generally, spring developments tend to be more detrimental than other kinds of water developments because the water source was often attractive to prehistoric and historic inhabitants of the region. Conversely, reservoirs are usually situated in drainage bottoms that tend to have been disturbed by alluvial action and are less likely to have soil deposits that could harbor intact archaeological materials.

Piping water from springs generally is beneficial to cultural resources both because it protects the natural appearance and setting of the water source and because it prevents livestock trampling in the immediate area. However, trampling can be increased in localized areas around troughs, fences, water gates, saltblock placements and similar facilities that tend to concentrate livestock in small areas. This accelerated trampling can sometimes be detrimental to cultural resources.

Livestock rubbing against rock art panels, and historic structures such as those at Crookston Ranch and the Rock Cabin could severely damage, or completely destroy those resources.

Surface disturbances caused by mining, quarrying, construction of oil and gas well locations, pipelines and other mineral development related facilities can destroy archaeological and historical resources. They can also change important cultural resource settings such as South Pass Historic Landscape. Pre-authorization inventory and evaluation requirements usually allow facilities to be authorized in such a way as to avoid direct effects to cultural resources. However, inventory is not required prior to some mining operations conducted pursuant to the 1872 Mining Act. Sometimes these operations have the potential to destroy significant cultural resources. Occasionally, inventory fails to identify archaeological or historic resources which then become vulnerable to destruction by surface disturbing activities resulting from mineral development.

In the planning area, the region of stabilized sand/silt sheet deposit north and west of White Mountain is especially vulnerable to this kind of impact because archaeological resources are known to be buried in the soil deposit with no surface expression. Surface disturbing activities in this area are especially prone to disturb buried archaeological sites. Furthermore, these kinds of sites as exemplified by the Finley and Krmpotich Sites are tremendously important to archaeological science. This is because those sites are very intact manifestations of some of the earliest cultures (e.g., Folsom, Goshen, et al.) in North America. The proximity of this region to the Pinedale Glaciation (the last of the great Pleistocene glacial advances) undoubtedly has some association with the preservation of these very ancient cultural materials in this area. Add to this the presence of skeletal remains of several species of extinct Pleistocene fauna (*Bison bison antiquus* and *Camelops* sp.), in the area and the tremendous scientific potential of the region becomes readily apparent.

This (no action) alternative projects 89 new oil and gas wells within the planning area. Any wells and associated

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facilities within the area of stabilized sand/silt deposit, would have a high potential for development to impact extremely important archaeological resources.

Native American respected places can be adversely affected by surface disturbances within viewsheds a considerable distance away from the actual religious site. This is especially the case if unusual landscape features such as Boars Tusk, North Table Mountain, and Steamboat Mountain are within the viewshed of the respected place. Similarly, the surrounding landscape is an important part of many Native American respected places such as White Mountain Petroglyphs and other rock art sites. This is because those sites may have been used, in part, for shamanistic purposes in which the setting of the site was as important as the site proper. These kinds 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.

If any of the 89 projected oil and gas wells in this alternative and their associated facilities are within the viewshed associated with these respected places, adverse effects to the sites would probably be unavoidable.

There would be a slight potential for salable mineral development to adversely affect heritage resource values.

Geophysical activities can sometimes be detrimental to cultural resources. However, pre-authorization inventory and avoidance can usually allow the geophysical operation to be conducted in such a way as to avoid affecting most kinds of cultural resources. However, special restrictions may be necessary in the area of stable sand/silt soils and around Native American respected places. Furthermore, requirements of the newly proposed four dimensional geophysical operations may make it much more difficult to avoid impacting all types of cultural resources.

Geophysical operations would have a slight potential to impact heritage resources of all kinds.

No Surface Occupancy (NSO) stipulations would generally enhance protection of all kinds of heritage resources. Transportation planning would generally enhance efforts to protect heritage resources of all kinds.

Visual resource management can have tremendous positive effects to cultural resources because it allows 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. Heritage resources with visual values such as some areas identified by Native American traditional elders as respected places are vulnerable to adverse effects by remaining within a VRM Class III status.

Usually efforts to manage watershed and soils are very beneficial to cultural resources because they lessen erosion which can destroy both archaeological and historic sites. On rare occasions, treatments such as waterbars could damage cultural resources. This can easily be prevented by prior inventory and evaluation of cultural resources.

Most wildlife management practices are either beneficial or benign to cultural resources. Generally, things like seasonal restrictions tend also to protect cultural resources to some degree. Fire manipulation practiced could have a negative effect on cultural resources in some cases (see Fire Management). The animal images at White Mountain Petroglyphs and other rock art sites in the region illustrate Native American concern for wildlife. Native American elders have expressed appreciation of BLM wildlife management efforts.

Core Area

Impacts on cultural resources from management of the following resources would be the same as described for the general impact discussion: air quality, cultural, fire, hazardous materials, land and realty, livestock grazing, transportation, vegetation, visuals, and wildlife. No additional development in the core would greatly enhance BLM's ability to manage heritage resources.

Cumulative Impacts

Avoid effects to cultural resources is the BLM preferred method of managing cultural resources relative to other activities. There may be rare cases where it is not possible to avoid effecting cultural resources. In cases where the resource that would be effected is an archaeological site it may be possible to mitigate the adverse effect by retrieving a significant portion of the scientific data that the site contains. However, data recovery mitigation can be expensive and time consuming. Since data recovery would need to occur prior to activities that would destroy the archaeological resource in question this approach is usually an impediment development efforts. With two exceptions standard avoidance and mitigation strategies should result in little impact to most kinds of heritage resources under the no action alternative.

The first exception is a region within the Jack Morrow Hills study area that is especially prone to having very significant archaeological resources which would be very costly and time consuming to mitigate. That area, called the Paleosol Deposition Area, would likely suffer much greater impacts than the remainder of the study area should development occur. The second exception is areas identified by Native American traditional elders as respected places. The viewshed surrounding these places is a critical component of the heritage resource. It would be difficult to avoid adverse effects to respected places if development activities are proposed under the no action alternative.

Paleontological Impacts

The type of direct and indirect impacts described in the Preferred Alternative are the same for all alternatives. The magnitude of the impacts under each alternative increases or decreases proportionally with the increase or decrease in surface disturbance and establishment of new roads. The projected development under the No Action Alternative would be greater in the general area compared to the Preferred Alternative and Alternative B but less when compared to

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Alternative A. Therefore, the magnitude of the impacts would be greater under the No Action Alternative than under the Preferred Alternative and Alternative B but not as great as would be anticipated under Alternative A.

Under the No Action Alternative, known scientifically significant fossil sites would not be closed to surface disturbing activities. Failure to close these sites would increase the potential for the sites to be impacted. Under this alternative, preserving them for future study would not be assured.

Core Area

No new oil and gas or livestock project development would occur within the core area; therefore, the magnitude of the impacts would be the lowest of any alternative.

Cumulative Impacts

The type of cumulative impacts described in the Preferred Alternative would be the same for the No Action Alternative. However, these impacts would be concentrated outside the core area, unlike any other alternative being analyzed.

Fire Impacts

The impacts to fire management activities would be the same as described for the Preferred Alternative except that fewer restrictions for resource protection would be applied to fire management activities.

Lands Impacts

Right-of-way holders would have some flexibility and opportunity for locating and routing rights-of-way under this alternative. However, right-of-way placement would be impacted by exclusion, avoidance, and no surface occupancy areas, and those areas with seasonal restrictions.

The exclusion of rights-of-way within the South Pass Historic Landscape vista (about 23,640 acres) would have a major impact if activity should increase in this area since rights-of-way in exclusion areas would not be allowed unless mandated by law. Large avoidance areas would have a similar impact as avoidance of these areas may require a longer route which would affect other offsite areas and increase costs to the applicant. About 34 percent of the planning area would be an avoidance area for rights-of-way and about 5 percent would be excluded from rights-of-way activity. Additional mitigation may also be applied to activities that may occur in all avoidance areas, also increasing project costs and the amount of time needed to complete projects (Table 4-19).

No surface occupancy areas (about 30,580 acres or 5 percent of the planning area) preclude placement of rights-of-way because surface disturbing and disrupting activities are not allowed. Most of these areas are small and scattered throughout the planning area and can be easily avoided. Large areas with NSO restrictions have the same effect as large exclusion areas.

Areas closed to communication site location (about 43,400 acres) preclude placement of these types of facilities. If

alternate locations cannot be found, this can cause gaps in communication signals and inefficient communication coverage of areas.

Seasonal restrictions and other mitigation measures to protect resource values and threatened and endangered species (T&E) would impact rights-of-way by restricting location or timing of construction.

The possibility of high dust levels resulting from use of unpaved access roads would necessitate stipulations to control dust. All construction rights-of-way as well as access road rights-of-way would include a stipulation requiring that the holder meet Federal and State air quality standards.

Land tenure adjustments would occur only if the benefits outweigh any adverse impacts, and if there are no significant impacts which cannot be mitigated. About 4,721 acres have been identified as possibly suitable for disposal/acquisition.

The withdrawal of lands identified in the RMP (about 37,290 acres) would preclude disposal, entry, and mineral location in those areas (Table 4-20). Withdrawals for more than 5,000 acres would require notification of Congress. Existing withdrawals would be reviewed, and those which no longer serve the purpose for which they were withdrawn (oil shale and coal) would be revoked. These lands would then be open for disposal, entry, and mineral location. About 211,130 acres would be open to mineral location that previously were not available for this activity. Potential for mining claim activity is low except in the South Pass Area. This action would benefit mining claimants by allowing mining claim activity on areas that were previously closed.

There is adequate vehicle access on the existing roads and trails to the lands in the planning review area. Closing or restricting specific areas to protect public health and safety should not cause severe adverse effects to vehicle users because so much of the area is currently accessible and such closures would likely be few. Implementing the ORV designations would keep vehicles on designated routes which could result in traveling further to get to a destination, but should not preclude accessing an area. Foot and horse traffic would not be affected.

Impacts to rights-of-way and other lands actions for the South Pass Historic Landscape would be the same as discussed in the general impact section.

The impacts to rights-of-way for the Oregon Buttes and White Mountain Petroglyphs ACECs would be the same as discussed for exclusion and areas with NSO restrictions. The impacts to other lands actions would be the same as discussed for the general area.

Core Area

Since no new activities would be allowed within the core area (80,410 acres), no new rights-of-way would be issued for actions within the core and activities would have to avoid the area. Large avoidance areas would require routing rights-of-way around the core area. This would affect other offsite areas and could increase costs to the applicant. Land tenure, withdrawal, and access impacts would be the same as described for the general area.

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Cumulative Impacts

The combined actions of no new development in the core, about 189,000 acres of avoidance, much of it connecting, and about 27,120 acres of exclusion area (and about 43,400 excluded from communication sites) would affect rights-of-way placement. Long linear rights-of-way particularly would be affected by potentially long reroutes increasing construction costs.

Withdrawal of 37,290 acres would preclude disposal, entry, and mineral location. Revocation of 211,130 acres of oil shale and coal withdrawals would allow for entry and mineral location, and consideration of land disposal. No new development within the core area would result in no new right-of-way needs from within the core.

Lands would be irreversibly lost to the public land base when sold or exchanged; however, under exchanges, lands of comparable value would be obtained.

Livestock Grazing Impacts

Impacts to livestock grazing from air quality management, cultural and paleontological management, healthy rangelands, livestock grazing suitability, wild horses, monitoring and reclamation practices, recreation and off-road vehicle use, special management area management, special status species management, threatened and endangered species management, weeds, wilderness management, xxx would be the same as described in the Preferred Alternative.

A total of 74 gas wells are predicted in this alternative and 15 shallow coalbed methane wells. Considering the pads and associated roads, pipelines and other necessary disturbances the total acres of surface disturbance of about 2,300 acres (about 3.5 sections) seems minimal. However, three and one half sections of potential forage loss could result in minor livestock reductions over the life of the plan. The long-term acreage loss of about 380 acres would decrease the effects and would be minimal.

Impacts to livestock from hard rock mining (locatables), gravel or other pits (salables), and coal, sodium, or oil shale exploration and development (leasables) would be the same as described in the Preferred Alternative. These activities would not pose a concern for livestock production and management.

With the increase of production, the likelihood of a hazardous spill would increase over the Preferred Alternative. However, mitigation to contain and cleanup any spill or accident as soon as possible, should keep any effects minimal.

Lands management, such as rights-of-way, would affect livestock the same as under the Preferred Alternative. Additionally, about 27,210 acres would be closed to rights-of-way which would benefit livestock by protecting available forage.

Salting for distribution of livestock could require some effort in planning and proper placement but would aid in the distribution of forage utilization and reduce impacts to other resources such as wildlife, water quality, and riparian resources. Reduced distance restrictions from water and sensi-

tive plant species would provide more management flexibility than under the Preferred Alternative.

Vegetative treatments beneficial to wildlife would also be beneficial to livestock. Burning or using chemicals to reduce sagebrush would only increase the forage for both livestock and some species of wildlife; however, no new treatments for livestock under the No Action Alternative would adversely affect livestock management.

No livestock management facilities would be developed. This would limit the number and type of management tools for livestock grazing management.

Authorized grazing use would not exceed the recognized permitted use. For analysis purposes, anticipated actual use would range from approximately 13,038 AUMs (1998 base year usage) to the total permitted use of 26,032 AUMs. The average between the two amounts is 19,535 AUMs (17,379 cattle and 2,156 sheep). Again, for analysis purposes, this grazing level was held constant throughout the planning period.

Historically areas within the planning area have been used below their adjudicated levels of 26,032 AUMs. Average use from 1994 through 1998 have been 9,851 AUMs with an average non-use of 5,661 AUMs.

Present classes of livestock grazing the planning area are broken down as 22,767 cattle AUMs and 3,265 sheep AUMs. Conversions from sheep to cattle have normally been granted until 1998. Under this alternative no changes in adjudicated permitted use would occur. Conversion in class would be analyzed. No new or additional impacts to livestock grazing are expected under the No Action Alternative.

The current season of use would continue. The current permits have the grazing period from May 1 through December 31 of each year. Seasons of use vary from allotment to allotment. No impact to livestock grazing from changes in season of use is expected for this alternative.

Grazing plans would be prepared as necessary and would address riparian desired plant community objectives and proper functioning condition. All plans would be developed with guidelines in all aspects of multiple use and rangeland management. All plans would be in accordance with the Green River Resource Management Plan and any other relative plans.

New riparian pastures would not be established which could limit management options in the grazing plans, reducing management flexibility.

Livestock grazing would not be adversely affected by the continued utilization limits set at 50 percent for upland and riparian species. Except for riparian areas, most of the area has been grazed at these levels for several decades. Generally, vegetation monitoring in the planning area has shown either an increase in production of vegetation on uplands and static to downward trends in riparian vegetation depending on allotment or area. Some areas have been rested for a period of 5 years due to regulatory actions which may have contributed to an increase in production. These areas show little or no use

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and the increased production has in most cases helped the health of the rangeland. Other areas where problems exist would continue to see overutilization and unsatisfactory vegetative condition.

An increase in water developments could help in controlling livestock, making available previously unused livestock forage. Not developing water sources in the area would decrease management options for providing improved distribution through water availability. Existing waters would continue to be used, concentrating livestock for long periods, and may result in overutilization. Management options for meeting standards and guidelines and taking appropriate action could also be adversely affected. Use of forage in other areas may be necessary to mitigate overuse of certain riparian areas.

Livestock would be affected by riparian/wetlands management due to potential loss of watering sources and/or limitations on duration of grazing. Livestock have the potential to degrade these systems if not moved to other locations. These locations would need additional off-site watering sources to accommodate the needs of livestock. If a riparian area or wetland is used to the utilization limits addressed under the livestock grazing management section of this document, livestock would either be moved to another area or have the potential to be removed from the allotment before the grazing season is over. This could result in an economic impact to the livestock operators.

With no development of reservoirs, pipelines and other water improvements, livestock would continue to concentrate in the riparian and wetland areas. Impacts would continue until utilization levels are reached, and livestock would be removed. Water hauling would help improve livestock distribution.

For a detailed socioeconomic impacts discussion of the livestock industry, see Socioeconomic Impacts. Under the No Action Alternative, 347,580 cattle AUMs and 43,120 sheep AUMs would be available for livestock grazing during the 20-year life of the project. The total economic impact of livestock grazing would be \$24.4 million. Employment in the livestock sector would be 274 annual job equivalents earning \$16,373 average per year. The AUMs of livestock grazing are 92 percent of the No Action Alternative. AUMs available for livestock grazing on an annual basis under the Preferred Alternative represent an increase over the baseline year 1998 and the 5-year average of 1994-1998.

A lack of transportation planning could adversely affect livestock grazing activity through surface disturbance removing more forage.

Wild horses would not affect livestock grazing activities.

Under the No Action Alternative, wildlife habitat management would not affect livestock grazing patterns or distribution. Maintaining renewable resources for wildlife habitat would affect livestock operations in the short term. An increase in production of grasses is expected causing increased forage and distribution of livestock.

Distribution patterns may be affected by watering areas such as wells, pipelines, reservoirs, etc., and the inability to develop new water sources.

Management actions for species such as mountain plovers or special status species should not affect livestock grazing. The habitats for these species do not conflict with livestock grazing use.

Sage grouse need a stubble height of at least 8 inches for nesting and brood-rearing cover. Maintaining this minimum stubble height could impact livestock grazing operations.

Elk would only compete with livestock for forage. This could result in competition for forage. Both elk and cattle generally diets overlap.

Core Area

Impacts to livestock grazing in the core area would be the same as described in the general impact discussion. In particular, surface use constraints and management practices precluding construction of rangeland improvements may prevent improvement of livestock distribution patterns. This would affect the Pacific Creek, Steamboat Mountain, Sands, Bush Rim, and Fourth of July allotments.

Cumulative Impacts

Actions taken under this alternative could result in a short-term reduction in use as the area and time available for grazing would be limited. This potential impact would be greater than Alternative A, but less than the Preferred Alternative and Alternative B. The projected increase in forage production could help to offset this loss in the long term.

Minerals Impacts

Leasables - Oil and Gas and Coalbed Methane Resources

Oil and gas and coalbed methane development would be restricted or prohibited as the result of conflicts with environmentally related resource values. This cumulative impact is due to the restriction categories:

- no leasing,
- no surface occupancy,
- seasonal access restrictions, and
- controlled surface use restrictions.

Conflicts with other mineral resources can restrict development of the hydrocarbon resource. No conflicts with other mineral resources are expected over the life of this plan.

Approximately 34 percent of the planning area would be designated no leasing. Leasing would be prohibited within wilderness study areas and additional leasing would be prohibited within the core area.

In areas of no surface occupancy, surface disturbing activities are prohibited. About 5 percent of the planning area would be affected by this restriction (Map 21 and Table 2-10).

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Access to hydrocarbon resources located beneath these areas must be accomplished by drilling deviated or horizontal wells, which may not always be economically feasible. Directional drilling would increase well cost.

About 60 percent of the planning area is affected by seasonal restrictions (Map 11). Seasonal restrictions limit oil and gas activities to certain time periods during the year. Activities can be prohibited from between 2 and 9 months out of the year depending on the purpose of the time limitation, and number and kind of overlapping seasonal restrictions. This restriction is applied to leases in order to protect, big game winter ranges, certain calving and parturition areas, raptor habitat, mountain plover nesting, and sage grouse nesting areas (Table 2-10). Most of the seasonal restriction overlaps occur during the spring and early summer.

Controls on surface disturbing activities are applied to leases to mitigate adverse impacts. The effect of surface use restrictions can range from no effect, to added mitigation and reclamation requirements, to moving well locations, all the way to prohibiting exploration and development activity. The magnitude of the impact is generally not known until a well has been proposed. About 56 percent of the planning area would be affected by these controlled surface use restrictions (Table 2-10 and Map 22).

The reasonable foreseeable development scenario projected that 202 wells (192 oil and gas wells and 10 coalbed methane wells) could be drilled in the planning area if no restrictions were applied. The impacts of the restrictions on this projection are:

1. an unknown number of coalbed methane wells may not be drilled due to the combined restrictions resulting from no leasing, no surface occupancy and controlled surface use mitigation and reclamation requirements,
2. an estimated direct loss of 32 percent of the potentially drilled oil and gas wells (61 wells) through no leasing,
3. an estimated indirect loss of 35 percent of the potentially drilled oil and gas wells (67 wells) because restrictions (no leasing, surface occupancy stipulations, and mitigation and reclamation requirements) over almost all of the planning area are expected to discourage industry from initiating exploration and development,
4. increased operating costs related to trying to get access for drilling those available well locations and transporting production obtained,
5. in the short term (through 2007), the number of producing wells could increase from 48 wells (46 oil and gas wells and 2 coalbed methane wells) to 61 wells (56 oil and gas wells and 5 coalbed methane wells),
6. in the long term (through 2017), the number of producing wells could decrease to 43 wells (38 oil and gas wells and 5 coalbed methane wells).

Impacts of Fewer Wells

About 74 wells (43 producing wells) are expected to be drilled and 128 wells would not be drilled during the 20-year

analysis period. The new producing wells would account for additional royalty and tax revenue to government. The 38 new oil and gas wells could have a total reserve of 83.6 billion cubic feet of gas. The projected reserves of the expected 5 new producing coalbed methane wells is not known.

The unavailable production from the oil and gas wells not drilled represents unrealized royalty and tax revenue. Sixty-eight of the 128 wells would be expected to produce and they could recover 150 billion cubic feet of gas. Unrealized revenue could be on a total reserve of 150 billion cubic feet of gas from these potential producing wells. Potential revenue from undrilled coalbed methane wells is unknown, since the number of potential undrilled coalbed methane wells could not be determined. Opportunities for direct and indirect employment would also be reduced with fewer producing wells.

Time Delays Related to Restrictions

Barlow and Haun (1994) project an increased demand for clean-burning, affordable, natural gas in the area of the planning area. This increased demand coupled with slower drilling response time, due to high level of restriction on activity, does not allow for timely development of drilling programs. This adversely impacts economics for companies trying to develop the resource. Seasonal access restrictions increase the time needed to acquire seismic data, drill individual wells, and develop discovered fields. These delays do not generally prevent an individual operator from developing the resource, but they do increase costs of field development and slow the industry's response time to attractive increases in product prices. These time delays coupled with the many other restrictions on activity in the planning area are expected to discourage interest in the area and cause some wells to not be drilled. Barlow and Haun (1994) found that "cumulative costs associated with access in the NEPA process can add \$9,500 to \$21,000 on a per well basis."

Significance of Impacts to Oil and Gas Activities

Significance criteria 1, 2, and 3 would be met for the No Action Alternative. Two fields (Nitchie Gulch and Pine Canyon) lie in or partially in the planning area. They both exceed the 5 billion cubic feet of gas criteria. The Nitchie Gulch Field contains 48 wells (see RFD) and the Pine Canyon Field contains 22 wells (George 1992). The well average per field in this area is 35. In comparison, a natural gas field in southwestern Wyoming typically includes 30 to 200+ wells (Barlow and Haun 1994). It appears that at least one average field would not be developed due to direct impacts of not leasing and due to indirect impacts of applying surface use restrictions. Possibly as many as three fields would not be developed due to these restrictions

About 67 percent of expected potential exploration and development activity could not occur due to restrictions. The threshold was determined to be a loss of 25 percent of the potential exploration and development activity.

About 67 percent of expected reserve additions would not occur due to restrictions. The significance threshold was determined to be a loss of 25 percent of the potential reserves.

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The total number of producing wells would decrease by 17 percent over the 20-year study period. This did not meet the significance criteria of a reduction of 25 percent in the number of producing wells.

Core Area

Impacts as a result of restrictions in the Greater Sand Dunes ACEC and Steamboat Mountain ACEC are the same as for the core area since they lie within it. Types of impacts determined for the planning area as a whole, also apply to this area. No further leasing or drilling activity is permitted in this area.

Much of the Nitchie Gulch Field lies within the core area. A detailed reservoir analysis would need to be performed to determine the additional wells that could be drilled in this field. The core area makes up about 14 percent of the planning area. If potential wells were proportioned across the planning area, then 14 percent (27 wells) of the proposed wells could be expected to be drilled here if access were allowed. Some wells would be drilled as development wells within the Nitchie Gulch Field and some as part of another field (possibly as extensions of one or more of the small one- or two-well fields already present). It does not appear that development of an entire field would be precluded as a result of not allowing additional activity in the core area. The criteria #1 impact threshold would probably not be exceeded.

Significance criteria #2 and #3 impact threshold levels would be exceeded within the core area since 100 percent of any expected new exploration and development activity would be precluded. When considered as part of the entire area, the expected 14 percent decrease in activity just in the core area would not exceed the 25 percent threshold for either of these two criteria.

Forty wells have been completed as gas producers in the core area. Thirty of these wells still produce. With restrictions on leasing and exploration and development activity, no new wells could be drilled to replace depleted producers. Over the long term, 29 (97 percent) of these wells are expected to be abandoned, leaving only one producing well. The significant impact threshold for criteria #4 would be exceeded when 25 percent (8 wells) are abandoned.

Cumulative Impacts

Impacts include those expected from all oil and gas development. Present impacts are due to 48 existing producing wells. Short-term impacts (1998-2007) expected are: 14 new exploratory unit proposals; 42 new wells; 22 new producing wells; 20 drilled and abandoned wells; and 7 abandoned producing wells. At the end of 2007 there would be 63 producing wells in the planning area. This would be an increase of 15 wells (10 conventional and 5 coalbed methane wells) over the December 1997 total of 48 wells.

Long-term impacts (1998-2017) expected are: 28 new exploratory unit proposals; 74 new wells; 39 new producing wells; 35 drilled and abandoned wells; and 42 abandoned producing wells. At the end of 2017 there would be 45 producing wells in the planning area. This would be a decrease of three wells (an increase of 5 coalbed methane

wells and a decrease of 8 conventional wells) over the December 1997 total of 48 wells.

Leasables (Other Than Oil and Gas and Coalbed Methane), Locatables, and Salables

Leasables - Coal

A limited amount (10 to 15 acres) of exploration drilling is projected within the Coal Occurrence and Development Potential area during the latter part of the planning period (Map 47). The coal potential area is located in the extreme southern portion of the planning area and includes portions of the general and core areas. The core area would be closed to exploration, surface mining, and the construction of surface facilities related to underground mining. Activity would occur only in that portion of the coal potential area located outside the core area (south and east of Steamboat Mountain ACEC and south of Greater Sand Dunes ACEC). Where exploration is permitted, it would be subject to surface constraints to protect other resource values (Table 3-8).

Exploration drilling would have the same surface constraints as any other surface disturbing activity occurring within the planning area. Such restrictions result in an increased cost of operations and may preclude exploration altogether. Where exploration is precluded, isolated coal bodies would not be mined in the short and long term.

Cumulative Impacts Same as described for the general impact discussion.

Leasables - Sodium

The sodium brine potential area occurs outside the core area in the extreme western portion of the planning area (Map 47). Generally, impacts to development of this resource are created by constraints on related surface facilities. Thus, impacts would occur from air, water, wildlife, cultural, and visual resource management prescriptions. These resource objectives would increase the cost of development and may inhibit some further development in this area. Specifically, the number of facilities and their locations may be relocated or even denied. Development of the sodium brine would result in an irreversible irretrievable loss of the resource.

Cumulative Impacts Same as described for the general impact discussion.

Locatables

The withdrawals recommended in the Green River RMP (USDI 1997) impact mineral location activities. As much as 37,290 acres of public land would be pursued for withdrawal (Table 4-20). Public land withdrawals bar a potential claimant from locating a mining claim on public lands. Withdrawal of these lands from mineral location would exclude them from any additional locatable minerals exploration and development, other than on claims already existing in these areas at the time of withdrawal. The BLM has the option of pursuing validity exams on any existing claims. Should they be found invalid, they would be declared null and void on that basis (and should they be found valid, such claims could be mined and/or patented).

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ACECs, WSAs, and lands closed to ORV use open to mineral entry would affect the mining law program to a lesser extent. Potential claimants may locate mining claims in these areas, but any activity other than casual use requires a Plan of Operations and the posting of a bond. Approximately 109,530 acres of existing ACECs, 117,060 acres of WSAs, and 2,810 acres closed to ORVs would require this Plan of Operation. The largest impact to mining claimants in these areas would be on Notice level operations or operations disturbing 5 acres or less. Notice level operations outside these areas receive a lower level review by the BLM, and a claimant can usually proceed with activities without much delay. Once inside one of these special management areas, a plan of operations is required and a more intensive review by the BLM is required. The claimant is delayed until cultural, wildlife, and threatened and endangered plant and animal surveys are conducted and mitigation is developed to address any concerns. Impacts to other resources, such as livestock grazing and recreation, would also be considered. This environmental review can take more than 90 days to complete due to limited winter access to conduct the proper surveys. In addition to the time delays, developed mitigation would likely increase the cost of developing mining claims.

About 211,130 acres of existing withdrawals (oil shale and coal) would be revoked and may become available for mineral location, which would result in a benefit to mineral location activities.

Cumulative Impacts Same as described for the general impact discussion.

Salables

The Green River RMP (USDI 1997) closed 207,850 acres or about 33 percent (Table 4-21) of the public land within the planning area to the sale of mineral materials. Areas that remain open to development of mineral materials contain primarily shale, claystone, and sandstone and very little, if any, sand and gravel. Where construction requirements specify a certain type of material not found within the planning area, alternate sources outside the planning area are mined and hauled to the construction site.

The Green River RMP FEIS also describes areas where surface disturbance is constrained (in Table 2-8). These controlled surface use areas would adversely impact the access to and use of the surface for recovery of mineral materials. Mitigation measures would increase the cost of doing business, limit timing of activities, and may preclude some activities in both the short and long term.

The disposal of mineral materials from the existing Wyoming Department of Transportation pit along Wyoming Highway 28 would eventually result in the depletion of materials at this site, necessitating the establishment of a new site(s).

Core Area Similar conditions prevail in the core area to that of the general area. The Green River RMP deferred making the decision to permanently close to mineral material sales in Steamboat Mountain ACEC (43,310 acres) until completion of the JMHCAP. Steamboat Mountain is capped by lava, which could be crushed and used as road base except under the No Action Alternative.

Cumulative Impacts The cumulative effect on the mineral materials resource under this alternative is a reduction in the total amount of materials available from within the planning area, with a continued use of existing reserves.

Geophysical

Geophysical exploration includes gravity, geomagnetic, and seismic reflection surveys. Appendix 7-2 of the Green River RMP EIS contains a complete discussion of each survey type. Under the No Action Alternative, geophysical exploration could occur in some areas inside and outside the core area. These activities would be allowed only after a site-specific analysis was completed. The Green River RMP set restrictions, such as limiting the use of vehicles and explosive charges (Table 4-22) in sensitive resource areas inside and outside the core. Sensitive resources include; Boars Tusk, a portion of White Mountain Petroglyphs, Crookston Ranch, developed recreation sites and the ORV parking lot in the Greater Sand Dunes ACEC, raptor nesting sites, portions of South Pass Historic Landscape, Oregon Buttes ACEC, special status plant species habitat, Tri-Territory Marker, Native American respected sites, Wilderness Study Areas, and recreation interpretive sites. Some of these areas, such as the WSAs, would be open to foot traffic only.

Under the No Action Alternative, geophysical activities would be reviewed on a case-by-case basis. Detailed analysis of the potential restrictions would not be available prior to development of exploration proposals. Given the potential resource conflicts between wildlife, cultural, vegetation, and recreation resources and geophysical activities, the direct impact would be an increase in the cost of operations from mitigating impacts to these resources. The cost of geophysical activities would increase due to controlled surface use restrictions, time delays, and seasonal restrictions.

The Green River RMP identified certain areas that would remain open to leasing but closed or restricted to geophysical activities. This situation may indirectly affect overall development of oil and gas resources in those areas and potentially increase the amount of surface disturbance associated with development. If subsurface information can not be retrieved through conventional geophysical means, then operators assume a higher risk during exploration and development of these areas. The presence or absence of geophysical data can mean the difference between more efficient development, with fewer, more productive wells and missing the reservoir entirely. Areas that would remain open to leasing but closed or restricted to geophysical activities may incur less efficient development resulting in more surface disturbance than would otherwise occur were geophysical data available.

Core Area

Under the No Action Alternative, the core area would be closed to further oil and gas development and the issuance of new leases. Geophysical activities would be allowed, even within the Steamboat Mountain ACEC, but would not likely occur given the need for information would no longer exist.

ENVIRONMENTAL CONSEQUENCES

Cumulative Impacts

The cumulative impacts of the No Action Alternative on geophysical operations would be an overall increase in cost to the operator from mitigation and the potential for more surface disturbance to occur as more wells may be drilled to delineate a reservoir due to a lack of geophysical data. These impacts would occur primarily within the southern half of the general area, exclusive of the core. The southern half of the planning area has a moderate to high potential for oil and gas and includes the majority of the areas where geophysical activities would be prohibited or restricted, yet would remain open to leasing.

Off-Road Vehicle Impacts

Approximately 80 percent of the planning area is available for off-road vehicle (ORV) use. Wilderness Study Areas, candidate plant sites, and some cultural sites or 20 percent of the planning area is closed to ORV use creating a small impact to this type of recreation.

There are hundreds of miles of roads and trails available for the public to use. All-terrain vehicle (ATV) use, specifically four wheelers, has been increasing and is anticipated to continue to increase. A leader in the Utah BlueRibbon Coalition has predicted that in the next three to five years ATV use will increase 300 to 400 percent.

The Sand Dunes ORV open area would continue to operate as an open off-road vehicle play area. It is anticipated that the existing small, one-hole vault toilet would be replaced with a bigger toilet. The existing parking lot would be expanded to accommodate the increased use the area is receiving. This would relieve congestion and make the site more user friendly. There is a possibility that more improvements to the site could be made such as an off loading ramp, picnic tables, fire rings, and wind shelters. However, all this would be subject to appropriated dollars which have not been available in recent years.

The Sand Dunes ORV open area lies in the eastern third of the Sand Dunes Area of Critical Environmental Concern. ATV users (i.e., sand rails, all-terrain vehicles) are allowed to drive anywhere on the 10,500-acre active sand dune area. Presently, there are 17 producing gas wells, two pipelines, several storage tanks, and numerous access roads in the area creating health and safety issues. See the impact analysis for the Greater Sand Dunes ACEC.

Cumulative Impacts

Long-term beneficial effects would result from the large amount of area available to off-road vehicle use. The off-road vehicle user enjoys few restrictions on vehicle use.

Recreation Impacts

Visitor use in the planning area will continue to grow based on population increases in the Intermountain West. Visitation to Wyoming's National Parks and Forests is increasing and the public would be looking to the BLM-administered lands to

get away from the crowds. It is anticipated that as developments occur, populations increase, and other traditional recreation use areas become saturated, the integrity of setting and opportunity for unconfined and solitary recreation experiences would diminish. Non-consumptive recreation days are projected to increase by two percent per year during the planning period. About 1.18 million resident and nonresident non-consumptive recreation days would be used in the 20-year analysis period.

The BLM-administered lands in the planning area are noted for the undeveloped, wild nature of recreation opportunities. The only developed sites are the Sand Dunes Off-Road Vehicle Area and the interpretive sites along the Oregon/Mormon Pioneer/California/and Pony Express National Historic Trails. The White Mountain Petroglyphs cultural site is in need of a site plan to control visitor use. This site could be developed within the life of the plan.

Managing for the continued availability of outdoor recreational opportunities, meeting legal requirements for health and safety of visitors, and mitigating conflicts between different types of resource users would solve many of the current problems. Meeting the long-range needs of the public and utilization of recreation resources would be pursued.

Low-investment, resource-dependent opportunities such as backcountry byways, watchable wildlife, and wild horse viewing would be pursued in the area.

Development activities could impact elk, deer, antelope, and sage grouse populations. Lowered wildlife populations could directly affect the number of permits issued by the Wyoming Game and Fish Department. This could affect the quality of the recreation experience.

Cumulative Impacts

It is anticipated that as developments occur, populations increase, and other traditional recreation use areas become saturated, more demands would continue to be placed on recreation sites and facilities in the planning area.

Some hunting opportunities may diminish for the general public but these would be less than the Preferred Alternative.

Socioeconomic Impacts

The JMHCAP economic analysis was based on a 20-year planning period (1998-2017) with 1998 as the base year. In addition to looking at economic impacts by affected resource by alternative, cumulative economic effects are summarized for the short-term (1998-2007) and the long-term (1998-2017) portions of the planning period. The short-term and long-term cumulative effects for Alternative A, Alternative B, and the Preferred Alternative were compared with the impacts for the No Action Alternative on a percentage basis. All dollar figures used for evaluating impacts in the socioeconomic analysis are in current dollars. Economic tables which were used for the analysis in the document are on file at the Rock Springs Field Office.

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Oil and Gas

Sixty-four oil and gas wells and 20 coalbed methane wells would be drilled over the 20-year period of 1998 to 2017. Almost 116 thousand barrels of oil and 84,177 MMCF of natural gas would be produced. The total economic impact for drilling and production would be approximately \$246 million. Employment produced by the oil and gas activity over the life of the project would be 711 annual job equivalents with a total earnings of about \$23 million. On an annual basis, about 36 jobs earning a range of salaries of \$27,180 to \$34,921 would be supported. Economic impacts to oil and gas activities under the No Action Alternative are basically comparable to the Preferred Alternative, less than Alternative A, and more than Alternative B.

Livestock Grazing

Annual grazing AUMs were based on the average of the baseline year actual use (13,038 AUMs) and the total permitted use (26,032 AUMs). The average of the two amounts was 19,535 AUMs (17,379 cattle and 2,156 sheep). This grazing level was held constant throughout the planning period.

Under the No Action Alternative 347,580 cattle AUMs and 43,120 sheep AUMs would be available for livestock grazing during the 20-year life of the project. The total economic impact of livestock grazing would be \$24.4 million. Employment in the livestock sector would be 274 annual job equivalents earning \$16,373 average per year.

Recreation

Average elk hunter days would remain constant over the planning period at 424 hunter days per year. The 424 hunter days would include 65 nonresident days (15.3 percent) and 359 resident days (84.7 percent). Average deer and antelope hunter days are the same as the Preferred Alternative.

Non-consumptive recreation day impacts are the same as the Preferred Alternative.

Under the No Action Alternative, 1.18 million resident and nonresident non-consumptive recreation days would be used in the 20-year life of the project. The total economic impact of the non-consumptive nonresident recreation days would be \$62.7 million. About 19,040 nonresident hunting days (elk, deer, and antelope) with a total economic impact of \$6 million would be realized over the life of the project. Employment in the recreation sector would be 875 annual job equivalents earning approximately \$12,521 average per year.

Short-term Cumulative Impacts (1998-2007) and Comparison of Alternatives

See Table 4-14 in the Preferred Alternative impacts section for short-term physical outputs

The No Action Alternative is basically comparable to the Preferred Alternative and represents a midpoint between Alternative A and Alternative B.

See Table 4-15 in the Preferred Alternative impacts section for short-term economic effects.

Long-term Cumulative Impacts (1998-2017) and Comparison of Alternatives

See Table 4-16 in the Preferred Alternative impacts section for long-term physical outputs.

The No Action Alternative is basically comparable to the Preferred Alternative and represents a midpoint between Alternative A and Alternative B.

See Table 4-17 in the Preferred Alternative impacts section for long-term economic effects.

The No Action Alternative is basically comparable to the Preferred Alternative and represents a midpoint between Alternative A and Alternative B.

Special Status Plant Species Impacts

The impacts to special status plant species from air quality management, fire management, hazardous materials management, coal and sodium exploration, monitoring practices, recreation uses, special management areas, vegetation management, wild horses, and wildlife habitat management would be the same as described for the Preferred Alternative. Factors that adversely affect air quality (e.g., emissions from industrial sites, airborne particulate, etc.) may also affect special status plant species, especially if source areas are located near, upwind, or adjacent to actual plant locations or potential habitat areas. Generally, mitigation and management actions associated with air quality management would benefit and protect special status plant locations and potential habitat areas.

Measures under this alternative call for avoidance of cultural sites to be essentially the same as under the Preferred Alternative. Searches for special status plants prior to disturbing the surface would be likely to prevent most impacts to these species and their habitats.

Impacts from land and realty actions would be similar to those described for the Preferred Alternative. No activity within the core area would provide additional protection to species in the core area. Not concentrating activities in some areas (outside the core) could disturb currently unaffected areas. However, conducting searches prior to activity would provide for protection of special status plants.

Activities such as salting or other activities which concentrate livestock, chemical control of noxious weeds, and conversions of sheep to cattle could contribute to an irreversible irretrievable loss of the plant populations. Management prescriptions, including searches for special status plant species and no surface occupancy requirements in actual plant locations, would prevent impacts to special status plant species from range improvement projects such as wells, reservoirs, and fences.

Salting stations or other apparatus that concentrate livestock activity could damage or remove any of the special

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status plant species. With present livestock numbers, there seems to be insignificant impacts to known special status plant species locations. However, if livestock numbers were increased to the full authorized level, animals would be forced to use areas not presently grazed and special status plant species could be impacted. Riparian areas may provide habitat for special status plant species such as the Ute ladies'-tresses (*Spiranthes diluvialis*). Livestock could have a negative impact on this species where riparian areas do not meet Proper Functioning Condition.

Conversions from cattle to sheep could alter grazing patterns and forage preference, as would season of use changes. Special status plant species locations and potential habitat could be impacted by such management actions. Sheep camps could cause concentration of animals and adverse impacts to these populations.

Under this alternative weeds would generally tend to increase with continued livestock use alongside roads, trails, and riparian areas. Chemical control of noxious weeds could impact special status plant species populations. Roadside spraying could impact populations of the large-fruited bladderpod (*Lesquerella macrocarpa*) on the Tri-Territory Road near Bush Rim. Spraying of riparian areas for whitetop (*Lepidium latifolium*) could also negatively impact populations of the Ute ladies'-tresses should populations occur there.

Appropriate measures to meet rangeland health standards and guidelines would beneficially impact special status plant species by improving degraded native plant communities, providing desirable habitat. Protecting springs and seeps with appropriate fencing would provide additional potential special status plant habitat by maintaining healthy native plant communities in these areas.

Planned drilling of 89 wells outside the core area should not have significant impacts on special status plant species due to applied mitigation methods. Special status plant locations would be managed under a No Surface Occupancy requirement. Clearance surveys in potential special status plant habitat prior to surface disturbing activities and avoidance of special status plant species populations would help ensure that these species would be protected and impacts minimized.

Activities that would avoid slopes would potentially benefit special status plants as many of them are located on rims, slopes and windswept uplands. Unintentional uprooting and squashing damage from vehicular use, and physiological effects of associated dust settling on the plants would contribute to negative impacts.

Winter use could directly remove or destroy habitat, if populations are not avoided or if searches could not be performed prior to designating winter use areas.

Maintaining the closure of the Steamboat Mountain ACEC to mineral material sales would aid in ensuring that this area remains viable as special status plant habitat. In addition, the big sagebrush/scurfpea communities would be protected under a No Surface Occupancy requirement.

Special status plant species locations would be closed to mineral material sales. These actions would prevent damage

to plant populations already inventoried. Potential special status plant habitat would be searched and if plants are found, would be avoided, reducing these impacts to an insignificant level.

Special status plant species and their habitat would be open to mining claims until mineral withdrawals were secured. Clearances for known special status plant species and their potential habitat outside ACECs or for casual use activity of less than 5 acres, would not always be performed, and avoidance may not be required on all mining claims. Development of mining claims could significantly impact these species through an irreversible and irretrievable commitment of resources to mining activity, if the activity occurs on areas occupied by special status plant species.

Withdrawing the 2,650 acres of habitat for the large-fruited bladderpod from new mining claims and mineral material sales would reduce the level of impact to this species to an insignificant level.

Special status plants and their habitat are closed to off-road vehicle use, such as those used for geophysical exploration. Searches would be required in previously unserved areas prior to geophysical exploration to determine the presence of special status plants. If found, they would be avoided. These habitats are also closed to explosives and blasting. Impacts to these species from this activity are expected to be insignificant.

Actual plant locations (about 2,680 acres) would be closed to off-road vehicles. Off-road vehicle use in potential habitat areas would be limited to existing roads and trails; therefore, impacts to special status plant species populations would be minimal; however, unauthorized off-road vehicle use does occur and could impact current populations and potential habitat.

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.

Actions taken to attain Proper Functioning Conditions and restricting surface disturbing activities in riparian areas and wetlands would restore and maintain healthy, native riparian plant communities, providing additional potential habitat for special status plant species, especially the Ute ladies'-tresses.

Transportation plans would be beneficial to special status plant populations as known locations would be incorporated into the plans and these plant locations would then be avoided. Conducting clearance surveys prior to designating access routes would also help protect special status plant species, as roads and pipelines could be routed around special status plant species locations. Rehabilitation of unused roads and trails would stabilize areas and could restore habitat. Some loss of actual and potential special status plant habitat from vehicular use could occur and vehicular access across cushion plant communities, rims, slopes and other sensitive areas where special status plants are commonly found could impact these plants.

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Management actions described to protect visual quality would generally benefit or not impact special status plant species populations or potential habitat.

In general, practices to conserve and stabilize soils would help maintain healthy ecosystems which can support special status plant species.

Core Area

Continuing the no surface disturbance management inside the core area would reduce or eliminate most types of negative impacts to special status plant populations. Continued protective actions specific to ACECs would also reduce potential impacts to special status plant populations. Known locations of the large-fruited bladderpod (*Lesquerella macrocarpa*) would be evaluated on a case-by-case basis to determine if they meet the relevance and importance criteria to be considered for inclusion with the Special Status Plant Species ACEC.

Cumulative Impacts

Activities such as wildfire suppression, salting or areas where livestock concentrate, chemical control of noxious weeds, geophysical activity in potential habitat areas, off-road vehicle use, increased recreation use, trampling by large animals, and conversions of sheep to cattle could contribute to an irreversible irretrievable loss of the plant populations. Development activities, such as those associated with recreation sites and minerals actions, could have an impact on special status plant species in areas where several different resource concerns may limit options for placement of mineral development facilities. However, increased inventory for these species in areas projected for development could provide more information about rare plant species and their status.

Restrictions on wildfire suppression, geophysical activity, and off-road vehicle use would reduce the level of impact. Activity on existing mining claims and unauthorized uses could result in an irretrievable loss of plant populations and habitat. Withdrawing acres with known special status plant species populations or habitat from new mining claims and mineral material sales would reduce the level of impact. However, unauthorized uses could still have some adverse effects on special status plant species.

Intensive development could cause greater impacts to special status plant species because of more conflicting demands on the land and its resources. Although avoidance is the preferred form of mitigation, avoidance of special status plant populations would become increasingly difficult with more concentrated levels of developments and associated activities, potentially leading to listing these species as Threatened or Endangered.

Should new special status plant species be identified, they would be managed under the same prescriptions described above for the known species. Known locations of special status species would be evaluated on a case-by-case basis to determine if they meet the relevance and importance criteria to be considered for ACEC designation.

Vegetation/Woodlands/Weeds and Riparian/Wetland Resources Impacts

Impacts to Vegetation/Woodlands/Weeds

Impacts from air quality management, cultural and paleontological resource management, hazardous material, healthy rangelands, geophysical exploration, monitoring and reclamation practices, off-road vehicles, recreation use, special status species management, vegetation/woodlands, watershed management, wild horses, and wildlife habitat management would be the same as described in the Preferred Alternative

Impacts would be similar to those described for the Preferred Alternative. More acres could be burned in the big sagebrush/scurfpea plant communities as these areas would not be full suppression areas.

Impacts from lands and realty management would be similar to those described for the Preferred Alternative; however, less acreage would be identified for withdrawal from mineral entry which would provide less protection to vegetation.

Livestock grazing systems would be designed to achieve desired plant communities. If current use levels are maintained, these actions would probably have a long-term positive impact on uplands and riparian areas. The vegetation types that would be most affected by livestock grazing would include the saltbush, low density sagebrush, high density sagebrush, aspen, riparian, grassland, and greasewood classifications.

Direct impacts to vegetation would increase under this alternative with increased livestock use, although implementation of standards and guidelines would mitigate these impacts to some degree. Both riparian and upland species would decline in vigor, age and structural diversity, and composition with prolonged seasonal use, higher livestock numbers, or livestock conversions.

Currently, under the No Action Alternative, within the allotments that cover the planning area, there are 26,032 active permitted use AUMs of which about 13,000 were used in 1998. Some localized overuse of forage would continue, primarily in riparian zones, and around watering holes and dunal ponds. Localized overuse of forage can result when an area is grazed by too many animals or for too long a period of time. When forage is overused, plants cannot provide for their own growth, maintenance, and reproduction, so they are eventually replaced by less desirable species, many of which produce little or no forage value. If actual livestock use levels increase to active permitted use of 26,032 AUMs over the next 20 years, more widespread overuse of forage could be expected in riparian areas as well as on uplands. If current management were to continue, which is primarily season long cattle use (see Livestock Management in Chapter 3), it is anticipated that riparian area condition would remain static in trend and not move toward proper functioning condition. See the Riparian section of these Vegetation Impacts for further discussions.

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Trampling and use of dune ponds and adjacent riparian habitat by livestock would continue to occur. These areas are ecologically fragile and can easily deteriorate from sustained surface disturbing activities such as livestock watering and from livestock grazing.

Season of use changes or increased use of previously lightly used areas could result in significant reductions in the existing forage base for wildlife. In addition, use in stabilized dune areas could cause blowouts and destabilization of the dunes by removing vegetation needed to hold the sand.

Rangeland water project construction and implementation would not occur under this alternative, so no vegetation would be affected by these actions. Areas around existing water sources receive more utilization than the adjacent uplands with increased bare ground, weed invasion, and soil erosion. This would continue in the long term as no new waters would be developed. Stock ponds which fail have the potential for infestation of weeds until natural plant succession proceeds.

Mechanical manipulation of vegetation (chaining, chemicals, contour furrowing, ripping, etc.) has not been identified but has not been ruled out. These activities would result in a change in vegetation composition and would temporarily remove target species. Chemicals used to remove sagebrush and noxious weeds could impact nontarget vegetation on localized areas.

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 AMPs or better distribute livestock. In wetlands, fencing would control livestock use and improve habitat and watershed condition. More diverse vegetation would be produced and soil erosion would be reduced.

Livestock conversions from sheep to cattle would generally cause additional utilization of riparian vegetation. Conversions from cattle to sheep would generally result in greater utilization of upland areas and shrub species.

Allocation of unallotted forage, or changes in season of use would open new areas to livestock grazing and forage utilization. Increased utilization in these areas could result in species composition changes or a decrease in vegetative production and vigor.

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. Declines in soils conditions, plant cover and species composition encourage the invasion and growth of noxious weeds.

Early spring grazing would also negatively impact range grass and forb species by the trampling of wet soils, uprooting seedlings, and mechanical injury to both mature plants and new seedlings.

A total of 89 wells are predicted in this alternative. Construction of drill pads, roads, facilities, pipelines, powerlines,

and other structures associated with oil and gas operations would result in the loss or removal of vegetation from 2,300 acres over the next 20 years. Reclamation of disturbed sites would be accomplished on approximately 1,900 acres; therefore, total net loss of vegetation is expected to be approximately 380 acres over the next 20 years.

Placing well locations or access roads in stabilized dunes would cause direct loss of anchoring vegetation, creating active dunes which may not stabilize with natural vegetation within the analysis period (20 years). One such stabilized dune plant community, the basin big sagebrush/lemon scurfpea association is not known to exist elsewhere in the country. Disturbance of this plant community would likely result in the long-term loss of this unique vegetation type for the life of this plan.

Activities associated with coalbed methane projects are expected to remove vegetation from approximately 229 acres over the next 10 years. Reclamation of disturbed sites is expected to occur on approximately 177 acres; therefore, there would be a net long-term loss of vegetation from approximately 52 acres.

Some mitigation measures (such as directional drilling and limiting the number of well pads per section) may not be applied if costs are unreasonable on existing leases. Restricting the types of mitigation to be applied could increase impacts. The acres of disturbance shown above assumes that each well would have a pad, road, and pipeline.

Big sagebrush/scurfpea and other mountain shrub communities would be open to coal exploration and some development under this alternative. Removal of the plants and deterioration of their habitat would have long-term negative impacts on these communities through direct removal of the plants, and the long re-establishment times required by these shrubs.

Areas of sensitive vegetation, such as the big sagebrush/scurfpea communities, would be open to sodium exploration activities, potentially causing direct negative impacts to these plants and their habitats by removing the plants and long-term loss of habitat. Big sagebrush/scurfpea and other sensitive plant communities would be open to mineral material sales, potentially causing removal of the plants and deterioration of the habitat.

Known rare plant communities, such as the only known community of big sagebrush/lemon scurfpea and good representative areas of sagebrush-grass communities, could be lost to mining claim activity as mineral withdrawals would not be pursued and no special protection currently exists for them. The majority of the few aspen communities in the planning area (the northern elk birthing areas) would be open to location, resulting in direct removal of the trees, and conversion of the habitat to non-woodlands. Location of mining claims on Steamboat Mountain (within the ACEC) would cause potential destruction of the springs and seeps located in these areas, and direct loss of the significant vegetative resources they support.

Management actions described to protect visual qualities, special management areas, wildlife habitat, watershed values

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and to reduce channel erosion would generally benefit and protect native vegetative communities. In addition to lands, livestock grazing, and minerals activities, some short-term disturbance of vegetation could be expected due to construction of wildlife habitat and watershed improvement projects. Activities in the stabilized dunes would have long-term effects on the shrubs, as containerized shrub seedlings would not be required, therefore taking an extra 20 to 50 years for shrubs to re-establish.

Weeds are expected to increase under this alternative as a result of surface disturbing activities. Weeds have direct, negative 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. The first, and only, known occurrence of leafy spurge (a particularly persistent and noxious plant species) in the Rock Springs Field area was observed in the Honeycomb Buttes area. Extensive infestations of perennial pepperweed on Jack Morrow and Pacific Creek, and a population of leafy spurge in the Honeycomb Buttes area would likely increase with continued activity such as livestock use.

Surface disturbing activities such as those associated with roads, pipelines, well pads, coal and sodium exploration, locatable mineral exploration and development, and mineral material sales would disturb about 2,500 acres in the long term. Reclamation practices would restore vegetation to all but about 600 acres in the long term. Although vegetative reestablishment would occur, some original plant communities would not be reestablished for more than 20 years. This particularly applies to shrubland communities and the big sagebrush/scurfpea communities and stabilized sand dunes. Impacts are not expected to be significant because few of these communities would be disturbed with current management actions.

The effects from travel management action would be similar to the Preferred Alternative, except there would be fewer seasonal road closures and limitations on riparian area crossings. There would be more impacts to vegetation than under the Preferred Alternative.

Impacts to Riparian/Wetland Resources

Impacts to riparian/wetland resources from air quality management, hazardous materials, healthy rangelands, off-road vehicle use, recreation use, special status species, vegetation management, watershed management, wild horses, and wildlife habitat management would be the same as described in the Preferred Alternative.

Management of cultural sites is generally for the protection or preservation of such sites. These types of actions, if they occur near riparian areas, generally would benefit these also. However, excavation of cultural sites in or near riparian areas could cause short- to long-term negative impacts. Erosion could increase and sedimentation of streams could occur if not adequately mitigated (e.g., seeding, protective barriers, etc.). No activity of this type is anticipated at this time but if it should

occur a site specific mitigation plan must be developed to mitigate any negative impacts (i.e., reclamation, seeding, recontouring, etc.).

The impacts of fire management activities would be similar to the Preferred Alternative; however, additional acres could be burned since there would be fewer full suppression areas.

Impacts from lands and realty management actions would be similar to the Preferred Alternative; however, fewer acres would be considered for withdrawal from mineral entry, and there would be fewer avoidance areas for rights-of-way which would allow impacts to sensitive resources.

For wetlands and riparian areas, the minimum standard is Proper Functioning Condition (PFC). Stream (lotic) inventories began in 1995 and were completed in 1999. The ratings for lentic riparian areas (bogs, marshes, ponds, wetlands, and wet meadows) have not been completed. Twenty percent (16.5 miles out of 79.95 miles) of the stream (lotic) riparian areas in the Jack Morrow Hills planning area are in PFC. A significant portion (40 percent) is in upward trend and an equally significant portion (40 percent) is in downward or "not apparent" trend. These data were collected in 1995-6 when a significant amount of non-use by livestock was occurring. Not all of the poor conditions in riparian areas are due to livestock grazing; however, livestock grazing, roads, and water diversions create the most significant impacts to the riparian areas in the planning area. However, it is known that season long use by livestock, concentrates use around riparian areas during the hot season, and that later fall use tends to be adverse to riparian plants.

Rotations of livestock are not well established in any of the allotments and season long use results. Such concentrations and extended use tends to increase erosion, accelerate headcuts, decrease streambank stability, convert shrub communities (where they have the potential to exist) to a more herbaceous community, etc.

Within the allotments that cover the planning area, there are 26,032 AUMs of active permitted use of which about 13,000 were used in 1998. If current management were to continue, it is anticipated that riparian areas would remain static in their ecological progression or trend and not move toward proper functioning condition.

The assumptions for this alternative are that utilization levels would not exceed 50 percent for uplands and riparian areas as an end of the year measurement and that active AUMs would remain where they are. With these levels of use, it may not be possible to recover degraded riparian areas and move them toward a proper functioning condition or to maintain healthy conditions. Not allowing water developments in select areas may render some areas unsuitable for grazing use by livestock. This may also affect the use in riparian areas if no other actions are taken to protect them.

Guidelines for appropriate turn out dates (boot stage on plants), an active permitted use level of an average of 17,941 AUMs (which is the 5-year average), riparian vegetation utilization not to exceed levels of 40 percent on shrubs, 35

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percent “relative use” on herbaceous plants or an 8-inch stubble height, eliminating any season long grazing, conducting suitability reviews, taking aggressive appropriate actions for Standards and Guidelines that would bring riparian health to PFC, all would benefit riparian health and productivity. It is assumed that under the actions substantial progress toward riparian health and Desired Plant Communities would be achieved.

Surface disturbances can cause increased erosion and sedimentation in riparian areas and streams. Stipulations are in place to locate fluid mineral developments a minimum of 500 feet away from wetlands, riparian areas, 100-year floodplains, etc. This helps to create an adequate buffer zone of vegetation from these areas to trap sediment (and potential hazardous materials) and spread out runoff water. Placing disturbances inside of this margin is highly discouraged and cannot take place without additional stringent mitigation (such as, barriers, closed drilling systems, special grading and runoff controls, etc.). Placement of facilities in riparian areas and wetlands is prohibited. Linear crossings by pipelines is allowed with special considerations (see ROD Appendix 5-1, page 157). This would keep impacts from sedimentation to a minimum.

A total of 74 deep oil and gas wells are predicted in this alternative. Considering the pads and the associated roads, pipelines, and other necessary disturbances, the total acres of surface disturbance of around 2,200 acres seems minimal. Although some of these wells would be “scattered” throughout the area, some may end up being “clustered” in areas of greatest production or potential. This could increase erosion and concentrate runoff in certain drainages. The specific level of impact cannot be determined because specific locations for activities are unknown. With adequate mitigation, though, and by adhering to the stipulations currently allowed, the negative impacts to riparian areas, wetlands and fisheries should be low. Because of the increase in road and well pad density within watersheds (which would result in augmented flows in channels and streams) and because of the current instability of the riparian areas and soils, it is imperative that stringent mitigation measures and construction practices be adhered to in order not to have a negative impact. Some mitigation measures (such as directional drilling and limiting the number of well pads per section) may not be able to be applied if costs are unreasonable on existing leases. Restricting the types of mitigation to be applied could increase impacts. The acres of disturbance shown above assumes that each well would have a pad, road, and pipeline.

In addition, 15 coalbed methane wells would be drilled on existing leases. They would be clustered in the sand dunes area. These are shallow wells (900 to 1,000 feet deep). In the process of coalbed methane production, large volumes of water are pumped from the aquifer at that level. It is unknown at this time if the aquifer at this level is directly connected to the surface water in the dunal ponds and wet meadows. If it is, there may be an adverse effect of drying up the riparian in the area. This would not only affect the riparian plants but all of the wildlife that depends on those plants, insects, and surface water.

Hard rock mining (locatables) could pose significant threats to aquatic resources, especially when involving dredging or placer mining. The highest potential for this type of activity is in the Oregon Gulch area. Though there is no commercial activity anticipated at this time there is active prospecting in the area with the potential to create accelerated erosion.

Demand for other types of mineral development (salables) such as gravel pits, etc., would increase with gas development but these areas would be located away from riparian areas and streams and should have negligible impact to these resources.

No coal or sodium extraction is expected, thus no impacts are anticipated.

Geophysical activities currently have sufficient protective stipulations in the Green River RMP to eliminate impacts to riparian areas and streams.

Core Area

No new surface disturbance in the core would reduce short- and long-term impacts to vegetation. Road densities would not be established, allowing additional disturbance in special management areas outside the core. Livestock grazing could increase, affecting vegetation communities. Livestock grazing on stabilized dunes would be detrimental to native plant species, and would likely cause areas of destabilization, loss of native plants and acceleration of weed invasions. Implementation of use levels and assessment of standards and implementation of guidelines would reduce this effect.

Cumulative Impacts

Management actions implemented to control dust along dirt roads would permit vegetation to be more productive and vigorous. Localized overuse of forage would continue and could increase if full livestock permitted use is authorized. Riparian areas should improve over the long term, as proper functioning condition is achieved.

Both short- and long-term impacts would occur from not constructing rangeland improvement projects. Vegetation would not be removed for such improvements which would benefit the vegetation communities; however, a long-term adverse effect to overall vegetation production could occur, through a lack of improved livestock use distribution.

Surface disturbing activities would remove vegetation from an estimated 2,500 acres. An estimated 1,900 acres would be reclaimed. After reclamation, roughly 600 acres would be disturbed in the long term.

Both short- and long-term impacts to vegetation would result from anticipated increased recreational activity. With road closures and transportation planning, off-road vehicle use may be restricted to specific roads and trails, or areas may be closed to off-road vehicle use.

Vegetation and habitat quality would improve in some areas. However, more surface disturbance from development, recreational, and ORV activities would occur. Impacts could become greater when high intensity development occurs over broader areas. One result could be a reduction in

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forage availability and, consequently, livestock and wildlife use. Weeds would also increase and in some places, impacts would be considered long term due to the difficulty of eradicating established weed infestations.

Surface disturbing activities and uses in the stabilized dune areas would cause an increase in wind erosion of soil and long-term loss of vegetation. Disturbance of the unique big sagebrush/lemon scurfpea plant community on the stabilized dunes would likely result in the long-term loss of portions of this unique vegetation type.

Lands actions (rights-of-way for roads, pipelines, water diversions, well pads), livestock management and minerals development of all types have the greatest individual impact to riparian/wetlands. The combination of these actions compounds the effects that this vegetative type has to accommodate. Effects include increased peak flows, increased sediment loads, chemicals, decreased vigor in plants, structural changes in plant communities, unstable stream banks, etc. Under this alternative, all current possible mitigation measures to correct problems in riparian/wetland areas are not being applied. With the assumptions of this alternative in effect, reversing the downward trends or correcting the problems in the riparian areas might be achievable but the progress may be very slow.

Visual Resource Management Impacts

No additional development in the “core” would maintain the current Visual Resource Management classes in the Sand Dunes and Steamboat Mountain ACECs.

The initiation of a program to improve the visual quality of the oil fields would benefit the visual resources in those areas and, in many cases, would benefit other resources such as soil, watershed, and vegetation. The avoidance of identified areas which are not suitable for linear rights-of-way would protect the sensitive visual resources in these areas.

Protecting National Historic Trails and other trails by not allowing visual disturbance, by applying surface constraints to important cultural sites, and limiting geophysical vehicles to designated roads and trails in the South Pass Historic Landscape would enhance visual values and protect the visual sensitivity of these resources and areas.

Not allowing surface mining activities and surface occupancy areas around the Boars Tusk and the Steamboat Mountain-Killpecker Dune Fields, including the wild horse viewing area, would retain and enhance visual resources found in the area.

Cumulative Impacts

Same as described for the general impact discussion.

Watershed/Water Quality Impacts

The impacts on watershed values and water quality from air quality management, cultural and paleontological management, hazardous materials, monitoring and reclamation practices, economic benefits, special status species, and wild

horses would be the same as described in the Preferred Alternative.

The impact on watershed values and water quality from fire management activities would be the same as described in Alternative A. Fire suppression activities and the associated potential for increased erosion from suppression activities and potential long-term benefits would be similar to the Preferred Alternative but would differ in that aggressive fire suppression would not occur in the big sagebrush-scurfpea areas.

Implementation of Standards and Guidelines for Healthy Rangelands would reduce the effects to watersheds and water quality from surface disturbing activities, recreation uses, and livestock grazing. The differences between the alternatives can be expressed in the level of conflict that could occur between the actions that would take place under each alternative and the goals set forth by Standards and Guidelines. The No Action Alternative would create a level of conflict between proposed actions and Standards and Guides somewhere between the Preferred Alternative and Alternative A.

The overall impacts on water quality from lands and realty actions would be similar to those described in the Preferred Alternative. As most of the disturbances associated with communication sites would be away from riparian areas and streams, the effects of the creation and maintenance of communication sites would be less than an equivalent disturbance located closer to water courses. The disturbance created by the creation and maintenance of communication sites has the potential to affect watershed values and water quality, as does any disturbance.

Transportation corridors would not be limited as in the Preferred Alternative and Alternative B, which could create more disturbance over a wider area. The overall disturbance would most likely be closer to Alternative B than Alternative A. More areas would be open to consideration for communication sites and impacts could be greater than described for the Preferred Alternative.

Livestock grazing has a major influence on land and stream conditions and thus erosion and water quality. Implementation of existing programs (primarily standards for healthy rangelands and guidelines for livestock grazing management), as well as the management actions in this alternative would aid in improving watershed.

Livestock grazing, roads, and water diversions can alter conditions in riparian areas. However, not all of the impaired conditions in riparian areas are a direct result of livestock grazing. For riparian impacts, see Vegetation Impacts.

Activities that decrease plant vigor can increase erosion and decrease water quality. Depending on the actions taken, specific areas may show some changes, positive or adverse, but the overall trend would be closely related to the level of surface disturbing activities.

Impacts to soils from grazing can be caused by overutilization of riparian and upland areas leading to soil compaction and vegetative removal. This can lead to loss of the soil surface, rill, and gully formation which could impact water quality through more rapid runoff and higher sediment loads.

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Livestock could contribute to the degradation of areas that might cause further concern depending on their location. Areas in very erodible soil structure could have the possibility of washing, blowing, or being removed from further beneficial purposes.

The rate of progress towards achieving water quality goals would be closer to the Preferred Alternative than Alternative A under the No Action Alternative.

Road construction could change the patterns of overland flow and increase erosion. In addition to concentrating surface flows by interrupting natural surface flow patterns and concentrating them in ditches and culverts, roads and well pads reduce groundwater infiltration through soil compaction. This can increase the erosive potential of runoff events by creating a shorter period of runoff and an increased volume. Drainage ditches, culverts, and surfacing can channelize surface flows and direct them away from the road surface. While this helps protect the road surface, it can also increase erosive potential along the path of concentrated flow. Proper design, construction, and maintenance reduce the erosive potential for road and well pad areas but do not fully compensate for the concentration of flows.

Impacts to surface water quality from oil and gas development are generally the result of unsuccessful reclamation and/or increased runoff from pads and roads, destabilizing drainages. With effective monitoring from industry and management from the BLM, most individual well sites and mines should have only a short-term impact on watershed stability.

Other concerns which could arise include: sedimentation, soil contamination, salt and phosphate loading, groundwater contamination, bank and channel instability, loss of aquifers, augmented flows, and water disposal.

Because of the areas that would be closed to gas and oil development the amount of disturbance to the surface from these actions under the No Action Alternative would be closer to the Preferred Alternative than Alternative A. This would be reflected in the rate of achieving water quality goals

The effects of coalbed methane development would be similar to those described for the Preferred Alternative. In comparison to the other alternatives, there is a moderate potential for disturbance and water quality degradation. The closure of the core area would limit the area of development and thus the area disturbed.

The overall impacts from the extraction of mineral materials would be similar to those described for the Preferred Alternative. Because much of the development is unknown, the exact amount of disturbance is difficult to forecast. However, the Steamboat Mountain ACEC would remain closed to mineral material sales which would reduce the potential for erosion from mineral materials activities.

Surface disturbance impacts associated with coal exploration would be similar to those described in the Preferred Alternative. Areas closed to coal exploration activities (about 218,420 acres) would not be affected (Table 3-8). The Steamboat Mountain ACEC would remain closed to coal exploration activities.

About 10 acres would be disturbed from sodium exploration and development activities. Surface disturbance in the long term would be about 3 acres. Wastewater ponds would not occur within the planning area, so no direct impacts would occur from ponds associated with water disposal. About 218,420 acres would be closed to sodium prospecting. No impacts would occur in these areas.

The impacts of ORV and recreation use would be similar to those described for the Preferred Alternative. Impacts would be moderate because of the maintenance of seasonal road closures and the development of planned recreational sites. The exact level of disturbance is unknown.

Surface disturbance is closely tied to water quality. The greater the disturbance in time and area and the closer to places where the flow of water is concentrated the greater the potential for erosion. Because much of the development would take place on a case-by-case basis, the exact amount of disturbance is difficult to forecast.

The No Action Alternative would allow for moderate development in areas outside the core. The area would see an increase in surface disturbance that would be moderated by transportation planning. A lack of road densities would have some adverse effect; however, this would be reduced by the closure in the core area. About 2,500 acres would be disturbed over the long term from various activities. With reclamation, most of this disturbance would be reclaimed with a net long-term disturbance of about 550 acres.

Roads are one of the primary sources of erosion in the planning area. They tend to concentrate the overland flow and reduce infiltration. They can often be thought of as a set of superimposed ephemeral stream channels. As roads become more numerous, their effects become cumulative and may even work in combination to create greater levels of erosion. Road maintenance is also important. Timely maintenance of road surfaces can reduce erosion. Maintaining as much of the right-of-way in an undisturbed or revegetated state as possible would reduce both maintenance cost and erosion. Surfacing of major arterial roads with appropriate materials would also help limit the potential for soil erosion and reduced water quality. By not applying road densities, there is a greater potential for erosion than if the number and position of roads were planned.

As a general rule, the greater the vegetation cover, the less erosion and the better the water quality. A more diverse community is generally healthier. Implementation of standards (for healthy rangelands) and guidelines (for livestock grazing) would have an effect upon the vegetative communities. The differences between alternatives may not vary dramatically.

Vegetation removal can adversely impact stream hydraulics. Vegetation removal can cause an augmented flow regime which forces the stream channel to readjust its width and depth to accommodate the larger more rapid flows where vegetative conditions are impaired. Sedimentation would increase, due to a lack of filtering ability of the vegetation.

Vegetation manipulation to enhance wildlife habitat such as controlled burns, mowing, and chemical applications could

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cause short-term impacts to physical and chemical characteristics of soils, increasing erosion susceptibility through the loss of both ground cover and litter accumulation. Over the long term, areas of treated vegetation should increase over pretreatment production levels which would decrease the erosion hazard.

Under the No Action Alternative, vegetative conditions would most likely remain static. Overall progress towards the stated goals would most likely be static to moderate with a relatively high sensitivity to disturbance.

Wildlife habitat management has some effect on land, water and vegetation quality. Sufficient wildlife habitat creates a more varied environment that is better able to slow and filter overland flow, reduce erosive forces, and recover from disturbances.

The existing Green River RMP and standard mitigation provide for a level of habitat diversity that would most likely contain all the required elements but would be under greater stress and have less opportunity to expand than that proposed under the Preferred Alternative or Alternative B.

Groundwater

Oil and gas and coalbed methane activities have the highest potential for impacting groundwater and surface water quantity and quality. Refer to the groundwater discussion in the Preferred Alternative for a detailed description of the possible impacts and specifically, the hydrological investigations that may be necessary for coalbed methane development. Under the No Action Alternative, the core area would be closed to new oil and gas and coalbed methane activities, while the area outside the core including the connectivity area would be open to new development with fewer restrictions compared to the Preferred Alternative and Alternative B. Consequently, more oil and gas and coalbed methane development is projected for the general area under the No Action Alternative than in these other alternatives. Therefore, the potential for impacting groundwater and possibly surface water resources would be greater than that projected for the Preferred Alternative and Alternative B. The No Action Alternative would be comparable to Alternative A with respect to the level of restrictions and areas open to development. The impacts would be similar between these two alternatives.

Core Area

No new oil and gas or coalbed methane development would occur within the core. Therefore, no impacts, as described in the Preferred Alternative, would be anticipated, except as may occur with continued operation of existing facilities. Continued operations may result in accidental spills. Spills would be cleaned up by the responsible party (43 CFR 3160).

Compared to the other alternatives, the No Action Alternative would have the least potential for impacting groundwater and surface water resources within the core area. All other alternatives would allow some level of new development to occur, where as, this alternative would not allow any new development.

Cumulative Impacts

The cumulative impact summary for the baseline watershed analysis would be the same as described for the Preferred Alternative.

Livestock grazing related erosion would most likely continue to be influenced by implementation of individual grazing practices and other activities that influence the distribution and timing of livestock use. Stream banks and riparian areas would most likely continue to be the focus of erosion reduction related activities. The greatest potential for erosion would occur along streams that had not achieved the minimally acceptable standard of PFC.

Surface disturbing activities would most likely occur in areas with high oil and gas potential. Given that the core area is closed to further development under this alternative, existing disturbances within the core would continue and most if not all new disturbances would occur outside the core area. As the resource distribution determines the level of activity, this might cause a more rapid development of some areas outside the core but the amount of disturbance would be about the same. This more rapid development in limited areas could cause a local increase in overland flow and potential erosion.

The potential level of cumulative disturbance to watershed values is directly related to the amount, timing, and location of surface disturbance. The primary causes of surface disturbance within the planning area are mineral development and livestock grazing improvements. Under the No Action Alternative, the overall level of disturbance would be low in the core area because of the lack of development activity but higher in the surrounding areas. Some of the streams within the planning area are recovering or have reached the minimum condition of PFC while others are showing less than desired results. This alternative would most likely produce an overall level of disturbance close to that of the Preferred Alternative. The higher levels of activity outside the core area, coupled with increased pressure from recreational activities, could create a zone of concentrated disturbance that could raise the level of concern affects over that of the Preferred Alternative.

The cumulative impact on groundwater resources over the planning period for oil and gas development is likely to be minimal and insignificant given the projected yearly drilling rate of 4 to 5 wells per year. Due to the lack of information, the cumulative impact on groundwater aquifers due to coalbed methane development cannot be determined. Investigation of aquifers and their possible connection to surface waters prior to development would provide the information necessary for determining cumulative impacts and any necessary mitigation.

Wild Horse Impacts

The impact on wild horses from air quality management, fire management, hazardous materials, off-road vehicle and recreation use, reclamation practices, wild horse management, and wildlife habitat management would be the same as described for the Preferred Alternative.

The management of cultural sites and properties is generally low impact and relegated to relatively small areas. Even

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under the most intense management (excavation) the amount of acreage disturbed is very small. These activities are not anticipated to have measurable impact on the forage resource for wild horses. The most likely impact to wild horses is temporary displacement while human activity occurs on the site. Once activity ceases, the horses would quickly re-occupy the area. Horses quickly adapt to human activities that are regular and long term in nature.

Numerous activities, such as pipelines, utility corridors, and other linear rights-of-ways, have the potential to impact wild horses and their management. These impacts involve the removal of vegetative cover and disturbance caused by human activity.

Standards for reclamation of linear surface disturbances are adequate to mitigate any potential impact to wild horses through vegetative removal. Impacts due to the actual location of linear facilities and the attendant human activity that goes with them are more problematic.

Without restriction on the actual location of these types of facilities it is likely that they would be located in areas of important habitat for wild horses. The most important of these are permanent water sources. Linear facilities would not be located on a pond; however if located immediately adjacent to a water source, could reduce its utility or totally preclude wild horse use of the water, if human activity is too disturbing. An impact such as this becomes cumulative when more animals must use fewer water sources and therefore less habitat, at some point competition would ensue, animals would die, and habitat quality may be altered for wild horses and other species.

Assessment of grazing allotments for conformance with Standards for Healthy Rangelands and implementation of appropriate actions to address non-conformance would be beneficial to wild horses and their habitat. Other appropriate actions proposed for livestock grazing may include additional fencing. Very little fencing presently exists within the wild horse herd management area and the entire planning area. Fencing within the wild horse herd management area could cause negative impacts to wild horse use of traditional habitats disrupting migration patterns and overall wild horse distribution. However, by policy any new fences in the wild horse herd management area can not interfere with the wild and free-roaming nature of the wild horses.

Reductions in livestock use has the most potential to produce benefits to wild horses and their habitat in the short term. Under this alternative this tool would only be used if it is the only appropriate action that can address non-conformance with the standards for healthy rangelands and guidelines for livestock grazing. Any forage or water use competition between wild horse and domestic livestock would continue.

Current seasons of use by domestic livestock would continue. There would be no additional impact to wild horses from this action.

Changes in class of livestock could be beneficial to wild horses or produce negative impacts. Whether the actual impact is positive or negative, and the scope of the impact is

largely dependant upon what class of animal is being considered. Generally, dietary overlap, and habitat preference between wild horses and cattle are greater than for wild horses and sheep. Therefore, as a rule, if cattle are converted to sheep it would benefit wild horses. Conversely, conversion from sheep to cattle would have negative impacts on wild horses.

Removal of areas unsuitable for livestock grazing from the forage base for domestic livestock would benefit wild horses and their habitat. Other beneficial actions under this alternative include the establishment of use limits of 50 percent on key upland and riparian forage species, establishing PFC as minimum acceptable level for stream function, and the inclusion of riparian desired plant communities in grazing management plans.

The decision to not conduct vegetation treatments, where these treatments have the potential to improve wild horse habitat is a negative impact. To construct no new range improvements is mostly positive to wild horses with the exception of water developments within the wild horse herd management area where additional water would improve habitat quality and wild horse distribution.

The minimal amount of surface disturbance expected to result from predicted oil and gas activity would cause negligible impact to wild horse habitat. Some temporary or permanent displacement from areas experiencing increased human activity due to mineral development would occur. Most of the wild horse herd management area is located in areas of low potential for hydrocarbon development and wild horses tend to adapt to human presence over time; however, exactly where development would occur could have a major influence on the level of impact on wild horses. If activity is located outside the wild horse herd management area and away from critical habitats, there would be negligible impact to wild horses. Should activity be increased inside the wild horse herd management area and be located on critical habitats, impacts to wild horses due to oil and gas development could occur.

Large scale mining of locatable minerals would have the potential to negatively affect wild horses. Mines by their nature are very single use developments that are long term in nature. Once a pit is opened the area of the pit no longer provides habitat for wild horses. Dredging or placer mining causes negative impacts on streams which could pose serious threats to the long-term viability of wild horse habitat in the wild horse herd management area. Salable mineral activity is not expected to have any impact on wild horses.

Many of the planned actions to mitigate or limit impacts to surface resources from surface disturbing activities have been discussed in other sections (minerals, reclamation, livestock grazing, and lands and realty management). Under all alternatives, controls on surface disturbance benefit wild horses and their habitat. The alternatives vary only in the degree of benefit. Alternative B and the Preferred Alternative are more beneficial than are the No Action Alternative or Alternative A.

Establishment of a one-half mile buffer around the proposed wild horse viewing area would protect the public's ability to enjoy their wild and free-roaming horses in a natural

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setting. It would also increase the likelihood that wild horses would be in the vicinity of the viewing area more often.

Developing Desired Plant Communities within grazing allotments that provide adequate forage for wild horses would be beneficial. Most vegetative treatments would have positive impacts on wild horses and their habitat.

Management actions to stabilize and conserve soils, increase vegetative production, maintain or improve surface and ground water quality, and to maintain or improve wetlands, floodplains and riparian areas would benefit wild horses and their habitat. Under all alternatives, improvement of the soil, vegetation, and water resources benefit wild horses and their habitat. The alternatives vary only in the degree of benefit. Alternative B and the Preferred Alternative are more beneficial than are the No Action Alternative or Alternative A.

Core Area

The impact on wild horses would be the same as described for the Preferred Alternative. Only a very small portion of the Great Divide Horse Herd Management Area lies within the core area, connectivity areas, and the ACECs. Due to the limited area of overlap with the wild horse herd management area, it is anticipated that no impact to wild horses or their habitat would result from these activities.

Cumulative Impacts

Under all alternatives, no significant cumulative impacts to wild horses and wild horse management are anticipated.

Wildlife Impacts

Effects from air quality, cultural, fire, off-road vehicles, reclamation, recreation, special status species plants, surface disturbance, vegetation, watershed/water quality, and wild horse herd management would be the same as described for the Preferred Alternative.

The effects from lands and realty actions would be similar to those discussed in the Preferred Alternative. In addition, preventing activity in the core area would benefit wildlife and wildlife habitats by preventing disturbance and disruption in this area.

Although no surface disturbance would occur in the core under this alternative, potential exists for increased access into the core due to roads surrounding this area being opened year round by adjacent oil and gas development, coalbed methane development, and increased mining activities.

Steamboat Mountain, Oregon Buttes, and Continental Peak would be closed to communication sites which would benefit big game, especially during winter periods.

Locatable mineral activity (mining) in and around parturition areas in the Oregon Buttes area 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 the parturition areas. These areas are also important to a variety of raptors, neotropical

birds, and other wildlife and is a rare habitat type in the planning area. Although current 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.

The effects from livestock grazing would be similar to those discussed in the Preferred Alternative except that no new livestock water developments would be authorized. This would benefit big game species by reducing the competition for forage, while helping sage grouse by increasing the residual herbaceous cover needed for nesting and brood rearing.

No surface disturbing activities in the core area would protect some of the most pristine and important habitat for all wildlife species that inhabit the planning area. However, the core area alone can not support big game numbers agreed to by BLM, WGFD, and the public under this alternative. Leasing outside the core with the prescriptions listed in Table 2-10 would not adequately protect big game habitat or assure a viable elk herd would still occur in the area due to habitat fragmentation and human disturbance.

Under this alternative, 89 wells would be drilled over the life of the plan. Because the core area is unavailable under this alternative, most development would occur within the migration corridors identified by the WGFD. This would increase traffic and add additional oil/gas field activities into the field of view of the Steamboat Mountain elk herd and other wildlife species. Seasonal mitigation for surface disturbing activities (November 15 to April 30 for crucial winter range and May 1 to June 30 for parturition areas) would not provide adequate long-term protection for big game. Normal operations and activities conducted during the production phase and during crucial winter periods could interfere with big game use of winter ranges. In addition, animal access (migration) to key winter ranges could be disrupted or interrupted, resulting in risk to the long-term survival of the area's elk herd. These impacts could include abandonment of habitat, increased mortality, and a decrease in successful fawn and calf rearing.

Lack of constraints on road densities under this alternative would likely eliminate elk use from areas with road densities greater than 0.5 mile of all weather roads per square mile. Studies have shown elk areas on the Bighorn National Forest that averaged 0.43 mile of road per square mile, while areas that had road densities greater than 0.5 mile of road per square mile showed greatly reduced use by elk (Sawyer 1997). This study was conducted where forested habitat occurs. There is much less cover for elk in the planning area, and disturbance due to roads is expected to be greater.

Plowing of roads in the winter and early spring would adversely affect big game use of wintering habitats. Habitats could be abandoned and big game could receive additional stress from being displaced during harsh winter conditions.

Visual resource management effects would be the same as the Preferred Alternative, except that fewer acres would be managed as VRM Class II.

Not offering any new oil and gas leases in the core area

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would provide the best long-term protection for wildlife and wildlife habitat in this area; however, leasing outside the core and development outside the core could adversely affect wildlife populations, particularly elk, to the point where the population may not be sustained in this area. Potential exists for adverse impacts to the connectivity area and further fragmentation of this habitat from developments outside the core. Riparian management would benefit wildlife and wildlife habitat, but not to the extent of Alternative B and the Preferred Alternative.

Continued livestock grazing practices could adversely affect wildlife and wildlife habitat, especially with continued early turnout dates. Not constructing livestock grazing improvements should benefit wildlife habitat as no surface would be disturbed, and livestock would not concentrate in areas with water developments. However, continued concentrations could occur on existing water sources as no new developments would be constructed.

Maximum road densities would not be established and transportation planning would be minimal, which would adversely affect wildlife and wildlife habitat outside the core area.

Impacts to Fisheries Resources

The effects to air quality management, hazardous materials management, off-road vehicle management, recreation resource management, special status species management, vegetation management, visual resource management, watershed/water quality management, and wild horse herd management would be the same as the Preferred Alternative.

Management of cultural resources are generally for the protection or preservation of such sites. These types of actions, if they occur at or near streams, generally would also benefit these also. Impacts from excavations of cultural sites as described in the Preferred Alternative would apply for this alternative also.

Impacts from lands and realty management actions would be similar to those described for the Preferred Alternative. There would be more surface disturbance with realty actions in the No Action Alternative. Adequate mitigation (barriers, culverts, re-vegetation, etc.) would be implemented in order to keep the negative impacts short term. The lack of avoidance areas for rights-of-way would allow impacts to sensitive resources.

Fisheries are directly affected by the condition of riparian areas. Refer to the Riparian/Wetland section under Vegetation Management in this chapter. As riparian condition declines, so too does fish habitat quality.

The RMP removed AUMs for grazing from special management exclosures. This should allow for the maintenance of the riparian area in the upper 4 exclosures (hay meadow) on Pacific Creek and maintain the fish habitat for trout. Recovery of degraded habitats would not be as rapid as with the Preferred Alternative but otherwise impacts are the same.

The drilling of gas wells would require local water sources for drilling and completion. It is assumed that all water used

for drilling and completion of wells within the Green River and Sweetwater River basins would have been part of the surface flows of the Colorado River or Platte River, respectively, or of its tributaries (though that would not always be the case). The estimate for the amount of water needed on each deep well is 2.0 acre-feet. Of the 89 wells in this alternative, 15 are shallow coalbed methane, 10 are deep coalbed methane wells located entirely within the Great Divide Basin (Red Desert), and the remaining 64 are standard deep gas wells. For these 64 wells it is estimated that 75 percent would be within the Green River Basin, 23 percent would be within the Great Divide Basin (Red Desert), and 2 percent would be within the Sweetwater River drainage (Platte River). Water use for these 64 wells, would total 128 acre-feet in 20 years or 6.4 acre-feet/year. This would total 4.8 acre-feet/year in the Colorado River drainage and 0.13 acre-feet/year in the Platte River drainage. The water depletion effects of the 15 shallow coalbed methane is the same as described in the Preferred Alternative.

There are 15 coalbed methane wells that may be drilled on existing leases within the planning area within the next 3 to 5 years. The impact of these wells is described in the Preferred Alternative.

The depletion of water from the Colorado River drainage and its effect on T&E fish species downstream is described in the Green River RMP Record of Decision (see page 209, USDI 1997) and the Biological Assessment (Appendix 11) for this document.

Impacts from other types of mineral activity are the same as described in the Preferred Alternative.

Only positive long-term benefits are anticipated from wildlife management activities. Prescribed fire impacts to benefit watershed, vegetation, and habitat are described in the other sections. There are no specific fisheries activities planned in the planning area. Stipulations to protect and enhance wildlife habitat includes riparian areas and streams and result in positive impacts (e.g., increased plant species diversity and age structure, increased density, better production, decreased erosion, runoff and sedimentation, more available habitat, better water quality, etc.).

All other management stipulations as developed in the Green River RMP apply. This should result in positive impacts for riparian areas and fisheries.

Core Area

Under this alternative, the core area (about 80,410 acres) would be closed to oil and gas leasing, development, surface disturbing and disruptive activities. This would benefit wildlife and their crucial habitats in many ways and would make maintenance of this elk herd population objective very likely. The impacts to fisheries are the same described in the general impacts for the No Action Alternative.

Cumulative Impacts

Management actions under this alternative would result in fewer adverse impacts to wildlife habitats than Alternative A, but more than Alternative B. Protection would be provided in

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the core area; however, developments and activities outside the core area would adversely affect wildlife habitat, particularly big game habitat.

Developments and human presence would continue to remove and fragment wildlife habitats outside the core area, areas closed to leasing (about 197,470 acres), and closed to surface uses (about 30,580 acres). Demands on public lands from recreationists would continue to increase, resulting in less unoccupied and undisturbed areas which would increase wildlife displacement over the long term. More access would be provided into crucial habitats which would cause additional displacement.

With 117,000 acres of nondiscretionary closure, about 197,410 acres would be closed to oil and gas leasing and development.

Although about one-third of the planning area would be closed to leasing or surface disturbing and disrupting activities, not all of the closed areas occur in crucial habitats, nor are they interconnected. This development could occur in crucial habitats and in areas that connect these crucial habitats (connectivity area), fragmenting habitat and displacing wildlife.

Seasonal constraints would continue to be used to mitigate impacts to wildlife from human activities during crucial periods and provide short-term protection for wildlife. Long-term maintenance and operations activity in crucial wildlife habitats would continue to cause displacement of wildlife from crucial habitats, including disruption of nesting, fawning and calving areas, and crucial big game winter habitats. Increased access for recreationists due to development of new roads would magnify the negative impacts to wildlife and their habitats. This would make the protection of the core area and related crucial habitat more important.

Surface disturbing activities would continue to cause long-term losses of wildlife habitat. Overall, less acreage would be disturbed than under Alternative A, but more than Alternative B or the Preferred Alternative.

Adverse impacts to crucial wildlife habitats (e.g., riparian areas, crucial winter ranges, parturition areas, game bird winter concentration areas, etc.) from livestock grazing would increase if all current nonuse AUMs are activated. These adverse impacts would be severe in crucial winter ranges where other commodity uses such as mining or oil and gas development is taking place. Placement of livestock into these crucial habitats or concentrating livestock in crucial habitats where vegetation has been decreased due to commodity development would result in less forage available for big game animals during winter periods. This would be especially critical in severe winters. These impacts could be reduced through implementation of new AMPs and/or revision of management in old AMPs to include riparian objectives and implementation of actions associated with standards and guidelines assessments.

Potential exists for impacts to the migrational capabilities of the Sublette Antelope herd; however, these effects should not be significant. Fragmentation of habitat areas and displacement from existing migration corridors due to roads and

increased activity could occur; however, this development in crucial antelope habitat is anticipated to be minimal. Adverse impacts could occur when winter conditions are extremely severe (similar to the winters of 1978 and 1983). Sufficient habitat and open space would continue to be provided for antelope under this Alternative.

Management prescriptions for wildlife resources, watershed, visual resources, and off-road vehicle use would provide long-term benefits to wildlife populations and habitats. Fire (natural or prescribed) would result in a short-term loss of habitat, but could benefit habitat in the long term. Wildfire could result in a long-term loss of habitat and aspen stands if these areas are not fenced following a fire. Livestock would not be allowed to graze the burned area immediately after the fire, which would benefit wildlife and wildlife habitat.

Surface mining can result in an irreversible irretrievable loss of wetlands, springs, and parturition areas, and although mitigation occurs, the original site is lost; however, only about 53 acres are anticipated to be disturbed by mining exploration activity. Major road development also results in irretrievable losses of habitat as they are generally permanent structures. The impacts from road development would be less than from Alternative A.

Habitat fragmentation, particularly for big game, would occur in some areas, especially 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 can also increase the accessibility to the general public into areas that have previously been somewhat inaccessible to vehicles. 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 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; however, protection of the core area and associated habitat would mitigate some of these effects.

A summary of impacts to the individual species that may be affected by actions in the planning area follows.

Activity in the planning area would not significantly affect antelope migration. The main migration area is on the western edge of the planning area, which has low to moderate potential for mineral development and activity in the crucial winter range is not anticipated to be significant. Activities in main migration areas during winter periods can cause stress to the herd, which could have a direct effect on the physical condition of the animals upon arriving on crucial winter range, and their ability to survive severe winter conditions.

Accessibility and usability of crucial winter range is not the only contributing concern for this antelope herd. Accessibility and use of summer and transition ranges could also become more of a problem in the future.

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The Steamboat elk herd is very susceptible to displacement by human activities because of the lack of hiding and escape cover. No development proposals and other permanent uses in the core area makes maintenance of this herd population objective very likely. Road construction and increased access into remote areas outside the core could also increase use by the general public impacting this desert elk herd. With effective mitigation (such as remote or off-site facility placement, and seasonally restricting human activity to reduce access and traffic) applied to activity in crucial habitat and calving areas, the herd objective levels could be sustained.

Studies have shown that there is direct competition for forage between mule deer and cattle for saltbush and winterfat on crucial winter range. Although use by cattle generally occurs in the spring or summer months, low plant vigor has generally resulted in little regrowth which makes these preferred vegetation types unavailable during winter months. Studies have also shown that sagebrush makes up a large component of the deer's winter diet; however, this does not mean deer prefer it over other shrub species such as serviceberry, mountain mahogany, and bitterbrush. Control of wild-fire is largely responsible for the loss of key shrub species and the even-aged condition of sagebrush communities.

Increasing amounts of vegetation removal in crucial winter range by development activity compounds the problem of poor crucial winter range condition. Although many acres are returned to production by reclamation practices, almost all of this acreage contains forage either unusable by deer or of a different composition that may not provide the same nutritional benefits as the original forage. Shrubs planted during reclamation may take many years to return these habitats to a condition that provides usable forage for the deer. Loss of vegetation due to development activities has resulted in a reduction in available habitat and can result in increasing competition between livestock and wildlife for remaining vegetation. Oil and gas development and other developments (powerlines, pipelines) also result in decreased opportunities to use fire as a treatment tool to rejuvenate decadent plant communities, due to safety concerns.

The population numbers for Steamboat herd are below the Wyoming Game and Fish Department objective level. Although deer are probably more tolerant of human activities than elk, any large increase in development activities such as those associated with oil and gas development, could affect meeting the objective for this herd unit. The habitat at this time may not be capable of achieving the population objective for this herd given the development activity that has occurred in this portion of the herd area. However, closing the core area to surface disturbing and disruptive activities would reduce adverse effects to mule deer. Also, because this herd area is predominantly a desert type environment, areas for good fawn rearing are scarce. Direct competition between elk and deer for these parturition and winter use areas is probably more prevalent here than in most herd areas.

Fisheries

Lands actions (rights-of-way for roads, pipelines, water diversions, well pads), livestock management and minerals

development of all types have the greatest individual impact to fisheries. The combination of these actions compounds the effects that the riparian area and the streams have to accommodate. The health of the riparian areas is related to water quality and the quality of fishery habitat. Effects include increased peak flows, increased sediment loads, chemicals, decreased vigor in riparian plants, structural changes in riparian plant communities, unstable stream banks, etc. Under this alternative, currently, all possible mitigation measures to correct problems in riparian/wetland areas are not being applied. With the assumptions of this alternative in effect, reversing the downward trends or correcting the problems in the riparian areas might be achievable but the progress may be very slow in coming and not constitute a "significant" rate.

Special Management Areas

Greater Sand Dunes ACEC and Special Recreation Management Area

Impacts would be the same as described in the Preferred Alternative, except the effects from oil and gas and coalbed methane development would not occur and the ORV open area would not change in size. Adverse effects would occur to oil and gas operations due to increased costs and lost drilling opportunities.

Steamboat Mountain ACEC

Under this alternative, existing oil and gas leases would not be developed and new leases would not be issued. Under this alternative, impacts from oil and gas activities would be less than any of the other alternatives; however, impacts to oil and gas operations would be greatest for this alternative.

Closing Steamboat Mountain ACEC to communication sites and mineral material sales would enhance BLM efforts to manage wildlife, visual, and heritage resources of all kinds.

No additional withdrawals than those identified in the RMP would preclude the opportunity for future withdrawals which could slightly diminish BLM's ability to manage and protect wildlife resources and heritage resources of all kinds.

The benefits from livestock grazing management actions would not be as great as for the Preferred Alternative.

South Pass Historic Landscape ACEC

The Green River RMP and other management document prescriptions would significantly enhance BLM efforts to manage and protect heritage resources of all kinds.

An assessment of the amount of exploration and development activity that could occur if restrictions were not in place can not be made. An unknown number of potential drilling locations would not be available due to this restriction. Extra drilling and development costs would be required to meet restrictions placed on activity in this area. Extra costs would include relocating well pads; redesigning access routes, well pads, and production facilities; and directionally drilling some wells to reach potential reservoirs from off-site locations. Impacts from restrictions placed just on lands in this

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ACEC would not be great enough to meet established significance criteria.

White Mountain Petroglyphs ACEC

Impacts to the White Mountain Petroglyphs ACEC would be the same as those described for the Preferred Alternative.

Red Desert Watershed Area

No livestock water developments would be constructed throughout the area. This would reduce the effects of livestock water development construction and livestock use of the immediate and surrounding area. However, this would limit the use of such developments as a grazing management tool and could adversely affect livestock operations. These effects would be more than for the Preferred Alternative.

Portions of the watershed would be closed to oil and gas leasing which would benefit sensitive resources but adversely affect oil and gas operations.

Road densities for all weather roads would not be established which could adversely affect wildlife, cultural, and other sensitive resource values through increased road construction and traffic.

ALTERNATIVE A

Cultural Impacts

Impacts to cultural resources from air quality management, fire management, hazardous materials, monitoring and reclamation practices, off-road vehicle and recreation use, special status species management, vegetation management, and wild horses would be the same as described in the Preferred Alternative.

Impacts to cultural resources from cultural resource management actions would be the same as described in the No Action Alternative.

Seasonal restrictions and other mitigative measures applied to lands and realty actions generally have beneficial effects to cultural resources by limiting or otherwise controlling surface disturbing activities. Special management prescriptions for Areas of Critical Environmental Concern, such as the South Pass Historic Landscape and White Mountain Petroglyphs are generally protective in nature and tend to benefit cultural resources.

Impacts to cultural resources from rights-of-way authorizations would be the same as described in the No Action Alternative. Cultural resources in general would be somewhat vulnerable to damage from rights-of-ways, permits and leases in certain areas including Indian Gap, Monument Ridge, White Mountain and the face of Steamboat Mountain. Areas identified as respected places by Native Americans, and the surrounding terrain could suffer from surface disturbing activities. The negative effects of these changes in the landscape could be somewhat, but probably not totally, mitigated.

Impacts to cultural resources from withdrawals would be the same as described in the No Action Alternative. Withdrawals prescribed in the Green River RMP would slightly enhance efforts to protect heritage resources of all kinds.

Access acquisition prescribed in the Green River RMP would slightly improve efforts to manage heritage resources of all kinds.

Dispersed livestock grazing generally is fairly benign so far as impacts to cultural resources are concerned. Severe overgrazing can accelerate erosion and thus destroy the soil matrix in which archaeological resources are situated. Overgrazing could also adversely affect places such as the South Pass Historic Landscape by drastically changing the vegetative component of the viewshed. However, grazing within regulated limits usually would not adversely affect cultural resources.

Managing water for livestock operations can affect cultural resources. Spring improvements and construction of reservoirs can destroy archaeological resources because they disturb the soil matrix in which they are situated. Generally, spring developments tend to be more detrimental than other kinds of water developments because the water source was often attractive to prehistoric and historic inhabitants of the region. Conversely, reservoirs are usually situated in drainage bottoms that tend to have been disturbed by alluvial action and are less likely to have soil deposits that could harbor intact archaeological materials.

Piping water from springs generally is beneficial to cultural resources both because it protects the natural appearance and setting of the water source and because it prevents livestock trampling in the immediate area. However, trampling can be increased in localized areas around troughs, fences, water gates, salt block placements and similar facilities that tend to concentrate livestock in small areas. This accelerated trampling can sometimes be detrimental to cultural resources.

Livestock rubbing against rock art panels and historic structures such as those at Crookston Ranch and the Rock Cabin could severely damage, or completely destroy those resources.

Impacts to cultural resources from minerals management activities would be similar to those described in the No Action Alternative. Development of 125 projected oil and gas wells and associated facilities would approximately double the chances for these activities to adversely affect cultural resources of all kinds. Enhanced management prescriptions, including additional 1/4 mile protection around areas identified by Native Americans as respected places would mitigate these potential adverse effects to some degree.

There would be a slight potential for salable mineral development to adversely affect heritage resource values. Locatable mineral development has a potential to impact efforts to manage heritage resources; this is especially so with regard to South Pass Historic Landscape and Native American respected areas.

ENVIRONMENTAL CONSEQUENCES

Impacts to cultural resources from geophysical exploration activities would be the same as described in the No Action Alternative. Geophysical operations would have a slight potential to impact heritage resources of all kinds.

Impacts to cultural resources from surface disturbing activities would be similar to those described in the No Action Alternative. However, impacts would be somewhat greater as more surface disturbing activities associated with livestock facility development and mineral development would occur. No Surface Occupancy (NSO) stipulations would generally enhance protection of all kinds of heritage resources.

Impacts to cultural resources from transportation planning would be similar to those described in the No Action Alternative. Transportation planning would generally enhance efforts to protect heritage resources of all kinds. However, more roads and facilities could be placed in a wider variety of areas, which has the potential to affect a greater number of cultural resources.

The impacts to cultural resources from visual resource management would be similar to those described for the No Action Alternative. Changing the VRM class for farmlands within Eden Valley from Class III to Class IV would not appreciably affect heritage resources in that area.

Impacts to cultural resources from watershed management activities would be the same as described in the No Action Alternative.

Adverse effects to wildlife and riparian habitat would be somewhat detrimental to the overall appreciation of heritage resources within their environmental context.

Core Area

Impacts on cultural resources within the core area would be the same as described for the general area. More activity would occur in the core area than under the No Action Alternative.

Cumulative Impacts

Cumulative impacts would be the same as described for the No Action Alternative, except the 1/4 mile avoidance radius around Native American respected places would lessen potential impacts to those heritage resources. However, there would be a greater amount of surface disturbance overall which could increase disturbance of cultural resources.

Paleontological Impacts

Compared to any of the alternatives being analyzed, Alternative A would allow the most ground disturbance, both inside and outside the core area. New oil and gas leases would be issued throughout the planning area, with some having a no surface occupancy stipulation. Existing oil and gas leases would be developed in the core and general area. As in the No Action Alternative, transportation planning would not include road density limitations. Yearlong access to oil and gas facilities would be allowed. Under this alternative, known scientifically significant fossil sites within the planning area

would be closed to surface disturbing activity, which would effectively preserve them for future study.

The type of direct and indirect impacts described for the Preferred Alternative are the same for Alternative A. The magnitude of the impacts under Alternative A would be the greatest of any alternative.

Core Area

Alternative A opens more public land to development within the core area than any other alternative being analyzed. Activities associated with new oil and gas leases and existing leases and new livestock grazing developments all contribute to the additional acreage that could be disturbed. The magnitude of the impact from this development would be the greatest among the alternatives.

Cumulative Impacts

The type of cumulative impacts described in the Preferred Alternative would be the same for Alternative A. The magnitude of these impacts would be the greatest among any of the alternative being analyzed.

Fire Impacts

The impacts to fire management activities would be the same as described for the Preferred Alternative except that the fewest restrictions for resource protection would be applied to fire management activities.

Lands Impacts

Right-of-way holders would have the most flexibility and opportunity for locating and routing rights-of-way under this alternative. However, right-of-way placement would be impacted by exclusion, avoidance, and areas closed to surface occupancy, and those areas with seasonal restrictions. The effects would be the least under this alternative as fewer acres would be considered avoidance or exclusion areas.

The exclusion of rights-of-way within the South Pass Historic Landscape vista (about 23,640 acres) would continue to have a major impact if activity should increase in this area since rights-of-way in exclusion areas would not be allowed unless mandated by law. Large avoidance areas would have a similar impact as avoidance of areas may require a longer route which would affect other offsite areas and increase costs to the applicant. About 146,180 acres or 26 percent of the planning area would be avoidance areas for rights-of-way and about 27,120 acres or 4 percent of the planning area would be excluded from rights-of-way activities. Additional mitigation may also be applied to activities that may occur in all avoidance areas, also increasing project costs and the amount of time needed to complete projects (Table 4-23).

Areas closed to surface occupancy (about 30,580 acres or 5 percent of the planning area) preclude placement of rights-of-way because surface disturbing and disrupting activities are not allowed. Most of these areas are small and scattered throughout the planning area and can be easily avoided. Large

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areas with NSO restrictions have the same effect as large exclusion areas.

The effects to communication site holders would be less than for the No Action Alternative as more areas would be available for the placement of these facilities. Although no interest has been indicated, sites could be placed on Steamboat Mountain, which could facilitate communication activity around the area.

Seasonal restrictions and other mitigation measures to protect resource values and threatened and endangered species (T&E) would impact rights-of-way by restricting location or timing of construction.

The possibility of high dust levels resulting from use of unpaved access roads would necessitate stipulations to control dust. All construction rights-of-way as well as access road rights-of-way would include a stipulation requiring that the holder meet Federal and State air quality standards.

Land tenure adjustments would occur only if the benefits outweigh any adverse impacts, and if there are no significant impacts which cannot be mitigated. About 4,721 acres have been identified as possibly suitable for disposal/acquisition (USDI 1997).

The withdrawal of about 37,290 acres identified for withdrawal in the Green River RMP, would preclude disposal, entry, and mineral location in those areas. Withdrawals for more than 5,000 acres would require notification of Congress. Existing withdrawals would be reviewed and those which no longer serve the purpose for which they were withdrawn, would be revoked. These lands would then be open for disposal, entry, and mineral location. About 211,130 acres would open to mineral location that previously were not available for this activity. Potential for mining claim activity is low except in the South Pass Area. This action would benefit mining claimants by allowing mining claim activity on areas that were previously closed.

There is adequate vehicle access on the existing roads and trails to the lands in the planning review area. Closing or restricting specific areas to protect public health and safety should not cause severe adverse effects to vehicle users because so much of the area is currently accessible and such closures would likely be few. Implementing the ORV designations would keep vehicles on designated routes which could result in traveling further to get to a destination, but should not preclude accessing an area. Foot and horse traffic would not be affected.

Impacts to rights-of-way and other lands actions for the South Pass Historic Landscape would be the same as discussed in the general impact section.

The impacts to rights-of-way for the Oregon Buttes and White Mountain Petroglyphs ACECs would be the same as discussed for exclusion and areas with NSO restrictions. The impacts to other lands actions would be the same as discussed for the general area.

Core Area

New activities would be allowed within the core area, and new rights-of-way would be issued for actions within the core area. Large avoidance areas (Greater Sand Dunes ACEC) would require routing rights-of-way around this portion of the core area. This would affect other offsite areas and increase costs to the applicant. Land tenure, withdrawal, and access impacts would be the same as described for the general area.

Cumulative Impacts

The combined actions of about 146,180 acres of avoidance and about 27,210 acres of exclusion area would affect right-of-way placement but not as much as identified in the No Action Alternative as there are less contiguous acres of avoidance areas. Long linear rights-of-way particularly would be affected by potentially longer routes increasing construction costs, but this would be less than for the No Action Alternative.

Withdrawal of 37,290 acres would preclude disposal, entry, and mineral location. Revocation of about 211,130 withdrawn acres would allow for entry and mineral location, and consideration of land disposal.

Lands would be irreversibly lost to the public land base when sold or exchanged. However, under exchanges, lands of comparable value would be obtained.

Livestock Grazing Impacts

Impacts to livestock grazing from air quality management, cultural and paleontological management, healthy rangelands, monitoring and reclamation practices, off-road vehicle and recreation use, special status species management, threatened and endangered species management, weeds, wild horses, and wilderness management would be the same as described in the Preferred Alternative.

With the increase in the number of oil and gas wells drilled (110 gas wells and 15 shallow coalbed methane wells), there would be an estimated 2,700 acres of disturbance. Net long-term disturbance would be about 600 acres. The impacts would vary upon the location, timing, and size of disturbance caused by the wells or unit. However, the overall net long-term disturbance would be minimal.

Additional impacts might occur due to increased traffic, causing livestock to move from an area, which could cause stress, or even death from vehicle and heavy machinery collisions. There is also a potential for livestock to become trapped in reserve pits and dying. Due to the requirements for fencing such pits, this effect should be minimal.

Opening roads into previously inaccessible areas would benefit permittees access into areas and facilitate management of livestock. Livestock could also utilize access routes to trail into these areas. Additional water sources could be provided through oil and gas development and would benefit livestock grazing. This could partially offset no new water sources being developed specifically for livestock.

ENVIRONMENTAL CONSEQUENCES

Impacts to livestock from Hard Rock Mining (Locatables), Gravel or other pits (salables), and Coal, Sodium, or Oil Shale Exploration and Development (leasables) would be the same as described in the Preferred Alternative. These activities would not pose a concern for livestock production and management.

With the increase of production, the likelihood of a hazardous spill would increase over the Preferred Alternative. However, mitigation to contain and cleanup any spill or accident as soon as possible, should keep any effects minimal.

Lands and realty actions would affect livestock the same as under the Preferred Alternative. Additionally, about 84,420 acres would be closed to rights-of-way which would benefit livestock by protecting available forage.

Suitability of the planning area would mostly affect the class of livestock. Some areas are more suitable for cattle while other areas are more appropriate for sheep. Slopes greater than 20 percent are usually only accessible to sheep while the lower lying areas are more accessible to cattle grazing. Distance to water is also more critical for cattle than for sheep. Omitting areas of little or no productivity or very steep slopes might have an impact on the livestock operators by a reduction in adjudicated AUMs. However, this would decrease the potential overutilization of the vegetation in other areas. With sheep and cattle there is a diverse range of forage needs which separates each class of livestock. One area may indeed be unsuitable for one class of livestock but very suitable to another.

Salting for distribution of livestock could require some effort in planning and proper placement but would aid in the distribution of forage utilization and reduce impacts to other resources such as wildlife, water quality, and riparian resources.

Vegetative treatments beneficial to wildlife would also be beneficial to livestock. Burning or using chemicals to reduce sagebrush would only increase the forage for both livestock and some species of wildlife. New treatments for livestock would benefit livestock management.

In the foreseeable future any proposed livestock management facility submitted by the livestock operators would be assessed by an interdisciplinary team to insure that they comply with the land use plans and the JMHCAP. Livestock water could be developed which would enhance livestock grazing management flexibility, improve distribution, and reduce use of existing waters and riparian areas over the No Action Alternative.

Authorized grazing use would not exceed the recognized permitted use. For analysis purposes, anticipated actual use would be 26,032 AUMs (22,767 cattle and 3,265 sheep). This grazing level was held constant throughout the planning period.

Livestock grazing would benefit from management actions for seasons of use. The livestock operators would have the flexibility to move their livestock at times of financial gain. The earlier turnout would allow the livestock operators to adjust their operations causing less impact on their opera-

tions. However, the unpredictability of spring storms can impact livestock herds. By allowing early turn-out, livestock would be grazing at a time of critical growth to the vegetation. Without subsistence feeding, livestock may not get enough reserves to gain any weight during March and April. Only with green-up would the animals be able to graze plants which are capable of sustaining them. Because of plant phenology, green up is a very critical time for the plants that rely on the root reserves for the energy necessary for growth.

If a plant is cropped off while in this critical period, there is the potential to cause irreversible damage to the plant and ultimately kill it. Young plants are easily pulled out and subsequently killed. This would adversely affect livestock grazing in the long term due to a decline in the quality and quantity of forage. A rotation system would be necessary to insure resource damage did not occur.

Impacts of preparing livestock grazing plans would be similar to those described for the No Action Alternative. Under Alternative A, riparian pastures could be used as short duration grazing pastures which would increase management flexibility. These areas should be monitored very closely if they are to be used for this purpose.

A total of 25 reservoirs could be developed, cleaned out, or reconstructed to improve livestock distribution. This may reduce the amount of time livestock spend in riparian or wetland habitats. Vegetative production would increase in the riparian or wetland areas, resulting in increased forage productivity, diversity, and density. Depending on the type and locations of the watering sources, livestock distribution would improve within grazing allotments. The effects of utilization levels in riparian areas would be the same as described for the No Action Alternative. Managing riparian areas primarily for livestock grazing and developing riparian pastures would provide management flexibility and benefit livestock management.

For a detailed socioeconomic impacts discussion of the livestock industry, see Socioeconomic Impacts. Under Alternative A, 455,340 cattle AUMs and 65,300 sheep AUMs would be available for livestock grazing during the 20-year life of the project. The total economic impact of livestock grazing would be \$32.3 million. Employment in the livestock sector would be 365 annual job equivalents earning \$16,337 average per year. Economic impacts to livestock grazing under Alternative A are the highest of all alternatives. AUMs available for livestock grazing on an annual basis under Alternative A represent an increase over the baseline year 1998 and the 5-year average of 1994-1998.

No surface occupancy stipulations or rights-of-way avoidance areas in the South Pass Historic Landscape, Oregon Buttes ACEC, and White Mountain Petroglyphs ACEC could prevent construction of livestock management facilities; therefore, livestock distribution patterns may not improve.

Although some transportation planning would be implemented, road densities would not be established and more surface disturbance would occur under this alternative. This would remove more livestock forage.

ENVIRONMENTAL CONSEQUENCES

Of all the alternatives, wildlife habitat management actions would be the least restrictive, providing the most flexibility in livestock operations. Management tools can be developed to aid livestock operators in controlling or moving animals throughout the planning area.

Potential competition for forage and shade with wildlife would continue. More management tools would be available than under any other alternative. These tools may or may not be limited due to environmental concerns within the planning area.

Water sources may be developed in areas away from live water to draw livestock away from riparian areas. Fences and other livestock management facilities may be constructed to improve livestock distribution, reducing the potential for competition for forage and cover with wildlife.

Core Area

Construction of rangeland improvements would improve livestock distribution patterns.

Cumulative Impacts

Actions taken under this alternative could result in a short-term reduction in use as the area and time available for grazing would be limited. The levels of this potential impact is least under this alternative. The projected increase in forage production would be the least, but could help to offset this loss in the long term.

Minerals Impacts

Leasables - Oil and Gas and Coalbed Methane Resources

Oil and gas and coalbed methane development would be restricted or prohibited as the result of conflicts with environmentally related resource values. This cumulative impact is due to the restriction categories:

- no leasing,
- no surface occupancy,
- seasonal access restrictions, and
- controlled surface use restrictions.

Approximately 20 percent (Wilderness Study Areas) of the federal minerals in the planning area would be designated no leasing.

In areas of no surface occupancy, surface disturbing activities are prohibited. About 5 percent of the planning area would be affected by this restriction (Map 21 and Table 2-12). Access to hydrocarbon resources located beneath these areas must be accomplished by drilling deviated or horizontal wells, which may not always be economically feasible. Directional drilling would increase well cost.

About 60 percent of the planning area is affected by seasonal restrictions (Map 11). Seasonal restrictions limit oil and gas activities to certain time periods during the year. Activities can be prohibited from between 2 and 9 months out

of the year depending on the purpose of the time limitation, and number and kind of overlapping seasonal restrictions. This restriction is applied to leases in order to protect, big game winter ranges, certain calving and parturition areas, raptor habitat, mountain plover nesting, and sage grouse nesting areas (Table 2-12). Most of the seasonal restriction overlaps occur during the spring and early summer. The recent addition of a requirement for mountain plover nesting surveys would increase costs for any new wells or construction activities proposed.

Controls on surface disturbing activities are applied to leases to mitigate adverse impacts. The effect of surface use restrictions can range from no effect, to added mitigation and reclamation requirements, to moving well locations, all the way to prohibiting exploration and development activity. The magnitude of the impact is generally not known until a well has been proposed. About 56 percent of the planning area would be affected by these controlled surface use restrictions (Table 2-12 and Map 22).

The reasonable foreseeable development scenario projected that 202 wells (includes 10 coalbed methane wells) could be drilled in the planning area if the entire area were open to exploration and development. The impacts of restrictions on this projection are:

1. an unknown number of coalbed methane wells would not be drilled due to the combined restrictions resulting from no leasing, no surface occupancy and controlled surface use mitigation and reclamation requirements,
2. an estimated direct loss of 18 percent of the potentially drilled oil and gas wells (35 wells) through no leasing,
3. an estimated indirect loss of 24 percent of the potentially drilled oil and gas wells (47 wells) because restrictions (no leasing, surface occupancy stipulations, and mitigation and reclamation requirements) could discourage industry from initiating exploration and development activities,
4. increased operating costs related to trying to get access for drilling those available well locations and transporting production obtained,
5. in the short term (through 2007), the number of producing wells could increase from 48 wells (46 oil and gas wells and 2 coalbed methane wells) to 71 wells (64 oil and gas wells and 5 coalbed methane wells),
6. in the long term (through 2017), the number of producing wells could decrease to 64 wells (57 oil and gas wells and 7 coalbed methane wells).

Impacts of Fewer Wells

About 110 wells (53 new producing oil and gas wells and 5 new producing coalbed methane wells) are expected to be drilled and 82 wells would not be drilled during the 20-year analysis period. The new producing wells would account for additional royalty and tax revenue to the government. The 53 new oil and gas wells would have a total reserve of 116.6 billion cubic feet of gas. The projected reserves of the expected 5 new producing coalbed methane wells is not known.

ENVIRONMENTAL CONSEQUENCES

The unavailable production from the oil and gas wells not drilled represents unrealized royalty and tax revenue. Forty-three of the 82 wells would be expected to produce and they could recover 94.6 billion cubic feet of gas. A loss of opportunity for revenue and royalty would occur if wells could not be drilled to obtain hydrocarbons under no leasing and no surface operations areas. Where leasing is deferred, the opportunity to recover hydrocarbon reserves would also be deferred for some period longer than 20 years. The amount of potential revenue from undrilled coalbed methane wells is unknown, since the number of potential undrilled coalbed methane wells could not be determined. Opportunities for direct and indirect employment would also be reduced with fewer producing wells.

Significance of Impacts to Oil and Gas Activities

Alternative A impacts would be reduced in comparison to the No Action Alternative., but, significance criteria 1, 2, and 3 would still be exceeded. Two fields (Nitchie Gulch and Pine Canyon) lie in or partially in the planning area. They both exceed the 5 billion cubic feet of gas criteria. The Nitchie Gulch Field contains 48 wells (see RFD) and the Pine Canyon Field contains 22 wells (George, 1992). The well average per field in this area is 35. Diedrich (1999) has indicated that field sizes are likely to range from 20 to 25 wells. In comparison, a natural gas field in southwestern Wyoming typically includes 30 to 200+ wells (Barlow and Haun, 1994). It appears that at least one average field would not be developed due to direct impacts of not leasing and due to indirect impacts of applying surface use restrictions. Possibly as many as two fields would not be developed due to these restrictions.

About 42 percent of expected potential exploration and development activity could not occur due to restrictions. These potential losses are reduced from a potential loss of 62 percent that was determined for the No Action Alternative. Collectively these losses exceed the threshold loss of 25 percent which was determined to be significant. Direct losses were determined to be 18 percent and indirect losses were determined to be 24 percent. Individually, these losses do fall below the threshold determined for significant impact.

About 42 percent of expected reserve additions would not occur due to restrictions. The threshold was determined to be a loss of 25 percent of the potential reserves.

The total number of producing wells would increase by 11 wells over the 20-year study period due to the reduction in restrictions on exploration and development. This would be a positive impact.

Core Area

Impacts as a result of restrictions in the Greater Sand Dunes ACEC and Steamboat Mountain ACEC are the same as for the Core Area since they lie within it. Types of impacts determined for the planning area as a whole, also apply to this area. Alternative A re-opens this area for leasing.

An updated reservoir study of the Greater Sand Dunes ACEC portion of the Core Area was prepared (Stilwell 1999). As many as 10 new wells could be drilled within this ACEC.

An additional 18 wells could be drilled within the rest of the Core Area. Some wells would be drilled as step-out development wells from the Nitchie Gulch Field and some as part of another field (possibly as extensions of one or more of the small one- or two-well fields already present). A small number of wells may not be drilled for Alternative A, but it does not appear that development of the entire field would be precluded. The criteria #1 impact threshold would not be exceeded.

Significance criteria #2 and #3 impact threshold levels would not be exceeded within the core area since only a few wells might not be drilled due to restrictions placed on exploration and development activity.

Forty wells have been completed as gas producers in the core area and 30 wells still produce. Over the long term, 29 (97 percent) of these wells are expected to be abandoned, leaving only one producing well. Approximately 15 of the 28 new wells are expected to be productive. The significant impact threshold for criteria #4 would be exceeded since the total number of producers could decrease from 30 to 16 over the life of this plan. This impact would be more due to depletion of reservoir rocks in the area than it would be due to restrictions placed on exploration and development activity.

Cumulative Impacts

Impacts include those expected from all oil and gas development. Present impacts are due to 48 existing producing wells. Short-term impacts (1998-2007) expected are: 23 new exploratory unit proposals; 58 new wells; 30 new producing wells; 28 drilled and abandoned wells; and 7 abandoned producing wells. At the end of 2007 there would be 71 producing wells in the planning area. This would be an increase of 23 wells (18 conventional and 5 coalbed methane wells) over the December 1997 total of 48 wells.

Long-term impacts (1998-2017) expected are: 46 new exploratory unit proposals; 110 new wells; 58 new producing wells; 52 drilled and abandoned wells; and 42 abandoned producing wells. At the end of 2017 there would be 64 producing wells in the planning area. This would be an increase of 16 wells (an increase of 5 coalbed methane wells and an increase of 11 conventional wells) over the December 1997 total of 48 wells.

Leasables - (Other than Oil and Gas and Coalbed Methane), Locatables, and Salables

Leasables - Coal

The level of coal activity projected for this alternative is the same as that described for the No Action Alternative. The level of restrictions decreases slightly with respect to coal exploration inside the core area (Table 4-24). Exploration activities in the core area (including the Steamboat Mountain ACEC) would be open but limited to exiting roads and trails. Outside the core area, activities would be reviewed on a case-by-case basis, similar to the No Action Alternative. Native American respected sites would be avoided by 1/4 mile as opposed to 100 feet in the No Action Alternative.

ENVIRONMENTAL CONSEQUENCES

The effects to coal exploration under this alternative would be similar to that described for the No Action Alternative; however, the magnitude of the effects would be less due to the core area being open to exploration on existing roads and trails. This combined with the 1/4 mile avoidance around Native American respected sites may provide enough access for a preliminary exploratory program (assuming 1,000- to 1,500-foot drill hole spacing). If the preliminary exploratory program suggested a minable deposit may exist, then more detailed drilling would be in order. Detailed exploratory drilling can range from 200- to 250-foot spacing and possibly even to 50-foot spacing depending on the geologic conditions. This alternative would not provide the required access for such spacing; therefore, detailed exploration drilling would not likely occur during the planning period.

Cumulative Impacts Same as described for the general impact discussion.

Leasables - Sodium

The impacts to sodium development under this alternative would be similar to those described for the No Action Alternative.

Locatables

The impacts to locatable minerals development under this alternative would be the same as that described for the No Action Alternative.

Salables

The impacts to salable mineral activity for this alternative would be the same as described for the general area under the No Action Alternative. The same areas would be closed or restricted to development of mineral materials (Table 4-25).

Core Area This alternative would open portions of the Steamboat Mountain ACEC to development of mineral materials. The lava rock capping Steamboat Mountain would be a primary source of hard durable material that could be used for road base or other purposes. This would provide a much closer source of material in support of projected development. The cost of doing business would likely decrease, because haul distances would be reduced. As described for the No Action Alternative, mining of mineral materials would reduce existing reserves.

Cumulative Impacts The cumulative effects on mineral materials would be an increase in the total amount of materials available from within the planning area compared to the No Action Alternative.

Geophysical

Under Alternative A, geophysical exploration could occur in some areas inside and outside the core area. These activities would be allowed only after a site-specific analysis was completed. The Green River RMP set restrictions, such as limiting the use of vehicles and explosive charges (Table 4-22) in sensitive resource areas inside and outside the core. Sensitive resources include; Boars Tusk, a portion of White

Mountain Petroglyphs, Crookston Ranch, developed recreation sites and the ORV parking lot in the Greater Sand Dunes ACEC, raptor nesting sites, portions of South Pass Historic Landscape, Oregon Buttes ACEC, special status plant species habitat, Tri-Territory Marker, Native American respected sites, Wilderness Study Areas, and recreation interpretive sites. Some of these areas, such as the WSAs, would be open to foot traffic only.

Under this alternative, direct and indirect impacts would be similar to that described for the No Action Alternative as there are no prescriptive changes between the two alternatives. Geophysical proposals would be reviewed on a case-by-case basis. Detailed analysis of the potential restrictions would not be available prior to development of exploration proposals. However, given the potential resource conflicts between wildlife, cultural, vegetation, and recreation resources and geophysical activities, the direct impact would be an increase in the cost of operations from mitigation of impacts to these resources. The cost of geophysical activities would increase due to controlled surface use restrictions, time delays, and seasonal restrictions.

The Green River RMP identified certain areas that would remain open to leasing but closed or restricted to geophysical activities. Such a situation may indirectly affect overall development of oil and gas resources in those areas and potentially increase the amount of surface disturbance associated with development. If subsurface information can not be retrieved through conventional geophysical means, then operators assume a higher risk during exploration and development of these areas. The presence or absence of geophysical data can mean the difference between more efficient development, with fewer, more productive wells and missing the reservoir entirely. Areas that would remain open to leasing but closed or restricted to geophysical activities may incur less efficient development resulting in more surface disturbance than would otherwise occur were geophysical data available.

Core Area

Under Alternative A, the core area would be open to further oil and gas development and the issuance of new leases. Geophysical activities would be allowed within the core but would be subject to controlled surface use restrictions and seasonal restrictions. The direct and indirect impacts to geophysical activities would be the same within the core area as that described for the general area.

Cumulative Impacts

Same as described for the No Action Alternative.

Off-Road Vehicle Impacts

Off-road vehicle use in the Greater Sand Dunes "open" area would only be allowed on 5,500 acres due to increased oil and gas production (see write-up for Special Management Areas). Because of the additional producing wells associated with oil and gas production in this area, the public would have a reduced "open" area to play in. Concerns over safety would be reduced over the No Action Alternative because there

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would be fewer hazards in the reduced open area. Reducing the ORV open acreage in the planning area would have an adverse impact to this resource.

Allowing year round access by removing the status of the 15,981-acre Steamboat Mountain seasonal closure may benefit some ORV enthusiasts. However, much of the use would be weather dependant because of snowpack and spring runoff.

Cumulative Impacts

Long-term beneficial effects would be similar to the Preferred Alternative. There would be additional ORV opportunities over Alternative A in areas with the increased access development. However, the ORV open area would be reduced in size, restricting some ORV use.

Recreation Impacts

Managing riparian areas to emphasize livestock forage would result in the loss of valuable wildlife habitat upon which some of the highest quality recreation use is based, such as big game hunting and wildlife viewing. This emphasis on use of riparian areas could reduce the quality of these popular sites for dispersed recreation, independent of the potential impact to wildlife resources.

Non-consumptive recreation days are projected to increase by one percent per year during the planning period. The growth rate is lower under this alternative due to potential impacts from development that could impact open spaces and opportunities for solitude. About 1.07 million resident and nonresident non-consumptive recreation days would be used in the 20-year analysis period.

Under this alternative adverse impacts to the recreation resource could happen. With increased development and increased human activity, big game and sage grouse populations could drop. This would affect the number of permits the Wyoming Game and Fish Department would issue and the number of individual species that could be harvested. The quality of the recreation experience would decline in the planning area.

Under this alternative, there would be an impact to the proposed back country byway. With additional facilities in key wildlife areas and communication sites on high elevation features, there would be a visual impact and fewer big game animals to view along the byway. Increased oil and gas activity could increase the risk of accidents between tourists and industry vehicles along the byway route.

Cumulative Impacts

More impacts would occur to recreation users than for No Action Alternative. The settings available for dispersed recreation opportunities would be further diminished over a larger area by increased development activity, vehicular travel and access into previously undeveloped areas. This would create lost opportunities for unconfined recreation experiences for some recreation users.

Effects to hunting opportunities would be the same as described for the Preferred Alternative.

Socioeconomic Impacts

The JMHCAP economic analysis was based on a 20-year planning period (1998-2017) with 1998 as the base year. In addition to looking at economic impacts by affected resource by alternative, cumulative economic effects are summarized for the short-term (1998-2007) and the long-term (1998-2017) portions of the planning period. The short-term and long-term cumulative effects for Alternative A, Alternative B, and the Preferred Alternative were compared with the impacts for the No Action Alternative on a percentage basis. All dollar figures used for evaluating impacts in the socioeconomic analysis are in current dollars. Economic tables which were used for the analysis in the document are on file at the Rock Springs Field Office.

Oil and Gas

One hundred oil and gas wells and 25 coalbed methane wells would be drilled over the 20-year period of 1998 to 2017. Almost 138 thousand barrels of oil and 99,489 MMCF of natural gas would be produced. The total economic impact for drilling and production would be approximately \$303.5 million. Employment produced by the oil and gas activity over the life of the project would be 915 annual job equivalents with a total earnings of about \$29 million. On an annual basis, about 46 jobs earning a range of salaries of \$27,180 to \$34,921 would be supported. Economic impacts to oil and gas activities under Alternative A are the highest of all alternatives.

Livestock Grazing

Annual grazing AUMs were based on the total permitted use of 26,032 AUMs (22,767 cattle and 3,265 sheep). This grazing level was held constant throughout the planning period.

Under Alternative A 455,340 cattle AUMs and 65,300 sheep AUMs would be available for livestock grazing during the 20-year life of the project. The total economic impact of livestock grazing would be \$32.3 million. Employment in the livestock sector would be 365 annual job equivalents earning \$16,337 average per year. Economic impacts to livestock grazing under Alternative A are the highest of all alternatives.

Recreation

Average elk, deer, and antelope hunter days are the same as the Preferred Alternative.

Non-consumptive recreation days were projected to increase by one percent per year during the planning period. The growth rate is lower under this alternative due to potential impacts from development that could impact open spaces and opportunities for solitude. Under this alternative non-consumptive recreation days are project to increase to 58,835 days in 2017. The proportion of nonresident and resident recreation days was assumed to remain constant.

Under Alternative A 1.07 million resident and nonresident non-consumptive recreation days would be used in the 20-year life of the project. The total economic impact of the non-

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consumptive nonresident recreation days would be \$56.8 million. Some 19,070 nonresident hunting days (elk, deer, and antelope) with a total economic impact of \$6 million would be realized over the life of the project. Employment in the recreation sector would be 798 annual job equivalents earning approximately \$12,521 average per year.

Short-Term Cumulative Impacts (1998-2007) and Comparison of Alternatives

See Table 4-14 in the Preferred Alternative impacts section for short-term physical outputs.

Due to the emphasis on production, Alternative A generates the most oil and gas well development activity of all the alternatives with 50 percent more oil and gas well drilling than the No Action Alternative. Alternative A also generates the most oil and gas production with 7 percent more production than the No Action Alternative. The increase in oil and gas production for Alternative A is less than the increase for drilling activity due to continued production from the existing inventory of producing wells. The production from the existing wells tapers off in the later years of the planning period. Coalbed methane well drilling activity is the same for Alternative A and the No Action Alternative.

AUMs of livestock grazing for Alternative A are the highest of all alternatives with 33 percent more AUMs than the No Action Alternative. This alternative is higher because it projects that all permitted grazing would be utilized throughout the planning period. Nonresident and resident hunting days are about one percent higher for Alternative A than for the No Action Alternative due to the projected increase in elk hunting days between 1998 and 2005 due to displacement of elk caused by fragmentation of habitat. This increase would gradually decrease over the planning horizon to below current levels by 2012. Nonresident and resident non-consumptive recreation days are the lowest of all alternatives for Alternative A with 5 percent fewer days than the No Action Alternative. This alternative is lower due to a projected lower growth rate for non-consumptive use. The analysis makes no judgment regarding the quality of the hunting and recreation days under this or other alternatives.

See Table 4-15 in the Preferred Alternative impacts section for short-term economic effects.

Due to the increased emphasis on production, Alternative A generates the most economic activity in Southwest Wyoming of all the alternatives in the short term. Under Alternative A, direct and total economic impacts are 11 percent higher than the No Action Alternative. Total labor earnings are 18 percent higher than the No Action Alternative. Total employment is 11 percent higher than the No Action Alternative. Revenues to local governments are 8 percent higher than the No Action Alternative. Because there is less emphasis on protection of resources, Alternative A generate the least resident recreation benefits of all alternatives with 3 percent less net economic benefits than the No Action Alternative.

Long-Term Cumulative Impacts (1998-2017) and Comparison of Alternatives

See Table 4-16 in the Preferred Alternative Impacts section for long-term physical outputs.

Due to the emphasis on production, Alternative A generates the most oil and gas well development activity of all the alternatives with 56 percent more oil and gas well drilling than the No Action Alternative. Alternative A also generates the most oil and gas production with 18 percent more production than the No Action Alternative. The increase in oil and gas production for Alternative A is less than the increase for drilling activity due to continued production from the existing inventory of producing wells. The production from the existing wells tapers off in the later years of the planning period with some existing wells going out of production. Coalbed methane well drilling activity is the same for Alternative A and the No Action Alternative.

AUMs of livestock grazing for Alternative A are the highest of all alternatives with 33 percent more AUMs than the No Action Alternative. This alternative is higher because it projects that all permitted grazing would be utilized throughout the planning period. Nonresident and resident hunting days are slightly higher for Alternative A than for the No Action Alternative. This occurs because displacement of elk causes projected elk hunting days to increase during the early years of the planning horizon. Although elk hunting days decrease below current levels later in the planning horizon the net effect is slightly higher cumulative hunting days for Alternative A. Nonresident and resident non-consumptive recreation days are the lowest of all alternatives for Alternative A with about 10 percent fewer days than the No Action Alternative. This alternative is lower due to the decreased projected growth rate for non-consumptive use. The analysis makes no judgment regarding the quality of the hunting and recreation days under this or other alternatives.

See Table 4-17 in the Preferred Alternative Impacts section for long-term economic effects.

Due to the increased emphasis on production, Alternative A generates the most economic activity in Southwest Wyoming of all the alternatives in the long term. Under Alternative A, direct and total economic impacts are 18 percent higher than the No Action Alternative. Total labor earnings are 17 percent higher than the No Action Alternative. Total employment is 12 percent higher than the No Action Alternative. Revenues to local governments are 16 percent higher than the No Action Alternative. Because there is less emphasis on protection of resources, Alternative A generates the least resident recreation benefits of all alternatives with 7 percent less net economic benefits than the No Action Alternative.

Special Status Plant Species Impacts

The impacts to special status plant species from air quality management, fire management, coal and sodium exploration, monitoring practices, recreation use, special management area, vegetation management, wild horses, and wildlife habi-

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tat management would be the same as described for the Preferred Alternative.

Increased mineral activity under this alternative could cause increased indirect impacts on special status plant habitat due to the higher number of cultural sites that would have to be mitigated or avoided.

Increased activity under this alternative could potentially impact special status plant species locations due to increased risk of unauthorized dumping or spillage.

Increased lands and realty activity would potentially cause additional impacts to special status plant locations through unintentional plant removal and habitat alteration from roads, pipelines, vehicle access, facility construction, unauthorized off-road vehicle use, facility maintenance, and chemical control of noxious weeds.

The impacts from livestock grazing would be the same as described in the No Action Alternative. In addition, proposed reconstruction of 11 stock ponds in the project area would encourage livestock congregation in these areas. Impacts to special status plants are expected to be insignificant as searches would be done prior to surface disturbing activities, and if found, would be avoided. Minor impacts from trailing in the general area could occur. Changes in seasons of use, class of livestock and numbers of livestock would change patterns of grazing and could have negative impacts on vegetation. Animals would likely use areas previously unused.

Under this alternative, increased oil and gas development would cause short- and long-term loss of vegetation of an estimated 600 acres due to construction of roads, wellpads, pipelines and associated structures. Drilling of an additional 38 wells would be expected in the core area. This activity could have negative impacts on the large-fruited bladderpod (*Lesquerella macrocarpa*) habitat, under consideration as an ACEC, that occurs adjacent to a main county road. Increased vehicular traffic from drilling activity could cause indirect impacts by increasing air-laden dust to settle on the plants, decreasing photosynthesis activity.

Year-long road use would increase loss of vegetation due to increased road blading for road maintenance and snow removal.

Weed populations would also be expected to increase with increased vehicular traffic along existing roads. In addition, new roads and pipelines associated with development would provide openings for weed infestations in areas previously unused. Chemical control of noxious weeds could impact special status plant species populations. Roadside spraying could impact populations of the large-fruited bladderpod on the Tri-Territory Road near Bush Rim. Spraying of riparian areas for whitetop could also negatively impact populations of the Ute ladies'-tresses where they occur.

The impacts from mineral material sales would be the same as described for the Preferred Alternative. In addition, the potential development of a pit to quarry volcanic rock next to the switchbacks on Steamboat Mountain would cause negative impacts to an area of about 540 acres of vegetation. Searches would be conducted for special status plants prior to

the pit construction. Should any of these species be found at the project site, implementation of avoidance as a mitigation measure which reduce impacts to the species.

More area would be open to mining claim activity, increasing the potential for impacts to special status plant species. Significant impacts would occur if mining claim activity removed special status plant species populations and contributed to the listing of these plants as threatened or endangered. Increased vehicular traffic could cause increased impacts to known special status plant locations along roadsides due to dust accumulation and direct removal by vehicles and road blading.

Special status plants and their habitat are closed to off-road vehicle use, such as those used for geophysical exploration. Searches would be required in previously unserved areas prior to geophysical exploration to determine the presence of special status plants. If found, they would be avoided. These habitats are also closed to explosives and blasting. Impacts to these species from this activity are expected to be insignificant.

The impacts from off-road vehicle use would be the same as described for the No Action Alternative. Actual plant locations (about 2,680 acres) would be closed to off-road vehicles. Off-road vehicle use in potential habitat areas would be limited to existing roads and trails; therefore, impacts to special status plant species populations would be minimal; however, unauthorized off-road vehicle use does occur and could impact current populations and potential habitat.

The impacts from reclamation and reclamation monitoring would be the same as described for the No Action Alternative. 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.

The impacts to special status species from wetland and riparian management would be the same as described for the No Action Alternative. Actions taken to attain Proper Functioning Conditions and restricting surface disturbing activities in riparian areas and wetlands would restore and maintain healthy, native riparian plant communities, providing additional potential habitat for special status plant species, especially the Ute ladies'-tresses.

The impacts from transportation planning would be the same as described for the No Action Alternative, except that the number of stream and riparian crossings would increase, maintaining less riparian habitat and potential habitat for the Ute ladies'-tresses. The miles of road in sensitive areas could also increase. This along with additional disturbances that would occur with this alternative would increase the potential for adverse effects to special status plant species.

The impacts from visual resource management would be the same as described for the No Action Alternative. Management actions described to protect visual quality would generally benefit or not impact special status plant species populations or potential habitat.

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The impacts from watershed management would be the same as described for the No Action Alternative. In general, practices to conserve and stabilize soils would help maintain healthy ecosystems which can support special status plant species.

Core Area

This alternative would have the greatest potential to impact plant species due to increased development and recreational use activity. Restrictions on surface uses should reduce this somewhat. Continued protective actions specific to ACECs would also reduce potential impacts to special status plant populations. Known locations of the large-fruited bladderpod (*Lesquerella macrocarpa*) would be evaluated on a case-by-case basis to determine if they meet the relevance and importance criteria to be considered for inclusion with the Special Status Plant Species ACEC.

Cumulative Impacts

The summary of impacts would be the same as described for the No Action Alternative.

Vegetation/Woodlands/Weeds and Riparian/Wetland Resources Impacts

Impacts to Vegetation/Woodlands/Weeds

Impacts from air quality management, cultural and paleontological resource management, hazardous materials, healthy rangelands, geophysical exploration, monitoring and reclamation practices, off-road vehicle use, special status species management, vegetation management, watershed management, wild horses, and wildlife habitat management would be the same as described in the Preferred Alternative.

Impacts from fire management activities would be similar to those described for the Preferred Alternative; however, more acres could be burned in the big sagebrush/scurfpea plant communities as these areas would not be full suppression areas.

Impacts from lands and realty activities would be as described for the Preferred Alternative; however, less acreage would be identified for withdrawal from mineral entry which would provide less protection to vegetation.

Impacts from livestock grazing management would be similar to those described in the No Action Alternative. The level of permitted livestock use under this alternative is assumed to be 26,032 AUMs. The year-end utilization level of 50 percent for riparian species or 2-inch stubble height for herbaceous species would also be in effect as guidelines. Water developments, vegetation treatments, riparian pastures, and a March turnout date could be authorized. It is doubtful that an upward trend in riparian condition could be achieved with this level of use. See the Riparian section of these Vegetation Impacts for further discussions. Additional effects would occur to upland vegetation types from increased grazing use, earlier turnout dates, and development of range improvements.

Increased oil and gas activity is expected under this alternative. An additional 36 oil and gas wells are expected to be drilled, amounting to an additional loss of 366 acres of vegetation. With implementation of reclamation standards and guidelines, the short- and long-term loss of vegetation would be about 600 acres. Depending on the location of these wells, impacts to vegetation could be slight or significant. Under this alternative, the big sagebrush/scurfpea communities would be open to development. Loss of these plants would be considered a long-term significant loss due to the uncommonly long period of time it would take to stabilize their dunal habitat, develop the needed soil microbes and replace the 6-foot tall sagebrush, requiring a period of 70 to 150 years (or more) to reach pre-disturbance conditions.

Under this alternative it is assumed that 125 wells would be drilled in the Reasonably Foreseeable Development scenario (RFD). This would mean there would be about 2,700 acres of surface disturbance. This amount of disturbance would only have a minimal impact if stringent mitigation measures were followed (as described in the RMP and the No Action Alternative). Some mitigation measures (such as directional drilling and limiting the number of well pads per section) may not be applied if costs are unreasonable on existing leases. Restricting the types of mitigation to be applied could increase impacts. The acres of disturbance shown above assumes that each well would have a pad, road, and pipeline.

Impacts coal exploration activities would be the same as described in the No Action Alternative. Big sagebrush/scurfpea and other mountain shrub communities would be open to coal exploration and some development under this alternative. Removal of the plants and deterioration of their habitat would have long-term negative impacts on these communities through direct removal of the plants, and the long re-establishment times required by these shrubs.

Impacts from sodium activities would be the same as described in the No Action Alternative. Areas of sensitive vegetation, such as the big sagebrush/scurfpea communities would be open to sodium exploration activities, potentially causing direct negative impacts to these plants and their habitats by removing the plants and long-term loss of habitat.

Impacts from mineral material sales would be the same as described in the No Action Alternative. Big sagebrush/scurfpea and other sensitive plant communities would be open to mineral material sales, potentially causing removal of the plants and deterioration of the habitat.

Fewer withdrawals would be pursued in this alternative, leaving more area open to mining claim activity. Direct removal of big sagebrush/lemon scurfpea communities and aspen communities could occur. In addition, seasonal road closures would not apply and with yearlong access, these sensitive communities could be impacted from over the snow vehicles, blading for snow removal and surface damage from off-road vehicles during frost melt periods.

Removal of the seasonal road closure could result in both short- and long-term loss of unique and important big sagebrush communities due to increased ORV use and destruction of vegetation, especially when roads are impassable due to

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wet muddy conditions. Unauthorized use would be expected to increase.

A long-term loss of native vegetation due to weed invasions would be expected to increase with the higher rate of activity in the area, especially with unauthorized use of ORVs through previously undisturbed areas.

Recreation area support facility construction would remove vegetation. Concentrated recreational activities, especially around and near riparian areas, can damage vegetation through trampling, digging, cutting, or pulling. Off-road vehicle rallies, cross country races, and other such events would damage or totally remove vegetation from the event route.

Impacts from surface disturbing activities would be the same as described in the No Action Alternative. In addition, surface disturbing activities such as those associated with roads, pipelines, well pads, coal and sodium exploration, locatable mineral exploration and development, and mineral material sales, would disturb about 2,900 acres in the long term. Reclamation practices would restore vegetation to all but about 750 acres in the long term. Although vegetative reestablishment would occur, some original plant communities would not be reestablished for more than 20 years. This particularly applies to shrubland communities and the big sagebrush/scurfpea communities and stabilized sand dunes. Impacts could be significant if disturbance occurs throughout these communities, removing or fragmenting large portions of these communities.

This alternative has the potential for the greatest increase in weeds due to the increased surface disturbance.

Minimal transportation planning would be implemented. Impacts to sensitive vegetation resources such as riparian areas, mountain shrub, big sagebrush/scurfpea, and cushion plant communities would be increased.

No limit to the number of stream crossings would result in more use and surface disturbance in riparian areas, thereby making it more difficult to obtain proper functioning condition on area streams. Not limiting access through riparian areas or sensitive plant communities would cause irreversible damage to vegetation, by direct removal, habitat degradation and deterioration of healthy native plant communities promoting noxious weed invasions. In addition, woodland habitat would be open to road construction which would have direct negative impacts to aspen and associated woodland species and their habitat.

Generally, any management action that would preserve visual resources would also benefit vegetation.

Impacts to Riparian/Wetland Resources

Impacts to riparian and wetland resources from air quality management, fire management, hazardous materials, healthy rangelands, off-road vehicle use, recreation use, special status species management, vegetation management, watershed management, wild horses, and wildlife habitat management would be the same as described in the Preferred Alternative.

Impacts from cultural and paleontological management activities would be the same as described in the No Action Alternative. Management of cultural sites is generally for the protection or preservation of such sites. These types of actions, if they occur near riparian areas, generally would benefit these also. However, excavation of cultural sites in or near riparian areas could cause short- to long-term negative impacts. Erosion could increase and sedimentation of streams could occur if not adequately mitigated (e.g., seeding, protective barriers, etc.). No activity of this type is anticipated at this time but if it should occur a site specific mitigation plan must be developed to mitigate any negative impacts (i.e., reclamation, seeding, re-contouring, etc.).

Impacts lands and realty actions would be the same as listed in Preferred Alternative with the exception of fewer acres to be considered for withdrawal from mineral entry and the lack of avoidance areas for rights-of-way would allow impacts to "sensitive" resources.

For wetlands and riparian areas, the minimum standard is Proper Functioning Condition (PFC). Stream (lotic) inventories began in 1995 and were completed in 1999. The ratings for lentic riparian areas (bogs, marshes, ponds, wetlands, and wet meadows) have not been completed. Twenty percent (16.5 miles out of 79.95 miles) of the stream (lotic) riparian areas in the Jack Morrow Hills planning area are in PFC. A significant portion (40 percent) is in upward trend and an equally significant portion (40 percent) is in downward or "not apparent" trend. These data were collected in 1995-6 when a significant amount of non-use by livestock was occurring. Not all of the poor conditions in riparian areas are due to livestock grazing; however, livestock grazing, roads, and water diversions create the most significant impacts to the riparian areas in the planning area. However, it is known that season long use by livestock, concentrates use around riparian areas during the hot season, and that later fall use tends to be adverse to riparian plants.

The general impacts listed in the No Action Alternative also apply to Alternative A. The assumed level of active AUMs would be full active permitted use of 26,032. The year-end utilization level of 50 percent for riparian species or 2-inch stubble height for herbaceous species would also be in effect as allowable use guidelines. Water developments, vegetation treatments, riparian pastures, and March turnout dates could be authorized where appropriate. It is doubtful that an upward trend in riparian condition could be achieved with this level of use.

It is assumed that several (up to 25) livestock watering facilities (earthen ponds) would be constructed during the planning time frame. These would create short-term surface disturbance with minimal erosion but would increase livestock utilization in the immediate area. By itself this could increase erosion but under a proper grazing scheme should benefit the overall vegetation resource, especially riparian areas. Assumptions under this alternative include possible earlier turnout dates, full active preference, and the 50 percent or 2-inch stubble height use level with no actual grazing rotation or seasonal rest required would probably not be suitable for maintaining riparian health. It may not be possible

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to maintain these levels of livestock use when implementing appropriate actions under Standards and Guidelines. Appropriate actions taken under this alternative may be insufficient to achieve significant progress towards riparian health objectives in the short term. Intensive management would be needed to meet riparian objectives.

Under this alternative it is assumed that 110 deep oil and gas wells would be drilled in the Reasonable Foreseeable Development scenario (RFD). This would mean there would be about 2,500 acres of surface disturbance. This amount of disturbance would only have a minimal impact if stringent mitigation measures were followed (as described in the RMP and the No Action Alternative). Some mitigation measures (such as directional drilling and limiting the number of well pads per section) may not be able to be applied if costs are unreasonable on existing leases. Restricting the types of mitigation to be applied could increase impacts. The acres of disturbance shown above assumes that each well would have a pad, road and pipeline. Unlimited and indiscriminate crossings of riparian areas or creeks (i.e., limited or no transportation planning) could cause significant impact by increasing erosion and sedimentation. The core area and big game migration corridor areas are closed to leasing and this would protect streams in those areas from any new surface disturbances due to drilling.

In addition, 15 coalbed methane wells would be drilled on existing leases. They would be clustered in the sand dunes area. These are shallow wells (900 to 1,000 feet deep). In the process of coalbed methane production, large volumes of water are pumped from the aquifer at that level. It is unknown at this time if the aquifer at this level is directly connected to the surface water in the dunal ponds and wet meadows. If it is, there may be an adverse effect of drying up the riparian in the area. This would not only affect the riparian plants but all of the wildlife that depends on those plants, insects, and surface water.

Hard rock mining (locatables) could pose significant threats to aquatic resources, especially when involving dredging or placer mining. The highest potential for this type of activity is in the Oregon Gulch area. Though there is no commercial activity anticipated at this time there is active prospecting in the area with the potential to create accelerated erosion.

Demand for other types of mineral development (salables) such as gravel pits, etc., would increase with gas development but these areas would be located away from riparian areas and streams and should have negligible impact to these resources.

No coal or sodium extraction is expected, thus no impacts are anticipated.

Geophysical activities currently have sufficient protective stipulations in the Green River RMP to eliminate impacts to riparian areas and streams.

Core Area

The most surface disturbance would occur under this alternative which could have both short- and long-term impacts to vegetation in the core area and special management

areas and particularly affect the big sagebrush communities in the core. Road densities would not be established, allowing additional road construction which removes vegetation for the long term. Livestock grazing on stabilized dunes would be detrimental to native plant species, and would likely cause areas of destabilization, loss of native plants, and acceleration of weed invasions. Implementation of use levels and assessment of standards and implementation of guidelines would reduce this effect.

Cumulative Impacts

Cumulative impacts would be the same as those described for the No Action Alternative. In addition, direct impacts to vegetation would increase under this alternative. Both riparian and upland species would decline in vigor, age and structural diversity, and composition with prolonged seasonal livestock use, higher livestock numbers, or livestock conversions. Livestock watering facilities (earthen ponds) would be constructed creating short-term surface disturbance with minimal erosion, but would increase livestock utilization in the immediate area. This could increase erosion. Implementing proper grazing management should benefit the overall vegetation resource, especially riparian areas in the long term. A possible earlier turnout date, full active preference, and 50 percent or 2-inch stubble height use level, with no actual grazing rotation or seasonal rest required, would probably not be suitable for maintaining riparian health. It may not be possible to maintain these assumptions when implementing appropriate actions under Standards and Guidelines. Appropriate actions taken under this alternative may be insufficient to achieve progress towards riparian health objectives in the short term. It would be very difficult, even with all mitigation measures applied, to reverse downward trends in riparian areas. Intensive management would be needed to meet riparian objectives.

About 2,700 acres of surface disturbance would occur from all types of activities. This amount of disturbance would be reduced if stringent mitigation measures were followed. Some mitigation measures (such as directional drilling and limiting the number of well pads per section) may not be able to be applied on existing leases, causing increased impacts. The big sagebrush/lemon scurfpea communities would be open to development for all types of activities. Loss of these plants would be considered a long-term loss due to the uncommonly long period of time it would take to stabilize their dunal habitat, develop the needed soil microbes and replace the 6-foot tall sagebrush, requiring 70 to 150 years (or more) to reach pre-disturbance conditions.

Removal of the seasonal road closure could result in both short- and long-term loss of unique and important big sagebrush communities due to increased ORV use and destruction of vegetation, especially when roads are impassable due to wet muddy conditions. Unauthorized use would be expected to increase. Recreation area support facility construction would remove vegetation. Concentrated recreational activities, especially around and near riparian areas, can damage vegetation through trampling, digging, cutting, or pulling. Off-road vehicle rallies, cross country races, and other such

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events would damage or totally remove vegetation from the event route. A long-term loss of native vegetation due to weed invasions would be expected to increase with the higher rate of activity in the area, especially with unauthorized use of ORVs through previously undisturbed areas.

Limited transportation planning and access through riparian areas or sensitive plant communities would cause irreversible damage to vegetation, by direct removal, habitat degradation and deterioration of healthy native plant communities that promotes noxious weed invasions. In addition, woodland habitat would be open to road construction which would have direct negative impacts to aspen and associated woodland species and their habitat.

Visual Resource Management Impacts

Increased development in VRM II and III areas would be difficult to mitigate due to increased development. Some impacts to the visual values on Steamboat Mountain and Pacific Butte would occur due to locating communication sites on these high points.

The VRM Class III lands in the Eden Valley would be downgraded to VRM Class IV. This potentially could result in a negative visual effect to motorists driving along U.S. Highway 191 and from local residences.

Protecting National Historic Trails and other trails by not allowing visual disturbance, by applying surface constraints to important cultural sites, and limiting geophysical vehicles to designated roads and trails in the South Pass Historic Landscape would enhance visual values and protect the visual sensitivity of these resources and areas.

As more oil and gas development occurs, more effects to the visual quality of the Greater Sand Dunes ACEC would occur.

Cumulative Impacts

Same as described for the general impact discussion.

Watershed/Water Quality Impacts

The impact on watershed values and water quality from air quality management, cultural and paleontological resource management, hazardous materials, monitoring practices, economic benefits, special status species management, and wild horses would be the same as described in the Preferred Alternative.

Fire suppression activities and the associated potential for increased erosion from suppression activities and potential long-term benefits would be similar to the Preferred Alternative but would differ in that aggressive fire suppression would not occur in the big sagebrush-scurfpea areas.

Implementation of Standards for Healthy Rangelands and Guidelines for Livestock Grazing would reduce the effects to watersheds and water quality from surface disturbing activities, recreation uses, and livestock grazing. The differences between the alternatives can be expressed in the level of

conflict that could occur between the actions that would take place under each alternative and the goals set forth by Standards and Guidelines. The actions proposed under Alternative A have the greatest potential for creating conflict in meeting Standards and Guidelines.

Realty actions such as rights-of-ways for linear disturbances such as pipelines and roads can adversely affect soils especially in areas of vegetated sand dunes which could be impacted by wind erosion when the vegetation is removed. Uncontrolled runoff from roads can create gullying in adjacent drainages. Successful reclamation and maintenance of linear disturbances limits the impact of these actions.

As most of the disturbances associated with communication sites would be away from riparian areas and streams, the effects of the creation and maintenance of communication sites would be less than an equivalent disturbance located closer to water courses. The disturbance created by the creation and maintenance of communication sites has the potential to affect watershed values and water quality, as does any disturbance.

Of primary concern is the potential for increased traffic during periods of inclement weather along portions of travel routes to and from the sites, where conditions can create an increased potential for erosion close to water bodies. Also of concern is the increased potential for erosion from the steeper portion of the access roads. While such sections of road would most likely have a larger average particle size and thus be more resistant to erosion than areas with finer average soil particle sizes, the concentration of the flow of water associated with the creation and maintenance of the road would increase the potential for flow concentration and sediment production.

More communication sites and rights-of-way are proposed under this alternative. This could result in greater amounts of surface disturbance and a greater potential for erosion and water quality degradation. The establishment of additional communication sites would create the potential for additional roads and traffic to the sites and increased disturbance from site construction.

Livestock grazing has a major influence on land and stream conditions and thus erosion and water quality. Implementation of existing programs (primarily Standards for healthy rangelands and Guidelines for livestock grazing management (S&Gs)), as well as the management actions in this alternative would aid in improving watershed.

Livestock grazing, roads, and water diversions can alter conditions in riparian areas. For riparian impacts, see Vegetation Impacts.

Activities that decrease plant vigor can increase erosion and decrease water quality. Depending on the actions taken, specific areas may show some changes, positive or adverse, but the overall trend would be closely related to the level of surface disturbing activities.

Impacts to soils from grazing can be caused by overutilization of riparian and upland areas leading to soil compaction and vegetative removal. This can lead to loss of

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the soil surface, rill, and gully formation which could impact water quality through more rapid runoff and higher sediment loads.

Livestock could contribute to the degradation of areas that might cause further concern depending on their location. Areas in very erodible soil structure could have the possibility of washing, blowing, or being removed from further beneficial purposes.

Increased grazing use, winter road plowing, extended grazing seasons, and managing riparian areas for livestock are all practices that would be in conflict with the goals of achieving PFC throughout the area. Adverse effects would be greater under this alternative than under the No Action Alternative.

Road construction could change the patterns of overland flow and increase erosion. Roads and well pads affect overland flow and groundwater infiltration. Roads and well pads interrupt natural surface flow patterns and reduce groundwater infiltration by compacting the soil. This can increase the erosive potential of runoff events by creating a shorter period of runoff and an increased volume. Drainage ditches, culverts, and surfacing can channelize surface flows and direct them away from the road surface. While this helps protect the road surface, it can also increase erosive potential along the path of concentrated flow. Proper design, construction, and maintenance reduce the erosive potential for road and well pad areas but do not fully compensate for the concentration of flows.

Impacts to surface water quality from oil and gas development are generally the result of unsuccessful reclamation and/or increased runoff from pads and roads, destabilizing drainages. With effective monitoring from industry and management from the BLM, most individual well sites and mines should have only a short-term impact on watershed stability.

Other concerns which could arise include: sedimentation, soil contamination, salt and phosphate loading, groundwater contamination, bank and channel instability, loss of aquifers, augmented flows, and water disposal.

The greatest level of development would occur under this alternative creating the greatest potential for erosion and watershed damage. Combined with a lack of a transportation plan, this potential level of development could produce the greatest amount of disturbance and thus the greatest amount of water quality degradation of any of the alternatives.

In addition to the roads and other surface disturbances that would be required for coalbed methane production, there is the additional concern of water disposal. Any discharge into a surface channel that is unaccustomed to having similar flows creates the potential for increased erosion.

If the water obtained from coalbed methane production is of a high quality and discharged, there may be some controversy at the end of the project when the water is no longer available for use as livestock or wildlife water. If the produced water contains high levels of salts there is a potential for creating conditions similar to those surrounding the evaporation ponds associated with trona production. Reinjection of the water may solve some of these problems but care should

be taken to avoid creating new ones. It is assumed that the primary means of water disposal would be through reinjection.

The level of disturbance that can be associated with coal bed methane production would largely be determined by the area of development. Current technology requires relatively close well spacing and a road network for maintenance. Even with total reinjection of the produced water this road and well network would increase the potential of erosion in the area of development. Because the level of development would be approximately the same per unit area within a production zone, an estimate of the potential level of disturbance and subsequent erosion and threat to water quality can be related to the areas that would be made available for leasing under each alternative.

It is unknown whether there is a connection between the surface waters and the waters that would be removed to stimulate gas production. Investigations to determine if there is a connection and application of appropriate mitigation to protect water quality and quantity would be needed prior to production.

The region with the greatest coal bed methane production has a surface of stabilized sand dunes, a condition that makes the area vulnerable to disturbance of the vegetation cover. Given the road and well density that would be required, this is a concern. Proper land management would reduce the level of disturbance but not eliminate it. Maintenance of the vegetative community and the transportation network would be a primary concern on any development in the area.

The road network would create additional recreation access into the area of stabilized sand dunes. Given the sensitive nature of the soils in the area, this is a concern. A transportation and recreation management plan should be part of any development.

The greater level of development allowed for under Alternative A would produce the greatest potential for methane production related erosion.

The mineral material with the greatest potential for development in the area is sand and gravel. As most of the potential sites within the planning area are located away from streams and wetlands, the primary effect of their development on water and vegetation quality would come from increased activity on the roads. There could be some additional runoff from the mine areas but the effect that they would have on downstream water quality would be difficult to determine. Surfacing of roads with hard surfaces or gravel has the potential to reduce watershed impacts.

Additional areas would be available for mineral material sale activity which could increase the potential for erosion and watershed damage over the No Action Alternative.

Coal exploration can be related to surface water quality through the amount of surface disturbed. Surface disturbance impacts would be the same as discussed in the No Action Alternative; however, more areas would be open to coal exploration activity. About 159,900 acres would be closed to coal exploration activities.

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Impacts from sodium exploration and development would be the same as described for the No Action Alternative except that fewer acres would be closed to sodium prospecting activities.

The more rapid and complete the reclamation of a disturbed site the lower the potential erosion and potential water quality degradation. Monitoring is essential in the reclamation of disturbed sites. Without efficient reclamation techniques and timely monitoring by the BLM and industry, long-term landscape disruption such as linear scars, sand deflation and deposition, and drainage degradation could result.

Off-road vehicle use impacts soil stability as a result of compaction of travel surfaces, disruption of vegetative cover, and disruption of the soil surface.

Recreation within the planning area consists primarily of activities that require motorized vehicles. Thus, it is closely tied to transportation and reclamation, as well as any activities that create new roads of any sort. Because of the nature of much of the planning area new roads are easily created and road closures rely primarily on the public's willingness to comply. The reduction of seasonal closures over the other alternatives would increase the potential erosion by allowing traffic on roads during a time when the soils are vulnerable.

Surface disturbance is closely tied to water quality. The greater the disturbance in time and area and the closer to places where the flow of water is concentrated the greater the potential for erosion. Because much of the development would take place on a case-by-case basis, the exact amount of disturbance is difficult to forecast.

The greatest level of development would occur under this alternative. Combined with a lack of a transportation plan, this potential level of development could produce the greatest amount of disturbance and thus the greatest amount of water quality degradation of any of the alternatives. About 2,900 acres would be disturbed over the long term from various activities. With reclamation, most of this disturbance would be reclaimed with a net long-term disturbance of about 700 acres. The reduction of seasonal closures over the other alternatives would increase the potential erosion by allowing traffic on roads during a time when the soils are more vulnerable to erosion.

The lack of road density limits under this alternative would create increased erosion potential due to the number and miles of roads and pipelines that could be built, as would the winter plowing of roads.

Roads are one of the primary sources of erosion in the planning area. They tend to concentrate the overland flow and reduce infiltration. They can often be thought of as a set of superimposed ephemeral stream channels. As roads become more numerous, their effects become cumulative and may even work in combination to create greater levels of erosion. Road maintenance is also important. Timely maintenance of road surfaces can reduce erosion. Maintaining as much of the right-of-way in an undisturbed or revegetated state as possible would reduce both maintenance cost and erosion. Surfacing of major arterial roads with appropriate materials would also

help limit the potential for soil erosion and reduced water quality.

By not applying road densities, there is a greater potential for erosion than if the number and position of roads were planned. The higher levels of production under this alternative suggest that there would be greater numbers of roads and thus a greater potential for cumulative effects to soils and water quality.

As a general rule, the greater the vegetation cover, the less erosion and the better the water quality. A more diverse community is generally healthier. Implementation of standards for healthy rangelands and guidelines for livestock grazing would have an effect upon the vegetative communities. The differences between alternatives may not vary dramatically.

Vegetation removal can adversely impact stream hydraulics. Vegetation removal can cause an augmented flow regime which forces the stream channel to readjust its width and depth to accommodate larger flows where vegetative conditions are impaired. Sedimentation would increase, due to a lack of filtering ability of the vegetation.

Vegetation manipulation to enhance wildlife habitat such as controlled burns, mowing, and chemical applications could cause short-term impacts to physical and chemical characteristics of soils, increasing erosion susceptibility through the loss of both ground cover and litter accumulation. Over the long term, areas of treated vegetation should increase over pretreatment production levels which would decrease the erosion hazard.

Under Alternative A, livestock management and higher levels of surface disturbance would create a less diverse and less dense vegetative community, which would result in an increased vulnerability to erosion.

The higher levels of activity under Alternative A would produce greater levels of disturbance. Given the existing levels of sensitivity to disturbance, conditions would most likely remain static or decline. As the existing conditions are less than minimally acceptable in some locations, remaining static could produce a reduction in resource conditions.

Wildlife habitat management has some effect on land, water, and vegetation quality. Sufficient wildlife habitat creates a more varied environment that is better able to slow and filter overland flow, reduce erosive forces, and recover from disturbances. The emphasis placed upon production under this Alternative could reduce the diversity and distribution of habitats and increase the potential for erosion.

Groundwater

Oil and gas and coalbed methane activities have the highest potential for impacting groundwater and possibly surface water quantity and quality. Refer to the groundwater discussion in the Preferred Alternative for a detailed description of the possible impacts and specifically, the hydrological investigations that may be necessary for coalbed methane development. Alternative A and the No Action Alternative have a

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similar level of projected activity. Therefore the potential for impacting groundwater and possibly surface water resources would be similar in the general area. Compared to the Preferred Alternative and Alternative B, this alternative has fewer restrictions allowing for increased development and a greater potential for impacting groundwater and possibly surface water resources.

Core Area

The core area, including the connectivity area, would be open to development of existing oil and gas leases and new leases. As part of the core area, Greater Sand Dunes ACEC would also be open to new leasing, including the development of coalbed methane. The increase in the number of projected wells over the other alternatives reflects the opening of these areas for oil and gas and coalbed methane development and the application of fewer restrictions. Such an increase in development would result in the highest potential among the alternatives for impacting groundwater and possibly surface water resources within the core area.

Cumulative Impacts

The cumulative impact summary for the baseline watershed analysis would be the same as described for the Preferred Alternative.

Erosion from livestock grazing activities would most likely be influenced by both the management actions in this alternative and individual grazing practices and other activities that influence the distribution and timing of livestock use. Taking full use of the earlier turnout dates and other grazing practices allowed under this alternative could result in a general decline in vegetative health and increase the overall erosive potential. Stream banks and riparian areas would most likely continue to be the focus of erosion reduction related activities. The greatest potential for erosion would occur along streams that had not achieved the minimally acceptable standard of PFC.

The greater level of activity permitted under this alternative increases the potential for accelerated erosion. Most surface disturbing activities would most likely occur in areas with high oil and gas potential. The opening of the core area to further exploration would help distribute this activity over a larger area than if the core were closed but the total amount of disturbance could be greater.

The cumulative impact on groundwater resources over the planning period for oil and gas development is likely to be minimal and insignificant given the projected yearly drilling rate of 5 to 6 wells per year. Due to the lack of information, the cumulative impact on groundwater aquifers due to coalbed methane development cannot be determined. Investigation of aquifers and their possible connection to surface waters prior to development would provide the information necessary for determining cumulative impacts and any necessary mitigation.

The potential level of cumulative disturbance to watershed values is directly related to the amount, timing, and location of surface disturbance. The primary causes of surface disturbance within the planning area are mineral development and

livestock grazing facilities. Under this alternative, the overall level of disturbance would be the highest of all alternatives. Thus, this alternative, has the highest level of concern of all the alternatives.

Wild Horse Impacts

The impacts on wild horses from air quality management, fire management, hazardous materials, monitoring and reclamation practices, recreation use, vegetation management, wild horse management, and wildlife habitat management would be the same as described for the Preferred Alternative.

The impacts on wild horses from cultural and paleontological resource management would be the same as described for the No Action Alternative. The management of cultural sites and properties is generally low impact and relegated to relatively small areas. Even under the most intense management (excavation) the amount of acreage disturbed is very small. These activities are not anticipated to have measurable impact on the forage resource for wild horses. The most likely impact to wild horses is temporary displacement while human activity occurs on the site. Once activity ceases, the horses would quickly re-occupy the area. Horses quickly adapt to human activities that are regular and long-term in nature.

The impact on wild horses from lands and realty actions would be the same as described for the No Action Alternative. Numerous activities such as pipelines, utility corridors, and other linear rights-of-ways have the potential to impact wild horses and their management. These impacts involve the removal of vegetative cover and disturbance caused by human activity.

Standards for reclamation of linear surface disturbances are adequate to mitigate any potential impact to wild horses through vegetative removal. Impacts due to the actual location of linear facilities and the attendant human activity that goes with them are more problematic.

Without restriction on the actual location of these types of facilities it is likely that they would be located in areas of critical habitat for wild horses. The most important of these are permanent water sources. Linear facilities would not be located on a pond; however, if located immediately adjacent to a water source, could reduce its utility or totally preclude wild horse use of the water, if human activity is too disturbing. An impact such as this becomes cumulative when more animals must use fewer water sources and therefore less habitat, at some point competition would ensue, animals would die, and habitat quality may be altered for wild horses and other species.

Assessment of grazing allotments for conformance with Standards for Healthy Rangelands and implementation of appropriate actions to address non-conformance would be beneficial to wild horses and their habitat. Other impacts to wild horses and their habitat relative to conformance with Standards are the same as the No Action Alternative.

Allowing early turn-out of domestic livestock and growing season-long use by livestock is expected to result in increased competition for forage and to cause changes in plant commu-

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nities that would be deleterious to wild horses and their habitat.

Planned actions relative to changes in class of livestock, suitability reviews, Proper Functioning Condition, Desired Plant Communities, and forage use limits have the same impacts as the No Action Alternative.

Development of riparian pastures would most likely include new fence construction. If such fencing precludes access of wild horses to permanent water sources it would have serious negative consequences for the horses and their habitat. Improvements in the condition of riparian vegetation would benefit wild horses only if access is not denied.

Vegetation treatments have the potential to improve wild horse habitat, which would produce positive impacts to the wild horses and their habitat.

Impacts from mineral activities would be the same as the No Action Alternative. In addition, the small variation in the number of oil and gas wells among the alternatives and the small difference in surface disturbance between them makes the impacts to all alternatives the same from a surface disturbance standpoint.

No limitations or planning for the development of locatable and salable minerals under this alternative poses elevated risks to wild horses and wild horse habitat compared to the No Action Alternative.

Modification of the existing seasonal closure for vehicle use would increase the opportunity for human activity during this period. The increased activity would negatively impact wild horses and their distribution during this period.

Many of the planned actions to mitigate or limit impacts to surface resources from surface disturbing activities have been discussed in other sections (minerals, reclamation, livestock grazing, and lands and realty management). Under all alternatives, controls on surface disturbance benefit wild horses and their habitat. The alternatives vary only in the degree of benefit. Alternative B and the Preferred Alternative are more beneficial than are the No Action Alternative or Alternative A.

Establishment of a -mile buffer around the proposed wild horse viewing area would protect the public's ability to enjoy their wild and free-roaming horses in a natural setting. It would also increase the likelihood that wild horses would be in the vicinity of the viewing area more often.

Management actions to stabilize and conserve soils, increase vegetative production, maintain or improve surface and ground water quality, and to maintain or improve wetlands, floodplains, and riparian areas would benefit wild horses and their habitat.

Under all alternatives, improvement of the soil, vegetation, and water resources benefit wild horses and their habitat. The alternatives vary only in the degree of benefit. Alternative B and the Preferred Alternative are more beneficial than are the No Action Alternative or Alternative A.

The planned actions to improve habitat for wildlife and protection from human activity and habitat fragmentation

would benefit wild horses and their habitat. This benefit is common to all alternatives.

Core Area

Only a very small portion of the Great Divide Horse Herd Management Area lies within the core area, connectivity areas, and the ACECs. Due to the limited area of overlap with the wild horse herd management area, it is anticipated that no impact to wild horses or their habitat would result from these activities.

Cumulative Impacts

Under all alternatives, no significant cumulative impacts to wild horses and wild horse management are anticipated.

Wildlife Impacts

Effects from air quality, cultural resources, fire management, off-road vehicle management, reclamation, recreation management, special status species plant management, vegetation management, watershed/water quality management, and wild horse herd management would be the same as for the Preferred Alternative.

Impacts to wildlife from rights-of-way would be similar to those described for the Preferred Alternative; however, under this alternative, more development activity would occur, causing the greatest impact to wildlife habitat of any alternative. Displacement would occur to the greatest degree, more year round activity and access would be provided which would prevent a large number of animals from returning to their original habitat.

Locatable mineral activity in and around parturition areas in the Oregon Buttes area 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 the aspen stands associated with the parturition areas. These areas are also important to a variety of raptors, neotropical birds, and other wildlife and are generally rare habitat types in the planning area. Although current 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.

Steamboat Mountain would be open to placement of communication sites which could adversely impact wintering wildlife and cause displacement of animals.

Construction of livestock water developments within crucial big game winter ranges and connectivity areas would have adverse impacts to big game populations and habitat. Additional waters in these areas would increase forage consumption by livestock and could result in additional use by wildlife during the summer months reducing available forage for wintering big game. Large wild horse populations in the area would also be attracted, compounding impacts to vegetation and winter ranges. Constructing water developments outside of crucial big game habitats could lessen competition

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for forage between livestock and big game and could also help other wildlife since limited water resources occur there now.

Sage grouse would be negatively impacted if waters are developed within a quarter mile of leks. This would result in less residual grass cover which could lead to increased nest depredation. Wildlife, livestock, and wild horses use these areas and lactating elk and mule deer especially use habitats in close proximity to riparian type habitats or developed water. Any water development authorized for livestock in the planning area under this alternative should occur where mineral development is also occurring. Since big game show a reduction in use of habitats already disturbed by mineral development, the placement of water developments in those previously disturbed habitats could minimize the impacts to wildlife from the water developments. Any increase in livestock numbers due to water development would also decrease the amount of available forage, negatively affecting the wildlife that occur in the area.

Increasing the season of use under this alternative would benefit livestock operators in the short term, but would have long-term detrimental effects to wildlife. Health of vegetation is key to maintaining wildlife habitats and continuously using vegetation throughout the growing period would eventually result in a decline of the plant's vigor. This would result in less production and an increase in non-native weed species. This would have a negative impact on wildlife.

The effects of plowing roads in the winter and early spring would be same as described in the No Action Alternative.

Under this alternative, all unleased lands within the planning area would be available for leasing with the prescriptions listed in Table 2-12 and the most crucial habitat for elk identified by the WGFD for the Steamboat Herd unit would be available for leasing. This crucial area also has the most fawning habitat for mule deer and is very important for a wide array of other wildlife species including raptors and amphibians. Due to the overall lack of cover for big game in the area, standard stipulations offer insufficient protection for the big game herds. This would eventually result in loss of a viable elk herd in the planning area. If development occurs at 4 well locations per section, these habitats would still be unusable to elk; however, if development occurs in the area with only 1 or 2 well locations per section, maintenance of a viable elk herd might be possible.

Under this alternative, 125 wells could be drilled over the life of the plan. With all lands being available for leasing and development, the majority of interest lies within crucial winter ranges and migration corridors identified by the WGFD. Coalbed methane development potential is high in the core. Recent proposals for coalbed development include requests for 40-acre spacing. Although these proposals are just outside the planning area, drainage and interest inside the planning area would result in increased development. This would increase traffic and add additional oil/gas field activities into the field of view of the Steamboat Mountain elk herd and other wildlife species. Seasonal mitigation for surface disturbing activities (November 15 to April 30 for crucial winter range and May 1 to June 30 for parturition areas) would not provide adequate long-term protection for big game. Normal opera-

tions and activities conducted during the production phase and during crucial winter periods would most likely interfere with big game use of winter ranges. In addition, animal access (migration) to key winter ranges could be disrupted, resulting in risk to the long-term survival of the area's elk herd. These impacts could cause abandonment of habitat, increased mortality, and a decrease in successful fawn-calf rearing.

Areas with intensive development activity (40-acre well spacing or less, numerous roads, pipelines, etc.) would become unavailable for use by many species of wildlife as long as the activity occurs. This long-term displacement for big game may even result in permanent non-use of the area by the herds.

As development occurs, habitats would become more fragmented, creating islands of undisturbed habitats. Although these undisturbed areas (i.e., WSAs) would provide habitat for elk and other wildlife species, they would be unable to support viable populations for many species. Maintenance of connectivity between habitats (spring-summer habitats, summer-fall, fall-winter, and winter-spring) would be crucial to sustaining big game population objectives.

Displaced wildlife may move to less desirable habitats where they may be more adversely stressed resulting in an increase in mortality or loss of young. Displacement may also lead to a long-term change in migration patterns and overuse of crucial habitat.

About 2,900 acres would be disturbed by various activities over 20 years. Impacts may be severe especially in areas where no physical barriers exist to provide cover and relief from the activity and where activity occurs year round during crucial periods. Since activities would occur in the core area, impacts would be increased in the key habitat in the core area which would adversely affect wildlife in the area, particularly elk and mule deer.

No livestock water developments within 1/4 mile of leks (in addition to the 1/4 mile closure for the lek itself) would provide some benefit to sage grouse by not placing permanent livestock water sources on strutting grounds. Impacts would be greater than described for the No Action Alternative due to concentrating livestock use in the areas surrounding the lek. Placing water developments within one-quarter mile of sage grouse leks would have significant impacts to sage grouse nesting success. This would decrease nesting success due to a decrease in residual grass and forb cover. Studies have shown that average distance to sage grouse nests from a lek is approximately two miles. Depredation of nests due to a lack of nesting cover (residual grass) is extremely high near leks (Heath, et al. 1997).

Most of the disturbed areas would be reclaimed with a long-term disturbance of about 750 acres. Reclamation could result in altered vegetation communities or introduction of undesirable plant species. This would cause negative impacts to sage grouse from the degradation of nesting and brood rearing habitat.

Transportation planning impacts would be similar to those described in the No Action Alternative; however, since the

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most disturbance would occur in this alternative, the adverse effects to wildlife and wildlife habitat would be greatest.

Constructing roads through woodland habitats under this alternative has the potential to greatly impact big game and other wildlife species that occur in the planning area.

Impacts from visual resource management would be the same as described for the No Action Alternative.

Potential exists for significant impacts to wildlife under this alternative. Drilling of 125 wells, no road density limitations, and limited mitigation requirements would eliminate elk from habitats near or adjacent to activities. Since much of this activity could occur in the core and connectivity area, habitats could be abandoned. Fragmentation of habitat and loss of habitat in the connectivity area would cause severe adverse impacts to big game and big game habitat. Riparian management impacts would be the same as in the No Action Alternative.

Impacts to Fisheries Resources

The effects from air quality management, cultural management, fire management, off-road vehicle management, recreation resource management, special status species management, vegetation management, visual resource management, watershed/water quality management, and wild horse herd management would be the same as described for Preferred Alternative.

In general, impacts from livestock grazing management described in the No Action Alternative would also apply to Alternative A.

Fisheries habitat would be adversely impacted as riparian areas are adversely impacted. It is assumed that several (up to 23) livestock watering facilities (earthen ponds) would be constructed during the planning time frame. These, assuming proper design, would create short-term surface disturbance with minimal erosion but would increase livestock utilization in the immediate area. By itself this could increase erosion, but under a proper grazing scheme should benefit the overall vegetation resource, especially riparian areas. This, in turn, benefits fisheries. Water would be evaporated from these ponds. The depletion of water from the Colorado River drainage and its effect on T&E fish species downstream is described in the Green River RMP Record of Decision dated October 1997 (see page 209; USDI 1997 of that document) and the Biological Assessment (Appendix 11) for this document. This activity is within the scope of that document.

Actions under this alternative, which include a possible earlier turnout date, full active preference, and the 50 percent or 2-inch stubble height use level with no actual grazing rotation or seasonal rest required, would probably not be suitable for maintaining riparian health or fish habitat. It may not be possible to maintain these assumptions when implementing appropriate actions under Standards and Guidelines. When appropriate actions are taken as a result of Standards and Guidelines analysis under this alternative, there may not be significant progress achieved for riparian health in any reasonable time frame.

Under this alternative it is assumed that 125 wells would be drilled. This would mean there would be about 2,500 acres of surface disturbance. This amount of disturbance would only have a minimal impact if stringent mitigation measures were followed (as described in the RMP and the No Action Alternative). However, unlimited and indiscriminate crossings of riparian areas or creeks (i.e., limited or no transportation planning) could cause significant impact by increasing erosion and sedimentation.

Additionally, the drilling of these wells would require local water sources for drilling and completion. It is assumed that all water used for drilling and completion of wells within the Green River and Sweetwater River basins would have been part of the surface flows of the Colorado River or Platte River, respectively, or of its tributaries (though that would not always be the case). The estimate for the amount of water needed to drill and complete each well is 2.0 acre-feet. Of the 125 wells in this alternative, 15 are shallow coalbed methane, 10 are deep coalbed methane wells located entirely within the Great Divide Basin (Red Desert), and the remaining 100 are standard deep gas wells. For these 100 wells it is estimated that 75 percent would be within the Green River Basin, 23 percent would be within the Great Divide Basin (Red Desert), and 2 percent would be within the Sweetwater River drainage (Platte River). Water use for these 100 wells, would total 200 acre-feet in 20 years or 10 acre-feet/year. This would total 7.5 acre-feet/year in the Colorado River drainage and 0.2 acre-feet/year in the Platte River drainage. The water depletion effects of the 15 shallow coalbed methane is the same as described in the Preferred Alternative.

The depletion of water from the Colorado River drainage and its effect on T&E fish species downstream is described in the Green River RMP Record of Decision dated October 1997 (see page 209; USDI 1997 of that document) and the Biological Assessment (Appendix 11) for this document.

The effects of wildlife management actions on fisheries resources would be the same as described for the No Action Alternative.

Core Area

The impacts within the Core Area and Special Management Areas are the same as for what is listed under the general impacts for Alternative A.

Fisheries

Impacts to fisheries in the core area would be the same as described for the No Action Alternative.

Cumulative Impacts

Management actions under this alternative would result in the most adverse impacts to wildlife habitats.

Increased developments and human presence would continue to remove and fragment wildlife habitats. Demands on public lands from recreationists would continue to increase, resulting in less un-occupied and undisturbed areas. More access into crucial habitats would increase displacement over

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the long term (possibly even permanently). Maintaining habitat to support existing Wyoming Game and Fish Department population objectives for big game would become more difficult.

Although about 148,000 acres in the planning area would be either closed to leasing or surface disturbing and disrupting activities, not all of the closed areas occur in crucial habitats, nor are they interconnected. Adverse impacts to crucial wildlife habitats (e.g., riparian areas, crucial winter ranges, parturition areas, game bird winter concentration areas, etc.) from livestock grazing would increase if all current nonuse AUMs are activated. These adverse impacts would be especially severe in crucial winter ranges where other commodity uses such as mining or oil and gas development is taking place. Displacement of livestock into these crucial habitats or concentrating livestock in crucial habitats where vegetation has been decreased due to commodity development would result in less forage available for big game animals during winter periods. This would be especially critical in severe winters. Development of livestock water in crucial habitats and within 1/4 mile of sage grouse leks removes vegetation and concentrates livestock around the water development. These impacts could be reduced through implementation of new AMPs and/or revision of management in old AMPs to include riparian objectives and implementation of actions associated with standards and guidelines assessments.

Cumulative effects of year-long livestock activity compound habitat impacts through displacement, forage competition, water competition, and social interaction.

Development could occur throughout the planning area, including the core area, affecting crucial habitats and migration routes and displacing wildlife. Production activities could occur year-round, causing disturbance and disruption in crucial habitats during crucial winter periods. This would add to the stress of displacement.

Seasonal constraints would be used to mitigate impacts to wildlife from human activities during crucial periods and provide short-term protection for wildlife. Long-term maintenance and operations activity in crucial wildlife habitats would continue to cause displacement of wildlife from crucial habitats, including disruption of nesting, fawning and calving areas, and crucial big game winter habitats. Increased access for recreationists due to development of new roads (especially all-weather roads that provide year-round access) would magnify the negative impacts to wildlife and their habitats and cause further displacement and habitat abandonment. Nondiscretionary closures to oil and gas leasing of about 117,000 acres would reduce the effects somewhat; however, these acres are not contiguous and not all are in crucial habitats, so impacts to crucial habitats would still occur.

Potential exists for impacts to the migrational capabilities of the Sublette antelope herd. However, these effects should not be significant as most development activity would occur outside antelope crucial winter range. Fragmentation of habitat areas and displacement from existing migration corridors due to roads and increased activity would occur; however, it is anticipated that the activity in the migration corridor

would be minor and sufficient habitat and open space would still be provided. Impacts would be greater than those described for the other alternatives. However, impacts could be significant (cause large amounts of winter kill) if winter conditions are extremely severe (similar to the winters of 1978 and 1983).

Surface disturbing activities would continue to cause long-term losses of wildlife habitat. The greatest amount of acreage would be disturbed under this alternative.

Management prescriptions for wildlife resources, watershed, visual resources, and off-road vehicle use would provide long-term benefits to most wildlife populations and habitats. Fire (natural or prescribed) would result in a short-term loss of habitat but could benefit habitat in the long term. Wildfire could result in a long-term loss of habitat and aspen stands if these areas are not fenced after a fire. Livestock would not be allowed to graze the burned area immediately after the fire.

Surface mining can result in an irreversible irretrievable loss of wetlands and springs, and although mitigation occurs, the original site is lost. Major road development also results in irretrievable losses of habitat as they are generally permanent structures. The adverse impacts from road development would be greatest under this alternative.

Habitat fragmentation, particularly for big game, would occur in some areas, especially 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 can also increase accessibility for the general public into areas that have previously been somewhat inaccessible to vehicles. Plowing of roads in the winter months would add to this impact. 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. This could diminish the ability to maintain current population objectives for big game species. Transportation planning would help to reduce this overall effect; however, lack of road density limits in crucial habitats would cause additional adverse effects.

Increased oil and gas activity, especially in areas with reduced well spacing (40- and 80-acre spacing) would eliminate use of some of these areas by wildlife species, especially deer and elk.

A summary of impacts to the individual species that may be affected by actions in the planning area follows.

Impacts to wintering antelope and antelope migration would be greater than described for the other alternatives. Most of the development would occur in portions of the planning area outside antelope crucial winter range and migration areas, this impact should not be significant.

The Steamboat elk herd is very susceptible to displacement by human activities because of the lack of hiding and escape cover. Continued development proposals and permanent uses on the Steamboat Mountain, Essex Mountain, and Jack Morrow Hills areas make maintenance of this herd population

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objective very unlikely. Road construction and increased access into remote areas would also increase use by the general public adding to the impacts of this desert elk herd. Mitigation such as remote or off-site facility placement, and seasonally restricting human activity to reduce access and traffic in crucial habitat and calving areas would help reduce these adverse effects.

Competition for forage between mule deer and cattle for saltbush and winterfat on crucial winter range would continue. Control of wildfire has been responsible for the loss of key shrub species and the even-aged condition of sagebrush communities.

The impacts to mule deer would be the most adverse under alternative A. Under this alternative the assumptions include increased amounts of surface disturbing activities and increased numbers of livestock. It would be very difficult, even with all mitigation measures applied under this alternative, to reverse downward or static trends in riparian areas.

Fisheries

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

Special Management Areas

Greater Sand Dunes ACEC and Special Recreation Management Area

Oil and gas leasing would occur in the area that could lead to impacts to the visual integrity of the area. New surface facilities could have an adverse impact to the health and safety of the recreational users in the area. Up to 15 coal bed methane wells and 10 new wells could be drilled within this ACEC. Beneficial effects would occur to oil and gas operations due to increased availability of areas for leasing and development.

Because of the additional producing wells associated with oil and gas production in this area, the public would have a reduced "open" area to play in. Concerns over safety would be reduced over the No Action Alternative because there would be fewer hazards in the reduced open area. Reducing the ORV open acreage in the planning area would have an adverse impact to this resource.

The seasonal off-road vehicle closure within the Steamboat Mountain and Greater Sand Dunes ACEC would not be maintained. New seasonal closures in crucial ranges would not be considered. This would adversely affect big game birthing activity. Failure to maintain this seasonal vehicle closure could slightly diminish efforts to manage heritage resources of all kinds.

Fewer restrictions on surface disturbances would generally be adverse to efforts to manage heritage resources of all kinds.

Steamboat Mountain ACEC

This alternative would provide the most benefit to oil and gas operations as more areas would be open to leasing and development.

In addition to the effects described in the Preferred Alternative for oil and gas developments, the top of Steamboat Mountain would be open to communication sites. This could have an impact to the visual values of the area and diminish efforts to manage Native American respected places. Under this alternative, Steamboat Mountain would be managed as a VRM II and III area which would not provide as much protection as the preferred alternative. If a communication site is located in and near crucial habitats, this habitat could be lost which would be a significant impact. Year round access can result in displacing and disturbing wildlife during critical periods.

Allowing mineral material sales on the face of Steamboat Mountain could adversely impact visual, cultural, and wildlife values.

The effects of withdrawals and livestock grazing management would be the same as described for the No Action Alternative.

South Pass Historic Landscape ACEC

Allowing Pacific Butte to remain open for consideration of communication sites would significantly diminish BLM efforts to manage and protect certain classes of heritage resources, especially the South Pass Historic Landscape viewshed. Additionally, the Green River RMP and other management document prescriptions would significantly enhance BLM efforts to manage and protect heritage resources of all kinds. Impacts to oil and gas development would be the same as the No Action Alternative.

White Mountain Petroglyphs ACEC

Impacts to the White Mountain Petroglyphs ACEC would be the same as described for the Preferred Alternative.

Red Desert Watershed Area

Livestock water developments could be constructed throughout the planning area which could enhance livestock distribution. However, surface disturbance associated with construction of water developments could adversely affect sensitive resources. Livestock grazing use could also be concentrated in areas that would adversely affect wildlife use of the area, and cultural resource values.

The entire watershed would be open to leasing consideration which would increase the adverse effects from oil and gas development activities, but benefit actual oil and gas operations. These effects to wildlife habitat, visual and heritage resources, and open space would be greatest under this alternative.

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ALTERNATIVE B

Cultural Impacts

The impacts to cultural resources from air quality management, fire management, hazardous materials, access management, livestock grazing management, monitoring and reclamation practices, off-road and recreation uses, special status species management, vegetation management, and watershed management would be the same as described in the Preferred Alternative.

The impacts to cultural resources would be similar to those described in the Preferred Alternative. Seasonal restrictions and other mitigative measures applied to lands and realty actions generally have beneficial effects to cultural resources by limiting or otherwise controlling surface disturbing activities. Special management prescriptions for Areas of Critical Environmental Concern, such as the South Pass Historic Landscape and White Mountain Petroglyphs are generally protective in nature and tend to benefit cultural resources. Enhanced avoidance distances would facilitate easier protection of all kinds of heritage resources.

Closure of Indian Gap and the face of Steamboat Mountain to rights-of-way would appreciably protect cultural resources in general and especially areas identified by Native Americans as respected places. Closure of Steamboat Mountain, Essex Mountain, Oregon Buttes ACEC, Continental Peak, and Pacific Butte to communication sites would likely protect cultural resources, including areas identified as respected places by Native Americans, in those areas.

Development of fewer, e.g., 65, projected oil and gas wells and associated facilities with enhanced management prescriptions, including additional 1-mile protection around areas identified by Native Americans as respected places would significantly increase protection of cultural resources of all kinds.

Mitigation prescriptions for mineral material sales in Alternative B, including closure of the Steamboat Mountain ACEC, would generally enhance protection of cultural resources of all kinds.

Additional withdrawals in the connectivity area, elk calving areas, Steamboat Mountain ACEC, and eastern portion of the Greater Sand Dunes ACEC generally enhance protection of cultural resources of all kinds. Withdrawal of areas on White Mountain identified by Native American traditional elders as respected places, as well as the two areas within the Steamboat Mountain ACEC would significantly enhance protection of those heritage values.

Additional prescriptions for geophysical exploration activities would generally enhance protection of cultural resources of all kinds.

Increasing the areas closed to surface disturbing activities would provide greater protection for heritage resources of all kinds. Intensified transportation planning would additionally enhance efforts to protect heritage resources of all kinds.

Changing the VRM Class in the Steamboat Mountain ACEC and Red Desert from Class III to Class II partially in recognition of the increased heritage resource values of those areas brought to our attention by Native American traditional elders would significantly improve BLM management of heritage resources of all kinds.

Grazing over-use can impact cultural resources both directly by destroying archaeological sites, historic trails and associated viewsheds, and indirectly by accelerating erosion which can eventually destroy some of these resources. Expansion of the wild horse herd management area would somewhat enhance appreciation of the horses as a heritage resource.

The impacts to cultural resources would be similar to those described for the Preferred Alternative. Efforts to prevent fragmentation of wildlife habitat and adverse effects to riparian habitats would enhance appreciation of heritage resources within their environmental context.

Core Area

Impacts on cultural resources from management of the following resources would be the same as described above for the general planning area: air quality, cultural, fire, hazardous materials, land and realty, and livestock grazing. Management of other resources, such as minerals, wildlife, and vegetation, would have specific impacts on cultural resources within the core.

Closure of the core area, and the connectivity area to oil and gas leasing would significantly enhance protection of heritage resources of all kinds.

Development and surface disturbing activities of all kinds would be reduced in the core area and would greatly enhance BLM's ability to manage heritage resources. Limitations on road density would generally enhance efforts to protect heritage resources of all kinds.

Desired Plant Community objectives would generally enhance efforts to manage heritage resources, and particularly Native American respected places.

The ability to protect and manage heritage resources would be greatly enhanced by expanding Class II VRM areas. Efforts to enhance wildlife and riparian habitats would generally enhance heritage resource management efforts.

Cumulative Impacts

Cumulative impacts would be the same as described for the No Action Alternative except that prohibition of surface disturbing activities within the paleosol deposition area, and 1 mile avoidance radius around Native American respected places would enhance protection of those kinds of heritage resources.

Paleontological Impacts

The types of direct, indirect, and cumulative impacts described under the Preferred Alternative for fossil resources would occur under this alternative, but the magnitude of the

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impacts would be the least of any alternative being analyzed. Under this alternative, known scientifically significant fossil sites within the planning area would be closed to surface disturbing activity, which would effectively preserve them for future study.

Among the alternatives being analyzed, Alternative B is the most restrictive, with respect to allowable surface disturbing activities outside the core area. The large avoidance, withdrawal, and no lease areas means fewer fossil resources would be impacted, either positively or negatively. The development that may occur would have the same type of direct and indirect impacts to paleontological resources as that described for the other alternatives. However, the magnitude of the impacts would be the least of any alternative being analyzed.

Core Area

Except for development of the existing leases within the core, very little other surface disturbance would occur. With no new leases being issued, no new water developments permitted, and withdrawal of nearly the entire core area, this alternative would have the least amount of impact compared to the other alternatives, except for the No Action Alternative.

Cumulative Impacts

The types of cumulative impacts described for the other alternatives would occur under this alternative. However, the magnitude of the impacts would be the least of any alternative being analyzed.

Fire Impacts

The impacts to fire management activities would be similar to those described for the Preferred Alternative except that more restrictions for resource protection would be applied to fire management activities.

Lands Impacts

Right-of-way holders would have some flexibility and opportunity for locating and routing rights-of-way under this alternative. However, right-of-way placement would be impacted by exclusion, avoidance, and no surface occupancy areas, and those areas with seasonal restrictions. These effects would be greatest under this alternative as more acres would be considered avoidance or exclusion areas than the No Action Alternative.

The exclusion of rights-of-way within the South Pass Historic Landscape vista (about 23,640 acres) would have a major impact if activity should increase in this area since rights-of-way in exclusion areas would not be allowed unless mandated by law. Large avoidance areas would have a similar impact as avoidance of these areas may require a longer route which would affect other offsite areas and increase costs to the applicant. This alternative proposes the greatest number of avoidance and exclusion areas. About 70 percent of the planning area (393,680 acres) would be an avoidance area and

about 8 percent (39,870 acres) would be excluded from rights-of-way. Long linear facilities such as pipelines and powerlines would be affected the most by these restrictions, as extensive reroutes would be necessary. Additional mitigation may also be applied to activities that may occur in all avoidance areas, also increasing project costs and the amount of time needed to complete projects (Table 4-26).

No surface occupancy restrictions affecting about 36,010 acres preclude placement of rights-of-way because surface disturbing and disrupting activities are not allowed. Most of these areas are small and scattered throughout the planning area and can be easily avoided. However, effects increase when combined with avoidance and exclusion areas. Large areas with NSO restrictions have the same effect as large exclusion areas.

Areas closed to communication site location (about 44,550 acres) preclude placement of these types of facilities. If alternate locations cannot be found, this can cause gaps in communication signals, and inefficient communication coverage of areas. More areas would be closed to communication sites under this alternative.

Seasonal restrictions and other mitigation measures to protect resource values and threatened and endangered species (T&E) would impact rights-of-way by restricting location or timing of construction.

The possibility of high dust levels resulting from use of unpaved access roads would necessitate stipulations to control dust. All construction rights-of-way as well as access road rights-of-way would include a stipulation requiring that the holder meet Federal and State air quality standards.

Land tenure adjustments would occur only if the benefits outweigh any adverse impacts, and if there are no significant impacts which cannot be mitigated. About 4,721 acres have been identified as possibly suitable for disposal/acquisition.

The proposed withdrawal of about 193,180 acres, and the 37,290 acres identified for withdrawal in the Green River RMP, would preclude disposal, entry, and mineral location in those areas (Table 4-27). Withdrawals for more than 5,000 acres would require notification of Congress. Existing withdrawals, such as those for oil shale and coal, would be reviewed and those which no longer serve the purpose for which they were withdrawn, would be revoked. These lands would then be open for disposal, entry, and mineral location. About 211,130 acres would open to mineral location that previously were not available for this activity. Potential for mining claim activity is low except in the South Pass Area. This action would benefit mining claimants by allowing mining claim activity on areas that were previously closed.

There is adequate vehicle access on the existing roads and trails to the lands in the planning review area. Closing or restricting specific areas to protect public health and safety and implementing transportation planning, should not cause severe adverse effects to vehicle users because so much of the area is currently accessible and such closures would likely be few. Implementing the ORV designations would keep vehicles on designated routes which could result in traveling

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further to get to a destination, but should not preclude accessing an area. Foot and horse traffic would not be affected.

Core Area

The core area, including the Greater Sand Dunes and Steamboat Mountain ACECs, would be an avoidance area for rights-of-way. Large avoidance areas such as this would require routing rights-of-way around the core area. This would affect other offsite areas and increase costs to the applicant. Land tenure, withdrawal, and access impacts would be the same as described for the general area. Steamboat Mountain ACEC and Essex Mountain would be closed to communication sites which could result in inefficient communication coverage for portions of the planning area.

Cumulative Impacts

The combined actions of no new oil and gas leasing in the core and connectivity areas, large areas of avoidance (393,680 acres), much of it connecting, and about 39,870 acres of exclusion area (and about 44,550 acres excluded from communication sites) would affect right-of-way placement. Long linear rights-of-way particularly would be affected by potentially longer routes increasing construction costs. Fewer rights-of-way would be needed as less acreage would be leased and fewer gas wells would be drilled.

Withdrawal of 267,590 acres would preclude disposal, entry, and mineral location. Revocation of about 211,130 withdrawn acres through the removal of the oil shale and coal withdrawals would allow for entry and mineral location, and consideration of land disposal.

Lands would be irreversibly lost to the public land base when sold or exchanged. However, under exchanges, lands of comparable value would be obtained.

Livestock Grazing Impacts

Impacts to livestock grazing from air quality management, cultural and paleontological resource management, hazardous materials, healthy rangelands, vegetation treatments, livestock grazing plan development, monitoring and reclamation practices, off-road and recreation uses, special status species management, threatened and endangered species management, transportation planning, weeds, and wilderness management would be the same as described in the Preferred Alternative.

Under this alternative it is assumed that 50 gas wells and 15 shallow coalbed methane wells would be drilled. This would mean that there would be approximately 2,000 acres disturbed. This is less than the No Action Alternative by about 300 acres. Net long-term disturbance would decrease from the No Action Alternative by about 91 acres and would also be minimal.

Impacts to livestock from Hard Rock Mining (Locatables), Gravel or other pits (salables), and Coal, Sodium, or Oil Shale Exploration and Development (leasables) would be the same as described in the Preferred Alternative. These activities

would not pose a concern for livestock production and management.

Actions concerning rights-of-ways, pipelines, roads, utilities and other surface disturbing actions such as well pads, water diversions, etc., can adversely affect livestock by reducing available forage (see Minerals discussion). Reclamation of linear rights-of-ways that do not include permanent roads would mitigate these forage related impacts. Additionally, about 80,610 acres would be closed to rights-of-way which would benefit livestock by protecting available forage.

Some areas are more suitable for cattle while other areas are more appropriate for sheep. Slopes greater than 20 percent are usually only accessible to sheep while the lower lying areas are more accessible to cattle grazing. Distance to water is also more critical for cattle than for sheep. Omitting areas of little or no productivity or very steep slopes from livestock grazing might have an impact on the livestock operators by a reduction in adjudicated AUMs. However, this would decrease the potential overutilization of the vegetation in other areas. With sheep and cattle there is a diverse range of forage needs which separates each class of livestock. One area may indeed be unsuitable for one class of livestock but very suitable to another.

Conversions from sheep to cattle would not be considered under this alternative. Conversions from cattle to sheep might alleviate problems with riparian habitat. Normally sheep are herded and are not allowed to stay in riparian areas except to water. Sheep are more likely to use snow in the higher elevations located within the planning area. Conversions from cattle to sheep could reduce the stress placed upon the riparian areas. Also, many operators would not run sheep or do not have the infrastructure to conduct a sheep operation.

Salting for distribution of livestock could require some effort in planning and proper placement but would aid in the distribution of forage utilization and reduce impacts to other resources such as wildlife, water quality, and riparian resources.

No new livestock management facilities would be developed unless it would benefit wildlife and wildlife habitat. This may negatively impact livestock management by reducing options for addressing grazing related resource damage. Reductions in use and increased labor costs (herding) may result.

Modifying the season of use to a later turnout date would ultimately force the operators to find forage for their livestock elsewhere. Normally range readiness is around July 1 of each year, conditions such as soil moisture, ambient temperatures, and growing conditions. In some cases, turn out could be as early as June 1. Livestock operators could not expect a consistent turn-out date each year. This would increase the time involved in livestock management and increase costs. This uncertainty would cause operations to become less profitable by increasing costs for trucking, equipment, and labor.

Utilization levels would be set for willow at 30 percent, riparian vegetation at 35 percent, and upland vegetation at 40 percent. Lower utilization levels could possibly cause live-

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stock to be removed from an area within the allotment or the entire allotment due to utilization of critical areas meeting target levels prior to the end of the authorized grazing period. Livestock would initially be moved to other areas that have not reached the utilization levels. This may result in the operators having to take their livestock elsewhere earlier than currently occurs, thereby increasing costs. However, with the utilization levels set as they are, a positive change in vegetation can be assumed in a short time frame.

An estimated 11 water developments would be constructed outside the core area, connectivity, and crucial winter ranges. Eleven developments may not be sufficient to enhance distribution of livestock and some could not be located in the areas necessary to provide optimum distribution and use. Some areas would be underutilized or not utilized at all. Constraints on water development placement could result in an increased use of riparian areas and utilization limits could be reached within a short time frame.

This alternative has the greatest amount of restrictions for livestock management of all the alternatives. There would be no new water developments in the core and connectivity areas. This in conjunction with utilization limits on riparian areas would reduce the amount of forage and water available for livestock. Livestock would be moved from riparian areas and may need to be removed from the entire allotment prior to the end of the authorized use period. Utilization limits would have similar effects. Hauling water would be done in some cases by the livestock operators but would be costly.

Managing riparian pastures primarily for wildlife habitat and watershed resources, establishing riparian utilization at 30 percent for shrub species and 35 percent for herbaceous species, and prohibiting water developments in crucial winter ranges, the core, and connectivity areas would adversely affect livestock management opportunities. Livestock would be removed from riparian areas sooner than currently occurs. Over time, with improved riparian areas and increased vegetative production, livestock would benefit.

For a detailed socioeconomic impacts discussion of the livestock industry, see Socioeconomic Impacts.

Under Alternative B, 177,220 cattle AUMs and 19,800 sheep AUMs would be available for livestock grazing during the 20-year life of the project. The total economic impact of livestock grazing would be \$12.4 million. Employment in the livestock sector would be 139 annual job equivalents earning \$16,396 average per year. Economic impacts to livestock grazing under Alternative B are the lowest of all alternatives. AUMs available for livestock grazing on an annual basis under Alternative B represent a decrease over the baseline year 1998 and the 5-year average of 1994-1998.

Livestock grazing would be based on the last 5 years average use of 9,851 AUMs. This level of grazing activity could produce financial impacts to livestock operators, causing them to sell, lease, or look for other grazing lands. See also Socioeconomic Impacts.

No surface occupancy stipulations or rights-of-way avoidance areas in the South Pass Historic Landscape, Oregon

Buttes ACEC, and White Mountain Petroglyphs ACEC could prevent construction of livestock management facilities; therefore, livestock distribution patterns may not improve.

Expanding the wild horse herd management area would have a slight effect on livestock grazing. Limited competition for forage could occur. The largest impact would be from competition for available water in areas where livestock water could not be developed. Limiting water developments could increase competition between domestic livestock and wild horses for available water.

The prescriptions for grazing of livestock in this alternative would be the most restrictive, providing the least flexibility. The dietary overlap between elk and cattle and between deer and sheep has the potential for the most impact to livestock grazing. Restrictions on range improvements, watering sources and or areas, utilization levels, use of upland and riparian areas, and use limits would be greatest under this alternative.

The major impact to cattle from elk would be competition for forage. Areas managed for elk winter range would tend to cause cattle to be moved to other potentially less productive areas. Use of these areas would require increased management detail to address accessibility and water issues. Limitations on the use of management tools in areas historically grazed by cattle may require intensive management, increasing operating costs.

The major impact to sheep from elk or deer would be less dramatic than that of cattle. Since sheep are herded rather than allowed to roam freely, the costs of moving the animals would be lessened. Although there is still a cost to herding sheep, they can generally be moved to other areas at less expense than cattle. Herding sheep may displace elk or deer. The competition for forage between elk and sheep is very limited. However, the direct competition may occur any time during the growing season. Even though sheep are termed browsers, like deer, they utilize a variety of forages.

Impacts to sheep from application of utilization levels would be the same as for cattle by reducing the amount of forage available for grazing. These limits may cause sheep to be moved to areas of poorer quality of feed. Lower palatability forage might decrease their weight causing health concerns especially if they are lambing in these areas.

The competition between elk and cattle over shade may cause concern in areas that have the means to provide such cover. This is evident in the big sagebrush areas surrounding or near Steamboat Mountain. Because of the height of the big sagebrush in these areas and the sparsely timbered areas, livestock, in general, would seek out these areas for shade in late summer to early fall. Competition for these limited areas might cause a decline in the density of the big sagebrush stands. Elk and deer have been known to cause resource damage to these areas as well.

Operations in the core area such as limiting water sources may reduce the flexibility to manage both cattle and sheep. Additional management tools may have to be developed or adapted to allow the proper management of livestock within these areas. There may be additional expenses to livestock

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operators due limiting available management tools.

Restrictions in distance from water and utilization limits in sage grouse nesting areas, may cause management concerns and increase operating costs. Increased management and management tools may be needed to ensure compliance with stubble heights and utilization limits.

Limiting seasons of use and livestock numbers would affect livestock operations.

Limits on when livestock enter or are removed from an allotment may cause the livestock operators to utilize other resources which may or may not fit current grazing operations.

Limitations in the use of the connectivity area may create an impact to livestock operations. By limiting use and the duration of grazing within these areas, there may be increased costs associated with additional management tools.

Core Area

Impacts to livestock would be the same as described in the Preferred Alternative. Surface use constraints and management practices precluding construction of rangeland improvements may prevent improvement of livestock distribution patterns. This would affect the Pacific Creek, Steamboat Mountain, Sands, Bush Rim, and Fourth of July allotments.

Cumulative Impacts

Actions taken under this alternative could result in a short-term reduction in use as the area and time available for grazing would be limited. This potential impact would be the greatest under this alternative. The projected increase in forage production would also be the greatest and could help offset this loss in the long term.

Minerals Impacts

Leasables - Oil and Gas and Coalbed Methane Resources

Oil and gas and coalbed methane development would be restricted or prohibited as the result of conflicts with environmentally related resource values. This cumulative impact is due to the restriction categories:

- no leasing,
- no surface occupancy,
- seasonal access restrictions, and
- controlled surface use restrictions.

Approximately 38 percent of the planning area would be designated no leasing. Leasing would be prohibited within wilderness study areas, the core area, and the connectivity area.

In areas of no surface occupancy, surface disturbing activities are prohibited. About 6 percent of the planning area would be affected by this restriction (Map 21 and Table 2-15). Access to hydrocarbon resources located beneath these areas

must be accomplished by drilling deviated or horizontal wells, which may not always be economically feasible. Directional drilling would increase well cost.

About 60 percent of the planning area is affected by seasonal restrictions (Map 11 and Table 2-15). Seasonal restrictions limit oil and gas activities to certain time periods during the year. Activities can be prohibited from between 2 and 9 months out of the year depending on the purpose of the time limitation, and number and kind of overlapping seasonal restrictions. This restriction is applied to leases in order to protect, big game winter ranges, certain calving and parturition areas, raptor habitat, mountain plover nesting, and sage grouse nesting areas. Most of the seasonal restriction overlaps occur during the spring and early summer. The recent addition of a requirement for mountain plover nesting surveys would increase costs for any new wells or construction activities proposed.

Controls on surface disturbing activities are applied to leases to mitigate adverse impacts. The effect of surface use restrictions can range from no effect, to added mitigation and reclamation requirements, to moving well locations, all the way to prohibiting exploration and development activity. The magnitude of the impact is generally not known until a well has been proposed. About 80 percent of the planning area would be affected by these controlled surface use restrictions (Table 2-15 and Map 36).

The reasonable foreseeable development scenario projected that 202 wells (includes five coalbed methane wells) could be drilled in the planning area if the entire area were open to exploration and development. The impacts of restrictions on this projection are:

1. five coalbed methane wells expected to be drilled under the No Action Alternative would not be drilled due to additional restrictions resulting from no leasing, no surface occupancy, and controlled surface use mitigation and reclamation requirements being added for this alternative,
2. an estimated direct loss of 48 percent of the potentially drilled wells (92 wells) through no leasing,
3. an estimated indirect loss of 26 percent of the potentially drilled oil and gas wells (50 wells) because restrictions (no leasing, surface occupancy stipulations, and mitigation and reclamation requirements) over almost all of the planning area could discourage industry from initiating exploration and development activities,
4. increased operating costs related to trying to get access for drilling those available well locations and transporting production obtained,
5. in the short term (through 2007), the number of producing wells could increase from 48 wells (46 oil and gas wells and 2 coalbed methane wells) to 56 wells (51 oil and gas wells and 5 coalbed methane wells),
6. in the long term (through 2017), the number of producing wells could decrease to 33 wells (28 oil and gas wells and 5 coalbed methane wells).

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Impacts of Fewer Wells

About 50 wells (24 producing oil and gas wells and 3 producing coalbed methane wells) are expected to be drilled and 142 wells would not be drilled during the 20-year analysis period. The new producing wells would account for additional royalty and tax revenue to the government. The 24 new oil and gas wells could have a total reserve of 58.8 billion cubic feet of gas. The projected reserves of the expected 3 new producing coalbed methane wells is not known.

The unavailable production from the oil and gas wells not drilled represents unrealized royalty and tax revenue. Seventy-five of the 142 wells would be expected to produce and they could recover 165 billion cubic feet of gas. A loss of opportunity for revenue and royalty would occur if wells could not be drilled to obtain hydrocarbons under no leasing and no surface operations areas. Where leasing is deferred, the opportunity to recover hydrocarbon reserves would also be deferred for some period longer than 20 years. The amount of potential revenue from undrilled coalbed methane wells is unknown, since the number of potential undrilled coalbed methane wells could not be determined. Opportunities for direct and indirect employment would also be reduced with fewer producing wells.

Significance of Impacts to Oil and Gas Activities

Significance criteria 1, 2, 3, and 4 would be exceeded for the No Action Alternative. Two fields (Nitchie Gulch and Pine Canyon) lie in or partially in the planning area. They both exceed the 5 billion cubic feet of gas criteria. The Nitchie Gulch Field contains 48 wells and the Pine Canyon Field contains 22 wells (George 1992). The well average per field in this area is 35. Diedrich (1999) has indicated that field sizes are likely to range from 20 to 25 wells. In comparison, a natural gas field in southwestern Wyoming typically includes 30 to 200+ wells (Barlow and Haun, 1994). It appears that at least two average fields would not be developed due to direct impacts of not leasing and due to indirect impacts of applying surface use restrictions. Possibly as many as four fields would not be developed due to these restrictions

About 74 percent of expected potential exploration and development activity could not occur due to restrictions. Potential direct losses were determined to be 48 percent and indirect losses 26 percent. Collectively and individually these two types of losses exceed the threshold loss of 25 percent which was determined to be significant for criteria #2.

About 74 percent of expected reserve additions would not occur due to restrictions. The threshold for criteria #3 was determined to be a loss of 25 percent of the potential reserves.

The total number of producing wells would decrease by 31 percent over the 20-year study period. This exceeds the significance level established for criteria #4.

Core Area

No further leasing would be allowed in the core area and in the connectivity area. Impacts as a result of restrictions in the Greater Sand Dunes ACEC and Steamboat Mountain ACEC

would be the same as for the core area since they lie within it. Types of impacts determined for the planning area as a whole, also apply to this area.

The core area and the connectivity area make up about 38 percent of the planning area. Some of the new wells that could be drilled would be drilled as step-out development wells from the Nitchie Gulch Field and some as part of another field (possibly as extensions of one or more of the small one- or two-well fields already present). Development of an entire field may be precluded in the core area and connectivity area under Alternative B, if productive areas are found to lay under unleaseable areas. The criteria #1 impact threshold may be exceeded.

Significance criteria #2 and #3 impact threshold levels are expected to be exceeded within the core area and connectivity area.

Forty-seven (47) wells have been completed as gas producers in the core area and connectivity area and 35 wells still produce. Over the long term, 35 of these wells are expected to be abandoned, leaving only 2 producing well(s). Approximately 11 of the 20 new wells projected under the RFD are expected to be productive. The significant impact threshold for criteria #4 would be exceeded since the total number of producers would decrease from 35 to 13 over the life of this plan. This impact would be partly due to depletion of reservoir rocks in the area and partly due to the restrictions placed on exploration and development activity.

Cumulative Impacts

Impacts include those expected from all oil and gas development. Present impacts are due to 48 existing producing wells. Short-term impacts (1998-2007) expected are: 10 new exploratory unit proposals; 27 new wells; 15 new producing wells; 12 drilled and abandoned wells; and seven abandoned producing wells. At the end of 2007 there would be 56 producing wells in the planning area. This would be an increase of eight wells (three conventional and five coalbed methane wells) over the December 1997 total of 48 wells.

Long-term impacts (1998-2017) expected are: 19 new exploratory unit proposals; 50 new wells; 27 new producing wells; 23 drilled and abandoned wells; and 42 abandoned producing wells. At the end of 2017 there would be 33 producing wells in the planning area. This would be a decrease of 15 wells (an increase of 3 coalbed methane wells and a decrease of 18 conventional wells) over the December 1997 total of 48 wells.

Leasables - (Other Than Oil and Gas and Coalbed Methane), Locatables, and Salables

Leasables - Coal

The level of coal activity projected for this alternative is the same as that described for the No Action Alternative; however, the level of restrictions would be increased compared to the No Action Alternative and Alternative A (Table 4-28). The core area including the Steamboat Mountain ACEC

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would be closed to coal exploration as it would be under the No Action Alternative. Native American respected sites would be avoided by 1 mile as opposed to 1/4 mile in Alternative A and 100 feet in the No Action Alternative. Exploration would avoid sensitive areas. Sensitive areas include elk calving areas, tall sagebrush, mountain shrubs, and special status plant species habitat. The effect of these avoidance areas would be the same as described for other areas closed to exploration, surface mining, or construction of surface facilities associated with underground coal mining. The effects to coal exploration under this alternative would be similar to that described for the No Action Alternative, but the magnitude would be greater due to the increased restrictions and avoidance areas.

Cumulative Impacts Same as described for the general impact discussion.

Leasables - Sodium

The entire planning area would be closed to exploration and development of sodium. This would prohibit resource recovery and may make recovery of sodium on lands adjacent to the planning area uneconomic.

Cumulative Impacts Same as described for the general impact discussion.

Locatables

The impacts to locatable minerals development under this alternative would be the same as that described for the No Action Alternative; however, the magnitude of the impacts would be greater due to an increase in withdrawal areas. In addition to the withdrawals identified in the Green River RMP, the connectivity area, elk calving areas, Steamboat Mountain ACEC, and all of the Greater Sand Dunes ACEC would be withdrawn.

Cumulative Impacts Same as described for the general impact discussion.

Salables

The impacts described for the general area under the No Action Alternative would be the same for this Alternative. In addition to the areas closed or restricted to development of mineral materials under the No Action Alternative, activities would avoid sensitive areas as described for coal exploration. About 406,080 acres would be closed to mineral material sale activity (Table 4-29).

Core Area Alternative B would close the same areas to mineral materials development as the No Action Alternative. The effects would be the same as described for the No Action Alternative.

Cumulative Impacts The cumulative effects on mineral materials would be the same as that described for the No Action Alternative.

Geophysical

Under Alternative B, geophysical exploration could occur within the core area but would be limited to foot traffic and use of existing roads and trails. Outside the core area, geophysical activities would be limited to foot traffic in the following areas: active sand dunes, slopes greater than 20 percent, ACEC values, key habitat - unique vegetation and plant communities, key habitat - escape cover, cultural/historical/ Native American concerns, connectivity area, inaccessibility, special status species, stabilized dunes, and VRM Class II areas. Geophysical activities would be allowed only after a site-specific analysis was completed.

Also carried forward from the Green River RMP, restrictions, such as limiting the use of vehicles and explosive charges (Table 4-7) in sensitive resource areas inside and outside the core. Sensitive resources include Boars Tusk, a portion of White Mountain Petroglyphs, Crookston Ranch, developed recreation sites and the ORV parking lot in the Greater Sand Dunes ACEC, raptor nesting sites, portions of South Pass Historic Landscape, Oregon Buttes ACEC, special status plant species habitat, Tri-Territory Marker, Native American respected sites, Wilderness Study Areas, and recreation interpretive sites. Some of these areas, such as the WSAs, would be open to foot traffic only.

Under the Alternative B, direct and indirect impacts would be similar to those described for the No Action Alternative and Alternative A, except the magnitude of the impacts would be greater. The magnitude of the impacts would be greater due to the increase in the number of areas having restrictions. Geophysical activities would be reviewed on a case-by-case basis. Detailed analysis of the potential restrictions would not be available prior to development of exploration proposals. However, given the potential resource conflicts between wildlife, cultural, vegetation, and recreation resources and geophysical activities, the direct impact would be an increase in the cost of operations from mitigation of impacts to these resources. The cost of geophysical activities would increase due to controlled surface use restrictions, time delays, and seasonal restrictions.

The Green River RMP identified certain areas that would remain open to leasing but closed or restricted to geophysical activities. This alternative adds to this list of areas as described above. Such a situation may indirectly affect overall development of oil and gas resources in these areas and potentially increase the amount of surface disturbance associated with development. If subsurface information can not be retrieved through conventional geophysical means, then operators assume a higher risk during exploration and development of these areas. The presence or absence of geophysical data can mean the difference between more efficient development, with fewer, more productive wells and missing the reservoir entirely. Areas that would remain open to leasing but closed or restricted to geophysical activities may incur less efficient development resulting in more surface disturbance than would otherwise occur were geophysical data available.

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Core Area

Under Alternative B, new leases would not be issued within the core area. Limited geophysical activities would be allowed, but restricted to foot traffic and use of existing roads and trails. The impacts to geophysical operations would be the same as that described above for the general area.

Cumulative Impacts

The cumulative impacts would be similar to those described for the No Action Alternative. In addition, costs to the operator from mitigation would be greatest under this alternative. Less area could be explored, increasing the potential for data gaps. Less efficient development could occur with a potential for more exploratory drilling related surface disturbance due to a partial lack of data.

Off-Road Vehicle Impacts

Impacts to ORV use would be the same as discussed for the Preferred Alternative.

Recreation Impacts

The impact on recreation would be similar to those described for the Preferred Alternative; however, more areas would remain available for dispersed recreation and hunting opportunities.

Socioeconomic Impacts

The JMHCAP economic analysis was based on a 20-year planning period (1998-2017) with 1998 as the base year. In addition to looking at economic impacts by affected resource by alternative, cumulative economic effects are summarized for the short-term (1998-2007) and the long-term (1998-2017) portions of the planning period. The short-term and long-term cumulative effects for Alternative A, Alternative B, and the Preferred Alternative were compared with the impacts for the No Action Alternative on a percentage basis. All dollar figures used for evaluating impacts in the socioeconomic analysis are in current dollars. Economic tables which were used for the analysis in the document are on file at the Rock Springs Field Office.

Oil and Gas

Forty-five oil and gas wells and 20 coalbed methane wells would be drilled over the 20-year period of 1998 to 2017. Approximately 104 thousand barrels of oil and 75,534.2 MMCF of natural gas would be produced. The total economic impact for drilling and production would be approximately \$212 million. Employment produced by the oil and gas activity over the life of the project would be 587 annual job equivalents with a total earnings of about \$19 million. On an annual basis, about 29 jobs earning a range of salaries of \$27,180 to \$34,921 would be supported. Economic impacts to oil and gas activities under Alternative B are the lowest of all alternatives.

Livestock Grazing

Annual grazing AUMs were based on the five-year average actual use of 9,851 AUMs (8,861 cattle and 990 sheep). This grazing level was held constant throughout the planning period.

Under Alternative B 177,220 cattle AUMs and 19,800 sheep AUMs would be available for livestock grazing during the 20-year life of the project. The total economic impact of livestock grazing would be \$12.4 million. Employment in the livestock sector would be 139 annual job equivalents earning \$16,396 average per year. Economic impacts to livestock grazing under Alternative B are the lowest of all alternatives.

Recreation

Average elk hunter days the same as the No Action Alternative. Average deer and antelope hunter days the same as the Preferred Alternative. Non-consumptive recreation day impacts are the same as the Preferred Alternative.

Under Alternative B, 1.18 million resident and nonresident non-consumptive recreation days would be used in the 20-year life of the project. The total economic impact of the non-consumptive nonresident recreation days would be \$62.7 million. Some 19,040 nonresident hunting days (elk, deer, and antelope) with a total economic impact of \$6 million would be realized over the life of the project. Employment in the recreation sector would be 875 annual job equivalents earning approximately \$12,521 average per year.

Short-Term Cumulative Impacts (1998-2007) and Comparison of Alternatives

See Table 4-14 in the Preferred Alternative impacts section for short-term physical outputs.

Due to increased restrictions, Alternative B generates the least oil and gas well development activity of all alternatives with about 30 percent less oil and gas well drilling than the No Action Alternative and 54 percent less drilling than Alternative A. Alternative B also generates less oil and gas production than the other alternatives with 6 percent less production than the No Action Alternative and 12 percent less production than Alternative A. The decrease in oil and gas production for Alternative B is less than the decrease in oil and gas well drilling due to the continued production from the existing inventory of producing wells in the short term. Coalbed methane well drilling for Alternative B is 20 percent lower than for either the No Action Alternative or Alternative A.

AUMs of livestock grazing for Alternative B are the lowest of all alternatives with 50 percent less AUMs than the No Action Alternative and 62 percent less AUMs than Alternative A. This alternative is lower because it projects that the previous five-year average actual use would continue throughout the planning period. Nonresident and resident hunting days are the same as the No Action Alternative and about 1 percent lower than Alternative A because the protective restrictions are not projected to increase hunter days. Nonresi-

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dent and resident non-consumptive recreation days for Alternative B are the same as the No Action Alternative because the protective restrictions are not projected to increase the growth rate in non-consumptive use. However, non-consumptive recreation days are about five percent higher for Alternative B than for Alternative A due to the lower growth rate projected for Alternative A.

See Table 4-15 in the Preferred Alternative impacts section for short-term economic effects.

Due to the increased emphasis on protection, Alternative B generates the least economic activity in Southwest Wyoming of all alternatives. Under Alternative B, direct and total economic impacts are 11 percent lower than the No Action Alternative and about 20 percent lower than Alternative A. Total labor earnings are 14 percent lower than the No Action Alternative and 27 percent lower than Alternative A. Total employment is 14 percent lower than the No Action Alternative and 22 percent lower than Alternative A. Revenues to local government are 8 percent lower than the No Action Alternative and 14 percent lower than Alternative A. Resident recreation benefits under Alternative B are the same as the No Action Alternative. Because there is more emphasis on protection, Alternative B generates 3 percent more resident recreation benefits than Alternative A.

Long-Term Cumulative Impacts (1998-2017) and Comparison of Alternatives

See Table 4-16 in the Preferred Alternative impacts section for long-term physical outputs.

Due to increased restriction, Alternative B generates the least oil and gas well development activity of all alternatives with about 30 percent less wells drilled than the No Action Alternative and 55 percent less drilling than Alternative A. Alternative B also generates less oil and gas production than the other alternatives with about 10 percent less production than the No Action Alternative and 24 percent less production than Alternative A. The decrease in oil and gas production is less than the decrease in oil and gas well drilling due to continued production from the existing inventory of producing wells. Coalbed methane drilling activity for Alternative B is 20 percent lower than for either the No Action Alternative or Alternative A.

AUMs of livestock grazing for Alternative B are the lowest of all alternatives with 50 percent less AUMs than the No Action Alternative and 62 percent less AUMs than Alternative A. This alternative is lower because it projects that the previous five-year average actual use would continue throughout the planning period. Nonresident and resident hunting days are the same as the No Action Alternative and slightly lower than Alternative A because the protective restrictions are not projected to increase hunter days. Nonresident and resident non-consumptive recreation days for Alternative B are the same as the No Action Alternative because the protective restrictions are not projected to increase the growth rate in non-consumptive use. However, non-consumptive recreation days are about 10 percent higher for Alternative B than for Alternative A due to the lower growth rate projected for Alternative A.

See Table 4-17 in the Preferred Alternative impacts section for long-term economic effects.

Due to the increased emphasis on protection, Alternative B generates the least economic activity in Southwest Wyoming of all alternatives. Under Alternative B, direct and total economic impacts are about 13 percent lower than the No Action Alternative and 26 percent lower than Alternative A. Total employment is 14 percent lower than the No Action Alternative and 23 percent lower than Alternative A. Revenues to local government are 12 percent lower than the No Action Alternative and 24 percent lower than Alternative A. Resident recreation benefits under Alternative B are the same as the No Action Alternative. Because there is more emphasis on protection, Alternative B generates 8 percent more resident recreation benefits than Alternative A.

Special Status Plant Species Impacts

The impacts to special status plant species from air quality management, fire management, lands and realty management, livestock grazing management, coal and sodium activities, mineral material sales, monitoring and reclamation practices, recreation use, riparian and wetland area management, transportation planning, vegetation management, watershed management, and wildlife habitat management would be the same as described for the Preferred Alternative.

Under this alternative, lower levels of activity and more stringent protective measures would cause less surface disturbance, resulting in fewer cultural sites being mitigated and potentially lower impacts to special status plants.

More limited permitting of mineral development and vehicle use would generally decrease the likelihood of unintentional spilling or unauthorized dumping of hazardous materials on these habitats.

Under this alternative, 65 new wells are proposed for drilling, about half of which would be expected in the core area. Fewer wells and access roads would have beneficial impacts to special status plants, both known locations and potential habitat by creating fewer surface disturbances, less removal of vegetation and fewer indirect impacts such as dust settling and trampling by off-road vehicle use. Restrictive measures such as directional drilling and other space-saving techniques could reduce impacts to special status plant species by reducing the amount of surface disturbance. Weed invasions associated with surface disturbing activities would be minimized.

Known special status plant species and their habitat could be negatively, and perhaps significantly, impacted from mining claim activity; however, additional withdrawals would protect more area from potential mining claim activity. Steamboat Mountain ACEC, the elk calving areas, and the eastern portion of the Greater Sand Dunes ACEC would be withdrawn from mineral location protecting any special status plant species in these areas.

Vehicle use, such as those used in geophysical activities would be limited to existing roads and trails, and foot-only traffic off-road inside the core area, and in sensitive areas (this

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would include special status plant locations, as well as the unique big sagebrush/scurfpea communities). Under this alternative, impacts to known special status plants and their habitats would be beneficial due to less surface disturbance.

Special status plant species are closed to off-road vehicle use, as well as to the use of explosives and blasting, providing protection of these plants from these activities. Specifying roads and trails to be designated would potentially provide benefits to special status plants by allowing more land to be reclaimed and return to native plant communities.

About 2,660 acres of large fruited bladderpod (*Lesquerella macrocarpa*) would be added to the existing Special Status Plant Species ACEC (designated in the Green River RMP, USDI 1997). This would benefit the plant by closing the actual plant locations to rights-of-way activity. A plan of operations would be required for any mining claim activity in an ACEC. However, under all alternatives the plant locations would be withdrawn from mineral entry and mining claim activity, so no effect would occur.

The impacts from visual resource management would be similar to those described for the Preferred Alternative. In addition, this alternative would have the greatest benefit from visual resource management actions as more areas would be managed for class II visual values.

The impacts to special status plant species from wild horses would be similar to those described for the Preferred Alternative. In addition, expanding the wild horse herd management area could result in continued minimal trampling of vegetation in the expanded area as existing horses would not be removed.

Core Area

The effects to special status plant species would be similar to those described for the No Action Alternative. In addition, known locations of the large-fruited bladderpod (*Lesquerella macrocarpa*) would be added to the existing Special Status Plant Species ACEC.

Cumulative Impacts

The effect to special status plant species would be similar to those described for the Preferred Alternative. However, use in the area would be less than that of the Preferred Alternative. Livestock grazing management practices including not converting from sheep to cattle, closing more areas to mineral leasing, transportation planning would provide less potential for impacts to occur to these plant species.

Inclusion of the large-fruited bladderpod (*Lesquerella macrocarpa*) into the special status species ACEC would only change the land designation for the known lands occupied by the large-fruited bladderpod from avoidance areas to exclusion areas for rights-of-way.

Vegetation/Woodlands/Weeds and Riparian/Wetland Resources Impacts

Impacts to Vegetation/Woodlands/Weeds

Impacts from air quality management, fire management, hazardous materials, healthy rangelands, coal and sodium exploration, mineral material sales, geophysical exploration, monitoring and reclamation practices, off-road and recreation uses, special status species management, transportation planning, vegetation management, watershed management, and wildlife habitat management would be the same as described in the Preferred Alternative.

Impacts from cultural and paleontological resource management would be the same as described in the Preferred Alternative. In addition, the mitigation measures applied to protect cultural sites are expanded in most cases preventing further surface disturbance under this alternative.

Impacts would be similar to those described for the Preferred Alternative. In addition, designated ROW avoidance areas that include the big sagebrush/scurfpea communities would have beneficial impacts on this rare plant association.

Rights-of-way corridors or windows (concentration areas) and avoidance areas would be identified that would minimize the impacts to a larger area. This should serve to decrease erosion and other impacts to sensitive resources.

More acreage in lands identified for withdrawal from mineral entry under this alternative than for the other alternatives would provide the most protection to vegetation from this activity than the other alternatives.

For purposes of analysis, the anticipated actual use would not exceed 9,851 AUMs. Less intensive grazing would promote healthier, more biologically diverse native plant communities. Implementation of more restrictive riparian utilization standards would directly benefit willows, grasses, and sedges by maintaining plant vigor, community structure, and diversity.

Locating salt licks as far as 1/4 mile from special status plant locations and riparian areas would benefit these populations and vegetation types by protecting them from livestock trailing and congregation impacts.

Delaying grazing livestock turnout until native range grasses are in the boot stage of phenological development would promote healthy, vigorous stands which could more easily repel weed invasions, and be more capable of withstanding drought.

Proposed reconstruction of 11 stock ponds in the project area would encourage livestock congregation in these areas, causing negative effects to surrounding vegetation. However, water developments, including wells, springs, and pipelines should improve livestock and wild horse distribution patterns, encouraging more uniform utilization of forage and causing less damage to certain vegetation types.

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Guidelines for appropriate turnout dates (boot stage on plants), an active permitted use level limited to 9,851 AUMs, riparian vegetation utilization not to exceed levels of 30 percent on shrubs, 35 percent “relative use” on herbaceous plants or an 8-inch stubble height, eliminating any season-long grazing, conducting suitability reviews, taking aggressive appropriate actions for standards for healthy rangelands and guidelines for livestock grazing that would bring riparian health to PFC, all would benefit riparian health and productivity. It is assumed that with these planned actions, substantial progress toward riparian health and Desired Plant Communities would be achieved. See the Riparian section of these Vegetation Impacts for further discussions.

Decreased oil and gas activity is expected under this alternative as 24 fewer wells would be drilled than under the No Action Alternative, and 244 fewer acres disturbed. With implementation of reclamation standards and guidelines, the short-term loss of vegetation would be 430 acres and the long-term loss would be 275 acres. Under this alternative, the big sagebrush/scurfpea communities would not be open to development and little or no long-term loss of these plants would occur. Some activity on existing leases could affect this vegetation community but impacts would not be significant. Long-term beneficial effects would occur.

Under this alternative it is assumed that 65 wells would be drilled in the Reasonable Foreseeable Development scenario (RFD). This would mean there would be about 1,700 acres of surface disturbance. This amount of disturbance would only have a minimal impact if stringent mitigation measures were followed (as described in the RMP and the No Action Alternative). Some mitigation measures (such as directional drilling and limiting the number of well pads per section) may not be applied if costs are unreasonable on existing leases. Restricting the types of mitigation to be applied could increase impacts. The acres of disturbance shown above assumes that each well would have a pad, road and pipeline.

Containerized shrub seedlings used in reclamation would help re-establish shrubs in sensitive areas under this alternative, decreasing impacts to the short term.

Proposed mitigation measures such as directional drilling, combining facilities, and multiple-hole, single pad drilling on currently leased areas would reduce negative impacts to vegetation in some critical areas, where these measures would be applied. These measures would not be applied in all cases.

Although weeds would increase due to surface disturbing activities, the impacts would be less than under the No Action Alternative as less area would be disturbed.

Surface disturbing activities such as those associated with roads, pipelines, well pads, coal and sodium exploration, locatable mineral exploration and development, and mineral material sales, would disturb about 2,300 acres in the long term. Reclamation practices would restore vegetation to all but about 500 acres in the long term. Although vegetative reestablishment would occur, some original plant communities would not be reestablished for more than 20 years. This particularly applies to shrubland communities and the big sagebrush/scurfpea communities and stabilized sand dunes.

Impacts are not expected to be significant because few of these communities would be disturbed with management actions.

Impacts would be similar to those described for the Preferred Alternative. Generally any management action that would preserve visual resources would also benefit vegetation. In addition, this alternative would provide a greater benefit than the No Action Alternative as more areas would be managed for Class II visual values. This alternative would have the greatest benefit from visual resource management actions as more areas would be managed for Class II visual values.

Proposed wild horse numbers would be managed at a level that would not adversely affect vegetation. However, continued concentration of wild horses and other large animals near water sources could damage vegetation in localized areas through trampling, trailing, and overgrazing. Expanding the wild horse herd management area could distribute these impacts over a larger area.

Impacts to Riparian/Wetland Resources

Impacts from air quality management, fire management, hazardous materials, healthy rangelands, off-road vehicle and recreation use, special status species management, vegetation management, watershed management, and wildlife habitat management would be the same as described in the Preferred Alternative.

Impacts from cultural and paleontological resource management would be similar to those described for the Preferred Alternative depending on the exact mitigation distance applied.

Generally, impacts from lands and realty actions would be the same as the Preferred Alternative. Rights-of-way corridors or windows (concentration areas) and avoidance areas would be identified that would minimize the impacts to a larger area. This should serve to decrease erosion and other impacts to sensitive resources. Additional areas identified for withdrawal from mineral development would also benefit riparian/wetland and aquatic areas by increasing the acreage prohibited from that type of surface disturbance. Increased emphasis on proper planning of access to public lands would provide for decreased erosion and sedimentation to rivers, streams and riparian areas.

For wetlands and riparian areas, the minimum standard is Proper Functioning Condition (PFC). Stream (lotic) inventories began in 1995 and were completed in 1999. The ratings for lentic riparian areas (bogs, marshes, ponds, wetlands, and wet meadows) have not been completed. Twenty percent (16.5 miles out of 79.95 miles) of the stream (lotic) riparian areas in the Jack Morrow Hills planning area are in PFC. A significant portion (40 percent) is in upward trend and an equally significant portion (40 percent) is in downward or “not apparent” trend. These data were collected in 1995-6 when a significant amount of non-use by livestock was occurring. Not all of the poor conditions in riparian areas are due to livestock grazing; however, livestock grazing, roads, and water diversions create the most significant impacts to the riparian areas in the planning area. However, it is known that

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season long use by livestock, concentrates use around riparian areas during the hot season, and that later fall use tends to be adverse to riparian plants.

In this alternative, guidelines for appropriate turn out dates (boot stage on plants), an active permitted use level of 9,851 AUMs (which is the 5-year average), riparian vegetation utilization not to exceed levels of 30 percent on shrubs, 35 percent “relative use” on herbaceous plants or an 8-inch stubble height, eliminating season-long grazing, conducting suitability reviews, taking aggressive appropriate actions for S&G’s that would bring riparian health to PFC within 5 years, etc., all would benefit riparian health and productivity. It is assumed that under the actions significant progress toward riparian health and Desired Plant Communities would be achieved.

Under this alternative it is assumed that 50 deep oil and gas wells would be drilled in the Reasonably Foreseeable Development scenario (RFD). This would mean there would be about 1,700 acres of surface disturbance. This amount of disturbance would only have a minimal impact if stringent mitigation measures were followed (as described in the RMP and the No Action Alternative). Some mitigation measures (such as directional drilling and limiting the number of well pads per section) may not be able to be applied if costs are unreasonable on existing leases. Restricting the types of mitigation to be applied could increase impacts. The acres of disturbance shown above assumes that each well would have a pad, road and pipeline. A transportation plan would be developed that would protect streams and riparian areas from poor or excessive numbers of crossings. The core area and big game migration corridor areas are closed to leasing and this would protect streams in those areas from any new surface disturbances due to drilling.

In addition, 15 coalbed methane wells would be drilled on existing leases. They would be clustered in the sand dunes area. These are shallow wells (900 to 1,000 feet deep). In the process of coalbed methane production, large volumes of water are pumped from the aquifer at that level. It is unknown at this time if the aquifer at this level is directly connected to the surface water in the dunal ponds and wet meadows. If it is, there may be an adverse effect of drying up the riparian in the area. This would not only affect the riparian plants but all of the wildlife that depends on those plants, insects and surface water.

Hard rock mining (locatables) could pose significant threats to aquatic resources, especially when involving dredging or placer mining. The highest potential for this type of activity is in the Oregon Gulch area. Though there is no commercial activity anticipated at this time there is active prospecting in the area with the potential to create accelerated erosion. The areas that are proposed for withdrawal would not be subject to impacts from this activity.

Demand for other types of mineral development (salables) such as gravel pits, etc., would increase with gas development but these areas would be located away from riparian areas and streams and should have negligible impact to these resources.

No coal or sodium extraction is expected, thus no impacts are anticipated.

Geophysical activities currently have sufficient protective stipulations in the Green River RMP to eliminate impacts to riparian areas and streams.

Impacts from wild horses would be similar to those described for the Preferred Alternative. Proposed wild horse numbers would be managed at a level that would not adversely affect vegetation. However, continued concentration of wild horses and other large animals near water sources could damage vegetation in localized areas through trampling, trailing, and overgrazing. These effects could occur over a larger area if the wild horse herd management area is expanded.

Core Area

Fewer surface disturbing activities in the core area would reduce both short- and long-term impacts to vegetation. Protective measures designed for vegetation in the ACECs would have short- and long-term benefits to native plant communities. Establishment of road densities would decrease the loss of critical vegetation types to surface disturbing activities to a lesser degree than the Preferred Alternative. Livestock grazing on stabilized dunes would be detrimental to native plant species, and would likely cause areas of destabilization, loss of native plants and acceleration of weed invasions. Implementation of use levels and assessment of standards and implementation of guidelines would reduce this effect. Withdrawal from mineral entry and any future leasing eliminates impact to riparian areas from mining claim activities. The stringent mitigation measures and guidelines that are assumed in this alternative for all other activities would allow riparian/wetland areas to recover or reach DPC very rapidly.

Cumulative Impacts

Impacts would be the same as described in the No Action Alternative. In addition, full fire suppression in the big sagebrush/lemon scurfpea plant communities would provide for protection for this unique vegetation association. Also, designated right-of-way avoidance areas would include this rare plant association and provide beneficial impacts.

Less intensive grazing would promote healthier, more biologically diverse native plant communities. Implementation of more restrictive riparian utilization standards would directly benefit willows, grasses, and sedges by maintaining plant vigor, community structure, and diversity. Additionally, setting appropriate turn out dates (boot stage on grasses), using seasonal utilization levels for riparian vegetation, eliminating any season long grazing, conducting suitability reviews, taking aggressive appropriate actions for standards and guidelines that would bring riparian health to proper functioning condition, and other riparian related management actions would benefit riparian health and productivity. Rapid progress in reversing downward trends and achieving the Desired Plant Community would be expected.

Decreased activity and surface disturbance is expected under this alternative with 244 fewer acres disturbed. With implementation of reclamation standards and guidelines, the short-term loss of vegetation would be 430 acres and the long-term loss would be 275 acres. The big sagebrush/lemon scurfpea communities would be closed to development and little

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or no long-term loss of these plants would occur. Some activity on existing leases could affect this vegetation community but impacts would not be significant. This amount of disturbance would have a minimal impact if stringent mitigation measures were followed. Some mitigation measures (such as directional drilling and limiting the number of well pads per section) may not be applied on existing leases. Restricting the types of mitigation to be applied could increase impacts. Additional withdrawals would protect additional areas from mining claim activity for locatables. Impacts to vegetation communities would be reduced due to management actions that limit vehicle use and explosive charges for geophysical exploration. Long-term beneficial effects would occur.

Transportation planning would benefit sensitive vegetation resources, such as riparian areas, mountain shrubs, big sagebrush/scurfpea and cushion plant communities, by channeling access to certain areas, allowing other areas to remain undisturbed or to revegetate. In addition, seasonal road closures and limitations on riparian area crossing would reduce impacts to vegetation and help meet proper functioning condition objectives.

Visual Resource Management Impacts

Not allowing communication sites on high points such as Steamboat Mountain, Essex Mountain, and Pacific Butte would maintain the visual values in the planning area.

Increasing the amount of VRM Class II lands on Steamboat Mountain would not only benefit the visual values but help mitigate negative impacts to Native American respected places, and protect soils and plants.

Changing the VRM III classification in the Red Desert Watershed area to VRM Class II would enhance the visual values in this area. Upgrading the VRM classification would help mitigate development activities that could impede upon the area's vast open space values.

Upgrading the VRM classification on portions of White Mountain to VRM II would help maintain the viewshed from U.S. Highway 191 and mitigate negative impacts to Native American respected places.

The initiation of a program to improve the visual quality of the oil fields would benefit the visual resources in those areas and, in many cases, would benefit other resources such as soil, watershed, and vegetation. The avoidance of identified areas which are not suitable for linear rights-of-way would protect the sensitive visual resources in these areas.

Protecting National Historic Trails and other trails by not allowing visual disturbance, by applying no surface constraints to important cultural sites, and limiting geophysical vehicles to designated roads and trails in the South Pass Historic Landscape would enhance visual values and protect the visual sensitivity of these resources and areas.

Not allowing surface mining activities and surface occupancy areas around the Boars Tusk and the Steamboat Mountain-Killpecker Dune Fields, including the wild horse viewing area, would retain and enhance visual resources found in the area.

As more oil and gas development occurs, more effects to the visual quality of the Greater Sand Dunes ACEC would occur.

Cumulative Impacts

Same as described for the general impact discussion.

Watershed/Water Quality Impacts

The impact on watershed values and water quality from air quality management, cultural and paleontological resource management, fire management, monitoring practices, economic benefits, special status species management, and vegetation management would be the same as described in the Preferred Alternative.

The level of activity under this alternative would create the least volume of hazardous material. This would create the smallest potential for a problem involving hazardous material.

Implementation of Standards and Guidelines for Healthy Rangelands would reduce the effects to watersheds and water quality from surface disturbing activities, recreation uses, and livestock grazing. The differences between the alternatives can be expressed in the level of conflict that could occur between the actions that would take place under each alternative and the goals set forth by Standards and Guidelines. The actions proposed under Alternative B would have the greatest potential for reducing conflicts and meeting standards and guidelines.

Realty actions such as rights-of-ways for linear disturbances such as pipelines and roads can adversely affect soils especially in areas of vegetated sand dunes which could be impacted by wind erosion when the vegetation is removed. Uncontrolled runoff from roads can create gulying in adjacent drainages. Successful reclamation and maintenance of linear disturbances limits the impact of these actions.

As most of the disturbances associated with communication sites would be away from riparian areas and streams, the effects of the creation and maintenance of communication sites would be less than an equivalent disturbance located closer to water courses. The disturbance created by the creation and maintenance of communication sites has the potential to affect watershed values and water quality, as does any disturbance.

Of primary concern is the potential for increased traffic during periods of inclement weather along portions of travel routes to and from the sites, where conditions can create an increased potential for erosion close to water bodies. Also of concern is the increased potential for erosion from the steeper portion of the access roads. While such sections of road would most likely have a larger average particle size and thus be more resistant to erosion than areas with finer average soil particle sizes, the concentration of the flow of water associated with the creation and maintenance of the road would increase the potential for flow concentration and sediment production.

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Closing areas to potential communication sites and limiting of rights-of-way to existing disturbances would have the effect of concentrating activity. This would decrease the overall disturbance but might create a greater level of disturbance for an individual project. The transportation and pipeline corridors would experience repeated disturbance but would also be more visible and thus be more likely to have any developing erosional problems fixed.

Livestock grazing has a major influence on land and stream conditions and thus erosion and water quality. Implementation of existing programs (primarily standards for healthy rangelands and guidelines for livestock grazing management), as well as the management actions in this alternative would aid in improving watershed.

Livestock grazing, roads, and water diversions can alter conditions in riparian areas. However, not all of the impaired conditions in riparian areas are a direct result of livestock grazing. For riparian impacts, see Vegetation Impacts.

Activities that decrease plant vigor can increase erosion and decrease water quality. Depending on the actions taken, specific areas may show some changes, positive or adverse, but the overall trend would be closely related to the level of surface disturbing activities.

Impacts to soils from grazing can be caused by overutilization of riparian and upland areas leading to soil compaction and vegetative removal. This can lead to loss of the soil surface, rill, and gully formation which could impact water quality through more rapid runoff and higher sediment loads.

Livestock could contribute to the degradation of areas that might cause further concern depending on their location. Areas in very erodible soil structure could have the possibility of washing, blowing, or being removed from further beneficial purposes.

Alternative B would provide the greatest positive effect and potential to achieve water quality goals in the least amount of time.

Road construction could change the patterns of overland flow and increase erosion. Roads and well pads affect overland flow and groundwater infiltration. Roads and well pads interrupt natural surface flow patterns and reduce groundwater infiltration by compacting the soil. This can increase the erosive potential of runoff events by creating a shorter period of runoff and an increased volume. Drainage ditches, culverts, and surfacing can channelize surface flows and direct them away from the road surface. While this helps protect the road surface, it can also increase erosive potential along the path of concentrated flow. Proper design, construction, and maintenance reduce the erosive potential for road and well pad areas but do not fully compensate for the concentration of flows.

Impacts to surface water quality from oil and gas development are generally the result of unsuccessful reclamation and/or increased runoff from pads and roads, destabilizing drainages. With effective monitoring from industry and management from the BLM, most individual well sites and mines should have only a short-term impact on watershed stability.

Other concerns which could arise include: sedimentation, soil contamination, salt and phosphate loading, groundwater contamination, bank and channel instability, loss of aquifers, augmented flows, and water disposal.

The closing of both the core and connectivity areas to leasing and subsequent development would produce less overall disturbance. The extended avoidance areas around archeological sites would have an undetermined effect on the severity of disturbance. The greater area of avoidance has the potential to protect areas but would direct roads and other disturbances to other areas.

Coalbed Methane

In addition to the roads and other surface disturbances that would be required for coalbed methane production there is the additional concern of water disposal. Any discharge into a surface channel that is unaccustomed to having similar flows creates the potential for increased erosion.

If the water obtained from coalbed methane production is of a high quality and discharged, there may be some controversy at the end of the project when the water is no longer available for use as livestock or wildlife water. If the produced water contains high levels of salts there is a potential for creating conditions similar to those surrounding the evaporation ponds associated with trona production. Rejection of the water may solve some of these problems but care should be taken to avoid creating new ones. It is assumed that the primary means of water disposal would be through reinjection.

The level of disturbance that can be associated with coalbed methane production would largely be determined by the area of development. Current technology requires relatively close well spacing and a road network for maintenance. Even with total reinjection of the produced water this road and well network would increase the potential of erosion in the area of development. Because the level of development would be approximately the same per unit area within a production zone, an estimate of the potential level of disturbance and subsequent erosion and threat to water quality can be related to the areas that would be made available for leasing under each alternative.

It is unknown whether there is a connection between the surface waters and the waters that would be removed to stimulate gas production. Investigations to determine if there is a connection and application of appropriate mitigation to protect water quality and quantity would be needed prior to production.

The region with the greatest coalbed methane production has a surface of stabilized sand dunes, a condition that makes the area vulnerable to disturbance of the vegetation cover. Given the road and well density that would be required, this is a concern. Proper land management would reduce the level of disturbance but not eliminate it. Maintenance of the vegetative community and the transportation network would be a primary concern on any development in the area.

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The road network would create additional recreation access into the area of stabilized sand dunes. Given the sensitive nature of the soils in the area, this is a concern. A transportation and recreation management plan should be part of any development.

The greater area of protection provided under Alternative B would result in the lowest potential of methane production related erosion and overall water quality degradation. However, the concentrated nature of the roads and well pads required for coalbed methane production could mean that local erosive potentials in production areas would not differ between alternatives.

The mineral material resource with the greatest potential for development in the area is sand and gravel. As most of the potential sites within the planning area are located away from streams and wetlands, the primary effect of their development on water and vegetation quality would come from increased activity on the roads. There could be some additional runoff from the mine areas but the effect that they would have on downstream water quality would be difficult to determine. Surfacing of roads with hard surfaces or gravel has the potential to reduce watershed impacts. The effects would be similar to the Preferred Alternative, although less activity could occur.

Coal exploration can be related to surface water quality through the amount of surface disturbed. Surface disturbance impacts would be the same as described in the No Action Alternative; however, more areas would be closed to coal exploration activity (about 224,400 acres). Activities would avoid areas with sensitive resources unless a plan could be developed to mitigate adverse impacts.

No impacts from plants, refineries, or wastewater ponds related to sodium exploration and development would occur. Some sodium development could occur. The entire planning area would be closed to sodium prospecting activity.

The more rapid and complete the reclamation of a disturbed site the lower the potential erosion and potential water quality degradation. Monitoring is essential in the reclamation of disturbed sites. Without efficient reclamation techniques and timely monitoring by the BLM and industry, long-term landscape disruption such as linear scars, sand deflation and deposition, and drainage degradation could result.

Off-road vehicle use impacts soil stability as a result of compaction of travel surfaces, disruption of vegetative cover, and disruption of the soil surface.

Recreation within the planning area consists primarily of activities that require motorized vehicles. Thus, it is closely tied to transportation and reclamation, as well as any activities that create new roads of any sort. Because of the nature of much of the planning area new roads are easily created and road closures rely primarily on the public's willingness to comply.

The maintaining of existing seasonal closures and considering seasonal closures for new roads would help mitigate the disturbance caused by roads.

Surface disturbance is closely tied to water quality. The greater the disturbance in time and area and the closer to places where the flow of water is concentrated the greater the potential for erosion. Because much of the development would take place on a case-by-case basis, the exact amount of disturbance is difficult to forecast.

The closing of both the core and connectivity areas to leasing and development activities would reduce overall disturbance. About 2,200 acres would be disturbed over the long term from various activities. With reclamation, most of this disturbance would be reclaimed with a net long-term disturbance of about 500 acres. The extended avoidance areas around archeological sites would have an undetermined effect on the severity of disturbance. The greater area of avoidance would protect archeological sites but might direct roads and other disturbances to other areas.

Maintaining the existing seasonal road closure and consideration of seasonal closures for new roads would help mitigate the disturbance caused by roads and their use during periods when soil moisture and runoff may be high. This would reduce adverse effects to soils from rutting and damage to roads from vehicle use.

Roads are one of the primary sources of erosion in the planning area. They tend to concentrate the overland flow and reduce infiltration. They can often be thought of as a set of superimposed ephemeral stream channels. As roads become more numerous, their effects become cumulative and may even work in combination to create greater levels of erosion. Road maintenance is also important. Timely maintenance of road surfaces can reduce erosion. Maintaining as much of the right-of-way in an undisturbed or revegetated state as possible would reduce both maintenance cost and erosion. Surfacing of major arterial roads with appropriate materials would also help limit the potential for soil erosion and reduced water quality.

Planning the roads in terms of number, location, and season of use should have a marked effect on reducing the level of disturbance. Individual projects may be expanded beyond the immediate need but the overall disturbance would be less. Planning other linear facilities, pipelines, power lines, cables, etc., in conjunction with roads would help localize disturbance and reduce the use of linear rights-of-way as access routes. Travel on rights-of-way, not designed for such use, can increase erosion by creating additional disturbance. When this occurs, vegetation, and soil stability are reduced and the potential for water quality degradation increases.

The greatest opportunity for recovery and improvement of land and water conditions occurs under Alternative B. The higher levels of protection has the potential of producing the greatest amount of recovery in the least amount of time. As with all other alternatives, natural events combined with existing conditions could still cause systems to reset themselves to earlier successional stages but the recovery from such events would be more rapid under this alternative than the others.

The greater detail that would be given to road design and dissipation of runoff would assist in the reduction of erosive forces and help reduce nonpoint pollution.

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Expanding the wild horse herd management area would extend limited effects throughout the planning area.

Wildlife habitat management has some effect on land, water and vegetation quality. Sufficient wildlife habitat creates a more varied environment that is better able to slow and filter overland flow, reduce erosive forces, and recover from disturbances.

The greatest variety of wildlife habitats would be nurtured under this alternative with the greatest potential for reducing erosion and its associated problems.

Groundwater

Oil and gas and coalbed methane activities have the highest potential for impacting groundwater and possibly surface water quantity and quality. Refer to the groundwater discussion in the Preferred Alternative for a detailed description of the possible impacts and specifically, the hydrological investigations that may be necessary for coalbed methane development. Alternative B has fewest new oil and gas and coalbed methane wells projected for the general area, not including the connectivity area. With the lowest level of projected activity, Alternative B would have the lowest potential for impacting groundwater and possibly surface water resources among the alternatives.

Core Area

The core area, including the connectivity area, would not be open to issuance of new oil and gas leases. Existing leases would be developed, resulting in the drilling of 20 new oil and gas wells over the planning period. The projected development under Alternative B is greater than that of the No Action Alternative; therefore, the potential for impacting groundwater and possibly surface water resources would be greater. Compared to the Preferred Alternative and Alternative A, Alternative B projects less development and would therefore have less potential to impact these resources within the core and connectivity areas.

Cumulative Impacts

The cumulative impact summary for the baseline watershed analysis would be the same as described for the Preferred Alternative.

Livestock grazing related erosion would most likely be influenced by both the management actions in this alternative and individual grazing practices and other activities that influence the distribution and timing of livestock use. The guidelines set forth under this alternative would create the greatest number of opportunities for vegetative growth and recovery. This would result in the greatest potential for reduced erosion. Streambanks and riparian areas would most likely continue to be the focus of erosion reduction related activities. The greatest potential for erosion would occur along streams that had not achieved the minimally acceptable standard of PFC.

The potential level of cumulative disturbance to watershed values is directly related to the amount, timing, and location

of surface disturbance. The primary causes of surface disturbance within the planning area are mineral development and livestock grazing facilities. Under Alternative B, the overall level of disturbance would be lower than the other alternatives, but there could still be areas of concentrated activity causing elevated levels of erosion that would need to be addressed.

The closing of the core area, elk birthing and connectivity areas under this alternative would reduce the overall level of disturbance and reduce the potential erosion. Areas that are open for exploration would most likely experience a more rapid rate of development and increase in erosive potential but the overall level of disturbance would be less. This more rapid development in limited areas could cause a local increase in overland flow and potential erosion.

The cumulative impact on groundwater resources over the planning period for oil and gas development is likely to be minimal and insignificant given the projected yearly drilling rate of 3 to 4 wells per year. Due to the lack of information, the cumulative impact on groundwater aquifers due to coalbed methane development cannot be determined. Investigation of aquifers and their possible connection to surface waters prior to development would provide the information necessary for determining cumulative impacts and any necessary mitigation.

Wild Horse Impacts

The impact on wild horses from air quality management, cultural and paleontological resource management, fire management, hazardous materials, lands and realty management, off-road and recreation uses, reclamation practices, vegetation management, and wildlife habitat management would be the same as described for the Preferred Alternative.

Assessment of grazing allotments for conformance with Standards for Healthy Rangelands and implementation of appropriate actions to address non-conformance would be beneficial to wild horses and their habitat. Reducing livestock numbers as the primary tool to address non-conformance with Standards would produce the greatest benefits to wild horse of all other alternatives analyzed in detail. Use of range readiness and eliminating growing-season-long use by domestic livestock would benefit wild horses.

Denial of sheep to cattle conversions would in most cases have positive impacts on wild horses. Removal of areas unsuitable for livestock grazing from the forage base for domestic livestock would benefit wild horses and their habitat. Limiting forage use to levels more strict than under the other alternatives makes this alternative the most beneficial to wild horses.

Impacts from minerals management activities would be the same as the No Action Alternative. In addition, closing certain portions of the planning area to new leasing would produce benefits to wild horses and their habitat. Expansion of the herd management area into areas of high potential for oil and gas development could increase impacts to wild horses. This is because in the absence of expansion, all wild horses in the expansion area are “excess” and subject to removal.

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Many of the planned actions to mitigate or limit impacts to surface resources from surface disturbing activities have been discussed above. Under all alternatives, controls on surface disturbance benefit wild horses and their habitat. The alternatives vary only in the degree of benefit. Alternative B and the Preferred Alternative are more beneficial than are the No Action Alternative or Alternative A.

Establishment of a 1/2-mile buffer around the proposed wild horse viewing area would protect the public's ability to enjoy their wild and free-roaming horses in a natural setting. It would also increase the likelihood that wild horses would be in the vicinity of the viewing area more often.

Management actions to stabilize and conserve soils, increase vegetative production, maintain or improve surface and ground water quality, and to maintain or improve wetlands, floodplains and riparian areas would benefit wild horses and their habitat.

Under all alternatives, improvement of the soil, vegetation, and water resources benefit wild horses and their habitat. The alternatives vary only in the degree of benefit. Alternative B and the Preferred Alternative are more beneficial than are the No Action Alternative or Alternative A.

Expanding the boundary of the existing wild horse herd management area to include the rest of the planning area and managing for no more than a total of 100 horses in the expansion area, would produce no impact to the managed population in the existing wild horse herd management area. These 100 horses would be part of the existing appropriate management level of 500 head (range 415 to 600). Some benefit may accrue to those horses and the habitat within the existing wild horse herd management area as the managed animals could be less dense (same number of horses with near doubling of the wild horse herd management area). Another benefit would be that much more habitat would be available for the same number of horses thereby reducing the impact of the horses on forage and water resources. Over time this should improve habitat quality for the wild horses. It should also reduce the potential for competition for forage and water with domestic livestock.

Expansion would benefit at least 100 of the wild horses presently residing within that portion of the planning area not presently managed for wild horses. One hundred (100) horses would be allowed to remain in the western two thirds of the planning area instead of being removed.

Expansion of the wild horse herd management area boundary would also benefit the wild horse viewing recreational public by maintaining wild horse populations on a much larger area.

Core Area

Expansion of the wild horse herd management area would include the core area and most of the special management areas. Management actions would benefit wild horses and their habitat.

Cumulative Impacts

Under all alternatives, no significant cumulative impacts to wild horses and wild horse management are anticipated.

Wildlife Impacts

The effects from air quality, cultural resources, fire management, off-road vehicle management, reclamation, recreation management, special status species management, vegetation management, visual resource management, and watershed/water quality management would be the same as described for the Preferred Alternative.

The types of impacts associated with lands and realty actions would be similar to those described for the Preferred Alternative; however, under this alternative, less development activity would occur and more areas would be closed or restricted to rights-of-ways. The greatest benefit to wildlife species would occur under this alternative due to the reduced activity.

Fewer new roads would be developed under this alternative and less year round access would be provided, benefitting wildlife and wildlife habitat.

Closing additional areas to communication site placement would greatly reduce adverse impacts, benefitting wildlife and wildlife habitat.

Pursuing mineral withdrawals in the Greater Sand Dunes and Steamboat Mountain ACECs, elk calving areas, and the entire connectivity area would provide the most protection to crucial habitat areas of all alternatives. Reasonable Foreseeable Development Potential for locatable mineral development in the planning area is minimal at this time except the South Pass Historic Landscape area.

Not allowing conversions from sheep to cattle under this alternative would provide the most benefits to riparian habitats which in turn would provide the most benefits to wildlife. Riparian habitats are very limited in the planning area and are extremely important to wildlife.

Not allowing livestock water developments in the core, crucial winter ranges, and the connectivity areas would provide the most benefits to big game. Protecting waters with fences and developing offsite waters would also benefit wildlife, especially waterfowl and sage grouse.

No water development within 2 miles of sage grouse leks (in addition to the 1/4 mile closure for the lek itself) would provide the most protection to sage grouse and would increase nesting success due to an increase in residual grass cover. Studies have shown that average distance sage grouse nest from a lek is approximately two miles. Depredation of nests due to a lack of nesting cover (residual grass) is extremely high near leks (Heath, et al. 1997).

Instituting delayed livestock turnout (mid to late June), range readiness (boot stage), and preventing season-long use under this alternative would provide the most benefits to wildlife.

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Limiting use of key riparian shrub species to 30 percent and riparian herbaceous species to 35 percent would provide the most benefits to wildlife.

Under this alternative, approximately 65 wells would be drilled. Impacts to wildlife would be much smaller but would still occur depending on where development and activities occur.

Not allowing any new leases to be issued within the core area, connectivity area, White Mountain, and Split Rock Canyon would offer the most protection to elk. Having areas without development activity is the only way the elk herd would be maintained over the life of this plan.

About 2,300 acres would be disturbed by various activities over 20 years. Impacts may be severe in areas where no physical barriers exist to provide cover and relief from the activity and where activity occurs year round during crucial periods. Since activities would be limited in the core area (222,790 acres not leased and 36,000 acres of NSO restriction), impacts would be reduced in the key habitat in the core, White Mountain, and Split Rock areas which would benefit wildlife in the area, particularly elk and mule deer.

Permanent high profile facilities would avoid sage grouse leks and the area within 2 miles, eliminating perches for aerial predators, which would benefit sage grouse. No new livestock water developments within 2 miles of leks (in addition to the 1/4 mile closure for the lek itself), would increase nesting success due to an increase in residual grass and forb cover. Studies have shown that the average distance to sage grouse nests from a lek is approximately two miles. Predation of nests with insufficient cover (residual grass and forbs) is extremely high near leks (Heath, et al. 1997). These benefits would be greater than under any of the other alternatives.

Permanent high profile facilities would avoid sage grouse leks and the area within 2 miles, eliminating perches for aerial predators, which would benefit sage grouse. No new livestock water developments within 2 miles of leks (in addition to the 1/4 mile closure for the lek itself) would also benefit sage grouse.

Most of the disturbed areas would be reclaimed with a long-term disturbance of about 365 acres. Reclamation could result in altered vegetation communities or introduction of undesirable plant species. This would cause negative impacts to sage grouse from the degradation of nesting, brood rearing, and wintering habitat if it occurs in sage grouse habitat.

Application of road densities of no greater than 0.5 to 1 mile of road per square mile of improved (all weather) road under this alternative would provide the most protection for elk. This would reduce the amount of noise and activity and allow for areas of escape.

This alternative would provide the greatest benefit for wildlife and wildlife habitat due to the amount of area managed as VRM Class II (about 384,000 acres).

Expanding the wild horse herd management area would allow horses to continue to concentrate in the core area and compete with wildlife for available forage. In the long term,

this could adversely affect the use of the area by big game. However, this potential impact could be mitigated by limiting the wild horse population in the expansion area to 100 individuals.

The effects of wildlife habitat management would be the same as described for the Preferred Alternative. In addition, riparian management actions under this alternative would provide the most benefits to wildlife. Managing the four enclosures on Pacific Creek for salmonids would benefit a large array of wildlife, especially sage grouse and waterfowl.

Limiting the numbers of roads under this alternative would provide the best opportunity to limit the amount of fragmentation occurring in the planning area.

Management of upland and riparian habitats primarily for wildlife would provide long-term benefits to wildlife if proposed actions under other resources occurs.

Not leasing areas in the core and connectivity areas provide opportunities to sustain big game populations in the planning area.

Management of the flocks for wildlife and vegetation enhancement would benefit wildlife, especially waterfowl, sage grouse, and amphibians.

Impacts to Fisheries

The effects from air quality management, fire management, hazardous materials management, off-road vehicle management, recreation resource management, special status species management, vegetation management, visual resource management, watershed/water quality management, wild horse management, and wildlife management would be the same as described for the Preferred Alternative.

The effects from cultural management would be the same as described for the Preferred Alternative, depending on the exact mitigation distance applied.

Lands and realty management impacts would be the same as listed in the Preferred Alternative with the exception of more acres to be considered for withdrawal from mineral entry and the potential for more exceptions to the rights-of-way windows.

The assumptions for this alternative have more prescriptions for the management of livestock grazing than the other alternatives. There would be more guidelines for riparian management which would be very beneficial to fisheries habitat in the long run. The aggressive approach of appropriate actions following standards and guidelines assessments to recover riparian areas would also benefit fisheries habitat to a great extent.

On Pacific Creek, managing the upper (hay meadow) enclosures for the maintenance of suitable riparian and instream fish habitat would allow for the continuation and expansion of a fishable salmonid population.

Ponds for livestock watering could be installed where appropriate and allowable but there probably would not be as many as Alternative A. The depletion of water from the

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Colorado River drainage and its effect on T&E fish species downstream is described in the Green River RMP Record of Decision dated October 1997 (see page 209; USDI 1997 of that document) and the Biological Assessment (Appendix 11) for this document.

Under this alternative it is assumed that 65 wells would be drilled in the Reasonable Foreseeable Development scenario (RFD). This would mean there would be about 1,700 acres of surface disturbance. This amount of disturbance would only have a minimal impact if stringent mitigation measures were followed (as described in the RMP and the No Action Alternative). A transportation plan would be developed that would protect streams and riparian areas from poor or excessive numbers of crossings. The core area and big game migration corridor areas are closed to leasing and this would protect streams in those areas from any new surface disturbances due to drilling.

Additionally, the drilling of these wells would require local water sources for drilling and completion. It is assumed that all water used for drilling and completion of wells within the Green River and Sweetwater River basins would have been part of the surface flows of the Colorado River or Platte River, respectively, or of its tributaries (though that would not always be the case). The estimate for the amount of water needed to drill and complete each well is 2.0 acre-feet. Of the 65 wells in this alternative, 15 are shallow coalbed methane, 5 are deep coalbed methane wells located entirely within the Great Divide Basin (Red Desert), and the remaining 45 are standard deep gas wells. For these 45 wells it is estimated that 75 percent would be within the Green River Basin, 23 percent would be within the Great Divide Basin (Red Desert), and 2 percent would be within the Sweetwater River drainage (Platte River). Water use for these 45 wells, would total 90 acre-feet in 20 years or 4.5 acre-feet/year. This would total 3.4 acre-feet/year in the Colorado River drainage and 0.09 acre-feet/year in the Platte River drainage. The water depletion effects of the 15 shallow coalbed methane is the same as described in the Preferred Alternative.

The depletion of water from the Colorado River drainage and its effect on T&E fish species downstream is described in the Green River RMP Record of Decision dated October 1997 (see page 209; USDI 1997 of that document) and the Biological Assessment (Appendix 11) for this document.

Hard rock mining (locatables) could pose significant threats to aquatic resources, especially when involving dredging or placer mining. The highest potential for this type of activity is in the Oregon Gulch area. Though there is no commercial activity anticipated at this time there is active prospecting in the area with the potential to create accelerated erosion. Fish habitat in the areas that are proposed for withdrawal would not be subject to impacts from this activity.

Impacts from other types of mineral activity are the same as in the Preferred Alternative.

Core Area

Impacts within the Special Management Areas and the core are the same as for what is described under general impacts for Alternative B.

Fisheries

Impacts are the same as for the Preferred Alternative.

Cumulative Impacts

Management actions under this alternative would result in fewer adverse impacts to wildlife habitats than the No Action Alternative and Alternative A and would provide the most benefit to wildlife.

Developments and human presence would continue to remove and fragment wildlife habitats. Demands on public lands from recreationists would continue to increase, resulting in less occupied and undisturbed areas which would increase displacement over the long term, but to a much smaller extent than would occur under Alternative A or the No Action Alternative.

Seasonal constraints would be used to mitigate impacts to wildlife from human activities during crucial periods and provide short-term protection for wildlife. Long-term maintenance and operations activity in crucial wildlife habitats would continue to cause displacement of wildlife from crucial habitats, including disruption of nesting, fawning and calving areas, and crucial big game winter habitats. Increased access for recreationists due to development of new roads, especially all-weather roads that provide for year-round access, would magnify the negative impacts to wildlife and their habitats. These impacts would be reduced through establishment of road density limitations in crucial habitats, transportation planning, and the closing of about 220,790 acres to oil and gas leasing and 36,010 acres to surface disturbance. With nondiscretionary closures, about 337,790 acres would be closed to oil and gas leasing and development activities.

Surface disturbing activities would continue to cause long-term losses of wildlife habitat. Overall, less acreage would be disturbed than under the No Action Alternative, Alternative A, and the Preferred Alternative.

Adverse impacts to crucial wildlife habitats (e.g., riparian areas, crucial winter ranges, parturition areas, game bird winter concentration areas, etc.) from livestock grazing would increase if all current nonuse AUMs are activated. These adverse impacts would be severe in crucial winter ranges where other commodity uses such as mining or oil and gas development is taking place. Placement of livestock into these crucial habitats or concentrating livestock in crucial habitats where vegetation has been decreased due to commodity development would result in less forage available for big game animals during winter periods. This would be especially critical in severe winters. Not developing livestock water in crucial habitats or within 2 miles of sage grouse leks (in addition to the 1/4 mile closure for the lek itself) would benefit wildlife, especially sage grouse. Removal of forage in these crucial habitats would not occur. These impacts could be further reduced through implementation of new AMPs and/or revision of management in old AMPs to include riparian objectives and implementation of actions associated with standards and guidelines assessments. Delaying turnout dates and limiting livestock use to 40 percent on upland key species, 30 percent on key riparian shrub species, and 35 percent (or 8-

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inch height) on riparian herbaceous species would further benefit wildlife use of riparian areas.

Potential exists for minor impacts to the migrational capabilities of the Sublette antelope herd. Most activity would occur outside antelope crucial habitat and migration areas. Fragmentation of habitat areas and displacement from existing migration corridors due to roads and activity would have the greatest effect. This could be significant when winter conditions are extremely severe (similar to the winters of 1978 and 1983).

Management prescriptions for wildlife resources, watershed, visual resources, and off-road vehicle use would provide long-term benefits to wildlife populations and habitats. Fire (natural or prescribed) would result in a short-term loss of habitat but would benefit habitat in the long term. Wildfire could result in a long-term loss of habitat and could be considered an unavoidable adverse impact to the habitat if livestock graze the burned area immediately after the fire.

Surface mining can result in an irreversible irretrievable loss of wetlands and springs, and although mitigation occurs, the original site is lost. Major road development also results in irretrievable losses of habitat as they are generally permanent structures; however, transportation planning would reduce these effects.

Habitat fragmentation, particularly for big game, would occur in some areas, especially 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 can also increase the accessibility to the general public into areas that have previously been somewhat inaccessible to vehicles. 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 eliminate 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. Transportation planning and the establishment of road densities in some crucial habitats would help to reduce this overall effect.

A summary of impacts to the individual species that may be affected by actions in the planning area follows.

Impacts to wintering antelope and antelope migration would be minimized in this alternative.

Continued development proposals and other permanent uses in the Steamboat Mountain, Essex Mountain, and Jack Morrow Hills areas would affect this herd somewhat; however, these effects are anticipated to be less than under the other alternatives. Some minor displacement of animals may occur; however, total abandonment of key habitats such as those found in the core area, should not occur. Road construction and increased access into remote areas would also increase use by the general public adding to the impacts of this

desert elk herd. Mitigation such as remote or off-site facility placement, and seasonally restricting human activity to reduce access and traffic in crucial habitat and calving areas would reduce adverse effects.

Although mule deer are probably more tolerant of human activities than elk and impacts would be reduced in this alternative, it is still unlikely the objective for this herd unit could be met. The habitat at this time is not capable of achieving the population objective for this herd, with the development that is occurring in this portion of the herd area. Also, because this herd area is predominantly a desert type environment, areas for good fawn rearing are very limited. Direct competition between elk and deer for these parturition and winter use areas is probably more prevalent here than in most herd units. Therefore the capability of the habitat to meet the objectives for mule deer and elk could be affected; however, with the management proposed in this alternative, the effects from surface disturbing and disrupting activities would be minimized.

Fisheries

Impacts are the same as for the Preferred Alternative.

Special Management Areas

Greater Sand Dunes ACEC and Special Recreation Management Area

Impacts would be similar to those described for the Preferred Alternative. Restrictions on activities such as rights-of-way, mineral materials and geophysical operations would generally enhance resource values in the ACEC. Withdrawal of entire the ACEC would greatly enhance efforts to manage heritage resources of all kinds as well as wildlife, recreation, and visual resource values. Livestock grazing management prescriptions would generally enhance efforts to manage for other resource values and reduce effects to the flocks the most under any alternative. Designation of roads would enhance efforts to manage heritage resources of all kinds, wildlife, visual and recreation resources. Possible additional seasonal closures would generally enhance efforts to manage heritage resources and wildlife resources. Adverse effects would occur to oil and gas operations due to increased costs and lost drilling opportunities.

Expanding the wild horse herd management area would somewhat enhance BLM's ability to manage heritage values associated with this resource which have been identified by Native Americans and others. However, horses could concentrate around water sources increasing the grazing impacts to these areas.

Steamboat Mountain ACEC

Impacts would be similar to those described for the Preferred Alternative. However, not issuing new leases in the ACEC would greatly enhance BLM's ability to protect wildlife resources and some kinds heritage resource values, especially respected areas identified by Native American traditional elders. However, this would adversely affect oil and gas operations.

ENVIRONMENTAL CONSEQUENCES

Closing Steamboat Mountain ACEC to mineral material sales would enhance BLM efforts to manage wildlife, visual, and heritage resources of all kinds. Pursuing additional withdrawals would enhance BLM's ability to manage and protect these resources.

Expanding the wild horse herd management area would somewhat enhance BLM's ability to manage heritage values associated with this resource which have been identified by Native Americans and others.

Expanding the ACEC to include the remainder of the core area (an additional 22,300 acres) would provide additional protection for the expanded area through application of ACEC management objectives and actions. However, most of the area would be protected regardless of the expansion, through the general prescriptions identified for this alternative (no leasing, closure to mineral location and mineral material sales, etc.)

South Pass Historic Landscape ACEC

Closing Pacific Butte to consideration of communication sites would enhance BLM efforts to manage and protect certain classes of heritage resources, especially the South Pass Historic Landscape viewshed. Additionally, the Green River RMP and other management document prescriptions would significantly enhance BLM efforts to manage and protect heritage resources of all kinds. Impacts to oil and gas development would be similar to the preferred alternative. However, portions of the ACEC would not be available for leasing and impacts from leasing restrictions could be significant if future analysis indicates no leasing areas have high exploratory drilling potential.

White Mountain Petroglyphs ACEC

Management actions would protect the rock art and surrounding 500 acres which would address Native American traditional cultural and religious concerns. No development would be allowed unless it were for the benefit of the cultural resource. Long-term benefits would be realized by restricting any activity that could degrade the site. Benefits would also be provided to the public and especially the local communities through the educational opportunities provided by the area. Unauthorized uses could damage rock art and impact area values. Inclusion of the White Mountain Petroglyphs ACEC within the connectivity area and accompanying no lease prescription would enhance BLM efforts to manage and protect heritage resources of all kinds. Any development activity that may occur could easily avoid this area.

Preparing a recreation project plan would provide further protection of the petroglyph resources.

Red Desert Watershed Area

Portions of the core, connectivity, and Split Rock areas would be closed to fluid mineral leasing which would benefit sensitive resources in this area. This would, however, adversely affect oil and gas operations.

Benefits to wildlife, heritage resources, vegetation and watershed would be greatest under this alternative. This alternative would also have the greatest adverse effects to development activities, including mineral resource development.

Management of the entire area as a VRM Class II area would benefit visual resource values and protect the area's vast open space.

**TABLE 4-1
SUMMARY COMPARISON OF IMPACTS**

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
GENERAL AREA IMPACTS				
AIR QUALITY	Adverse impacts to users could occur because of restricted location for placement of facilities to meet air quality standards.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	Significant effects to air quality resources would not occur.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	Noise levels in the planning area have not been monitored, but are likely to be in the “quiet” category. Constant noise levels greater than 49 decibels (d.b.a.) are considered significant. Drilling rigs and compressor sites exceed the 49 d.b.a. level; but no dwellings are within 800 feet of projected drill sites or 2,500 feet of projected compressor sites. Therefore, no impact to human activities is expected. Compressor facilities located within 2,500 feet of a sage grouse lek could impact use of the lek. However, no such activity is expected.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
AIR QUALITY (Cumulative)	The surface disturbances and activities that could occur could contribute to increased dust and emission levels; however, additional mitigation over a broader area would ensure air quality standards are met.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
CULTURAL RESOURCES	Given standard BLM mitigation measures, actions related to Air Quality Management, Hazardous Materials, Lands and Realty Management, Lands Withdrawals, Lands Access and Easements, Reclamation and Monitoring, Special Status Species, No Surface Occupancy stipulations, Vegetation Management, Transportation Planning, Visual Resource Management, Watershed/Soil Management, Wild Horses, and Wildlife Management would have little, no, or slightly beneficial impacts on Cultural Resources.	Same as Preferred Alternative.	Generally, actions taken under Alternative A are slightly less beneficial to Cultural Resources than the other alternatives.	Generally, actions taken under Alternative B are slightly more beneficial to Cultural Resources than the other alternatives.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
	Same as No Action Alternative and enhanced avoidance distances would lessen impacts to heritage resources. Closure of Indian Gap and the face of Steamboat Mountain would benefit cultural and heritage resources. Closure of Steamboat Mountain, Oregon Buttes ACEC, and Continental Peak to communication sites would benefit cultural and heritage resources.	With increased development, impacts may occur to Heritage Resources such as Native American respected places and cultural resources in general. Consultation with Native American traditional elders would attempt to avoid or mitigate impacts, especially to viewsheds. Impacts could be mitigated somewhat, but not totally.	Same as No Action Alternative.	Same as No Action Alternative and enhanced avoidance distances would lessen impacts to heritage resources. Closure of Indian Gap and the face of Steamboat Mountain would benefit cultural and heritage resources. Closure of Steamboat Mountain, Essex Mountain, Oregon Buttes ACEC, Continental Peak, and Pacific Butte to communication sites would benefit cultural and heritage resources.
	Fire suppression activities can impact cultural resources.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
CULTURAL RESOURCES (continued)	Same as No Action Alternative and AUM limitations would benefit cultural resources as would actions taken to meet Standards and Guidelines.	Spring developments associated with livestock operations, concentrated use, rubbing, and overgrazing can negatively impact cultural resources.	Same as No Action Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
	<p>Unavoidable negative impacts could occur to cultural resources from activities associated with drilling 85 new oil and gas wells. Efforts to identify and avoid cultural resources may ameliorate much of this potential impact. In the Paleosol Deposition Area, avoidance measures would likely be ineffective. A 2.5-mile protection area around areas of Native American concern would help mitigate some impacts.</p>	<p>Unavoidable negative impacts could occur to cultural resources from activities associated with drilling 89 new oil and gas wells. Efforts to identify and avoid cultural resources may ameliorate much of this potential impact. In the Paleosol Deposition Area, avoidance measures would likely be ineffective.</p>	<p>Unavoidable negative impacts could occur to cultural resources from activities associated with drilling 125 new oil and gas wells. Efforts to identify and avoid cultural resources may ameliorate much of this potential impact. In the Paleosol Deposition Area, avoidance measures would likely be ineffective. A 1/4-mile protection area around areas of Native American concern would help mitigate some impacts.</p>	<p>Unavoidable negative impacts could occur to cultural resources from activities associated with drilling 65 new oil and gas wells. Efforts to identify and avoid cultural resources may ameliorate much of this potential impact. In the Paleosol Deposition Area, closing the area to surface disturbance would provide the most protection. A 1-mile protection area around areas of Native American concern would help mitigate some impacts.</p>
	<p>Effects to resources in the paleosol deposition area could be significant if destroyed by surface disturbing activities.</p>	<p>Same as Preferred Alternative.</p>	<p>Same as Preferred Alternative.</p>	<p>Effects to the paleosol deposition area from surface disturbance would not occur.</p>
<p>CULTURAL RESOURCES (continued)</p>	<p>Additional mitigation measures and withdrawals would lessen cultural and heritage resource impacts from locatable and salable mineral development activities and geophysical activities.</p>	<p>Locatable and salable mineral development activities and geophysical activities could adversely impact cultural and heritage resources.</p>	<p>Same as No Action Alternative.</p>	<p>Additional mitigation measures and withdrawals for Steamboat Mountain ACEC, portions of White Mountain, and portions of the Greater Sand Dunes ACEC would lessen cultural and heritage resource impacts from locatable and salable mineral development activities and geophysical activities.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
	Designating roads and trails would benefit cultural resources. Proper ORV use has no impact on cultural resources; however, ORV use can cause significant damage to archaeological and historical sites when operated outside of management prescriptions.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	Increased numbers of people recreating on public lands would cause more pressure on BLM to protect resources such as the White Mountain Petroglyphs and Crookston Ranch Historic Site.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
CULTURAL RESOURCES (Core)	The types of direct and indirect impacts are the same as described in the Preferred Alternative general impacts discussion. The magnitude of impacts under the Preferred Alternative for the core area would be greater than the No Action Alternative and Alternative B and less than Alternative A.	No new oil and gas or livestock project development would occur within the core area. Therefore, the magnitude of impacts would be the lowest of all alternatives.	New oil and gas and livestock project developments would occur within the core area. Therefore, the magnitude of impacts would be the highest of all alternatives.	The magnitude of impacts under the Alternative B for the core area would be greater than the No Action Alternative and less than the Preferred Alternative and Alternative A.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
CULTURAL RESOURCES (Cumulative)	As with Alternative A, more cultural information would be discovered through inventory of sites in the area; however, fragmentation of historic trails and associated historic landscapes would increase somewhat. Cumulatively, intrusions could significantly diminish the historic trail resource. However, management prescriptions would reduce this effect over the No Action Alternative and Alternative A.	More cultural information would be discovered through inventory of sites in the area; however, fragmentation of historic trails and associated historic landscapes would increase. This would be less than Alternative A. Cumulatively, intrusions could significantly diminish the historic trail resource.	Alternative A would create a larger effect than the Preferred Alternative, No Action Alternative, or Alternative B on cultural values, particularly the unfragmented historic landscapes.	Less cultural information would be discovered as fewer site inventories would occur in the expanded area, and fragmentation of historic trails and associated historic landscapes would stay the same as it is currently or slightly increase. Cumulatively, intrusions could still diminish the historic trail resource but not to the extent of the other alternatives.
PALEONTOLOGICAL RESOURCES	New resources would be discovered providing beneficial effects by providing new information. Some resources may be destroyed resulting in a loss of scientific information. However, it is anticipated that more resources would be discovered than destroyed, so impacts overall would not be significant.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<p>PALEONTOLOGICAL RESOURCES (continued)</p>	<p>All surface disturbing activities have two types of impacts on undiscovered scientifically important fossils. The activities may inadvertently damage or destroy fossils buried below the surface. Such an impact is unavoidable. Also, discovery of significant fossil sites could occur during preconstruction field surveys or during monitoring of construction. Upon discovery, a mitigation plan would be developed for recovery, study, and housing of the fossils. New roads associated with development make public access easier which can lead to the discovery and study of new fossils; but may also provide more opportunities for unauthorized collection. At this time, unauthorized collection does not appear to be a problem in the planning area.</p> <p>Projected development (with associated surface disturbing activities) under the Preferred Alternative is less than Alternative A and No Action, but greater than Alternative B. Under the Preferred Alternative, known scientifically significant fossil sites in the planning area would be closed to</p>	<p>The types of direct and indirect impacts are the same as Preferred Alternative with more potential for impacts than the Preferred Alternative and Alternative B, but less than Alternative A. Under the No Action Alternative, known scientifically significant fossil sites in the planning area would not be closed to surface disturbing activities.</p>	<p>The types of direct and indirect impacts are the same as Preferred Alternative with more potential for impacts than all other alternatives. Under Alternative A, known scientifically significant fossil sites in the planning area would be closed to surface disturbing activities.</p>	<p>The types of direct and indirect impacts are the same as Preferred Alternative with the least potential for impacts than all other alternatives. Under Alternative B, known scientifically significant fossil sites in the planning area would be closed to surface disturbing activities.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
PALEONTOLOGICAL RESOURCES (Core)	The types of direct and indirect impacts are the same as described in the Preferred Alternative general impacts discussion. The magnitude of impacts under the Preferred Alternative for the core area would be greater than the No Action Alternative and Alternative B and less than Alternative A.	No new oil and gas or livestock project development would occur within the core area. Therefore, the magnitude of impacts would be the lowest of all alternatives.	New oil and gas and livestock project developments would occur within the core area. Therefore, the magnitude of impacts would be the highest of all alternatives.	The magnitude of impacts under the Alternative B for the core area would be greater than the No Action Alternative and less than the Preferred Alternative and Alternative A.
PALEONTOLOGICAL RESOURCES (Cumulative)	No additional effects would occur either to or from the general analysis area relative to paleontological resources.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
FIRE	Impacts would occur from costs for wildfire suppression and prescribed fire, accrued from restrictions imposed by other resource management requirements.	Impacts would occur from costs for wildfire suppression and prescribed fire, accrued from restrictions imposed by other resource management requirements, but would be less than the Preferred Alternative.	Benefits would occur from reduced costs for wildfire suppression and prescribed fire activity, due to fewer imposed restrictions than under the Preferred Alternative or No Action Alternative.	Impacts would occur from additional costs, over Preferred, for wildfire suppression and prescribed fire, accrued from restrictions imposed by other resource management requirements.
	Increased activity would increase the probability that wildfire would occur.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
FIRE (Cumulative)	No additional effects would occur relative to fire.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
HAZARDOUS MATERIALS	Immediate attention to releases of hazardous wastes would protect the environment and the public.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
HAZARDOUS MATERIALS (Cumulative)	No additional effects would occur.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
LANDS AND REALTY	Mineral withdrawals would be revoked and other lands withdrawn for resource protection (46,270 acres). The newly withdrawn lands would be unavailable for mineral entry, causing a long-term loss of productivity of locatable mineral resources.	Mineral withdrawals would be revoked and other lands withdrawn for resource protection. An additional 37,290 acres would also be withdrawn. The newly withdrawn lands would be unavailable for mineral entry, causing a long-term loss of productivity of locatable mineral resources.	Same as No Action Alternative.	Mineral withdrawals would be revoked and other lands withdrawn for resource protection (217,840 additional acres). The newly withdrawn lands would be unavailable for mineral entry, causing a long-term loss of productivity of locatable mineral resources.
	Approximately 75% of the planning area would be affected by avoidance and exclusion areas for surface disturbing activities.	Approximately 39% of the planning area would be affected by avoidance and exclusion areas for surface disturbing activities.	Approximately 31% of the planning area would be affected by avoidance and exclusion areas for surface disturbing activities.	Same as Preferred Alternative.
	Small right-of-way exclusion areas (10 to 20 acres) would not impact rights-of-way placement. The exclusion of 9,400 acres on the face of Steamboat Mountain, Indian Gap (690 acres), and the Oregon Buttes ACEC (3,450 acres) would have minimum impact unless production activity increases in these areas.	Small right-of-way exclusion areas (10 to 20 acres) would not impact rights-of-way placement. The exclusion of the Oregon Buttes ACEC would have minimum impact unless production activity increases in this area.	Same as No Action Alternative.	Small right-of-way exclusion areas (10 to 20 acres) would not impact rights-of-way placement. The exclusion of 9,400 acres on the face of Steamboat Mountain, Indian Gap (690 acres), the Oregon Buttes ACEC (3,450 acres), and special status plant <i>Lasquerella macrocarpa</i> would have minimum impact unless production activity increases in these areas.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
LANDS AND REALTY (continued)	Exclusion of rights-of-way in portions of the South Pass Historic Landscape (vista) would have a major effect on the location of rights-of-way and would require major reroutes.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	Management resulting in avoidance of placing rights-of-way in the big sagebrush/scurfpea vegetation type, historic trails and expansion era roads, the Greater Sand Dunes ACEC, portions of South Pass Historic Landscape ACEC, the Steamboat Mountain ACEC, the core area including the connectivity areas, areas of Native American concern, and the paleosol deposition area may require major reroutes and extensive planning to limit impacts.	Management resulting in avoidance of placing rights-of-way in the Greater Sand Dunes ACEC, portions of the South Pass Historic Landscape ACEC, Steamboat Mountain ACEC, historic trails and expansion era roads, and paleosol deposition area may require major reroutes and extensive planning to limit impacts.	Management resulting in avoidance of placing rights-of-way in the Greater Sand Dunes ACEC, portions of the South Pass Historic Landscape ACEC, historic trails and expansion era roads, and paleosol deposition area may require major reroutes and extensive planning to limit impacts.	Same as Preferred Alternative.
	Closing the Steamboat Mountain ACEC and Continental Peak to communication sites could cause gaps in communication signals.	Same as Preferred Alternative.	Closing Continental Peak to communication sites could cause a minor gap in communication signals.	Closing the Steamboat Mountain ACEC, Continental Peak, Essex Mountain, and Pacific Butte to communication sites would cause gaps in communication signals.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
LANDS AND REALTY (Core)	<p>The core area, including the Greater Sand Dunes and Steamboat Mountain ACECs, would be an avoidance area for rights-of-way requiring routing around these areas and could increase costs to the applicant. The face of Steamboat Mountain (9,400 acres) would be excluded from rights-of-way requiring placement of facilities outside this area. Land tenure, withdrawal, and access impacts would be the same as described for the general area. Communication sites would be excluded from the Steamboat Mountain ACEC which could cause inefficient communication coverage in some areas.</p>	<p>Since no new activities would be allowed within the core area (80,410 acres), no new rights-of-way would be issued for actions within the core. This would require routing around the core area which would affect other offsite areas and increase costs to the applicant. Land tenure, withdrawal, and access impacts would be the same as described for the general area.</p>	<p>New activities would be allowed within the core area, and new rights-of-way would be issued for actions within the core. Large avoidance areas (Greater Sand Dunes ACEC) would require longer, less direct routes which would affect other offsite areas and increase costs to the applicant. Land tenure, withdrawal, and access impacts would be the same as described for the general area.</p>	<p>The core area, including the Greater Sand Dunes and Steamboat Mountain ACECs, would be an avoidance area for rights-of-way. Large avoidance areas such as this would require routing around these areas which would affect other offsite areas and increase costs to the applicant. Land tenure, withdrawal, and access impacts would be the same as described for the general area. Steamboat Mountain ACEC and Essex Mountain would be closed to communication sites which could result in inefficient communication coverage for portions of the planning area.</p>
LANDS AND REALTY (Cumulative)	<p>The combined actions of large areas of avoidance and exclusion, much of it connecting, would affect right-of-way placement. Long linear rights-of-way particularly would be affected by potentially longer routes increasing construction costs. However, fewer rights-of-way would be needed as less acreage would be leased and fewer gas wells would be drilled.</p>	<p>The combined actions of no new development in the core, avoidance, and exclusion areas, much of it connecting, would affect rights-of-way placement. Long linear rights-of-way particularly would be affected by potentially long reroutes increasing construction costs.</p>	<p>The combined areas of avoidance and exclusion would affect right-of-way placement but not as much as identified in the No Action Alternative as there are less contiguous acres of avoidance areas. Long linear rights-of-way particularly would be affected by potentially longer routes increasing construction costs, but this would be less than for the No Action Alternative.</p>	<p>The combined actions of no new oil and gas leasing in the core and connectivity areas, large areas of avoidance, and exclusion areas would affect right-of-way placement. Long linear rights-of-way particularly would be affected by potentially longer routes increasing construction costs. Fewer rights-of-way would be needed as less acreage would be leased and fewer gas wells would be drilled.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
LANDS AND REALTY (Cumulative) (continued)	Withdrawal of 46,270 acres would preclude disposal, entry, and mineral location. Revocation of about 211,130 withdrawn acres would allow for entry and mineral location, and consideration of land disposal.	Withdrawal of 37,290 acres would preclude disposal, entry, and mineral location. Revocation of 211,130 acres of oil shale and coal withdrawals would allow for entry and mineral location, and consideration of land disposal. No new development within the core area would result in no new right-of-way needs from within the core.	Withdrawal of 37,290 acres would preclude disposal, entry, and mineral location. Revocation of about 211,130 withdrawn acres would allow for entry and mineral location, and consideration of land disposal.	Withdrawal of 267,590 acres would preclude disposal, entry, and mineral location. Revocation of about 211,130 withdrawn acres through the removal of the oil shale and coal withdrawals would allow for entry and mineral location, and consideration of land disposal.
LIVESTOCK GRAZING	Authorized grazing use would not exceed the recognized permitted use. For analysis purposes, anticipated actual use would range from approximately 9,851 AUMs (5-year average 1994-1998) to the total permitted use of 26,032 AUMs. The average between the two amounts is 17,941 AUMs (15,814 cattle and 2,127 sheep). Again, for analysis purposes, this grazing level was held constant throughout the planning period.	Authorized grazing use would not exceed the recognized permitted use. For analysis purposes, anticipated actual use would range from approximately 13,038 AUMs (1998 base year usage) to the total permitted use of 26,032 AUMs. The average between the two amounts is 19,535 AUMs (17,379 cattle and 2,156 sheep). Again, for analysis purposes, this grazing level was held constant throughout the planning period.	Authorized grazing use would not exceed the recognized permitted use. For analysis purposes, anticipated actual use would be 26,032 AUMs (22,767 cattle and 3,265 sheep). This grazing level was held constant throughout the planning period for analysis purposes.	Authorized grazing use would not exceed the recognized permitted use. For analysis purposes, anticipated actual use would be based on the 5-year average actual use of 9,851 AUMs (8,861 cattle and 990 sheep). This grazing level was held constant throughout the planning period for analysis purposes.
	Assessment of standards and guidelines and applying a variety appropriate actions would benefit livestock grazing in the long term by providing healthy rangelands.	Same as Preferred Alternative.	Same as Preferred Alternative.	Assessment of standards and guidelines and reducing levels of livestock use as the primary appropriate action would adversely affect livestock operators and constrain management options. Some benefit would occur to livestock grazing in the long term by providing healthy rangelands.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
LIVESTOCK GRAZING (continued)	Modifying turn-out dates to provide for growing season rest would benefit livestock grazing operations in the long term by providing healthy rangelands. However, adverse effects could occur to livestock operations in the short term as turn-out dates may be later.	Continuing existing turn-out dates could adversely livestock grazing in the long term by not providing growing season rest. However, beneficial effects could occur to livestock operations in the short term as turn-out dates would not change.	Modifying turn-out dates to provide for early turn-out and season-long use would benefit livestock grazing operations in the short term. However, adverse effects could occur to livestock operations in the long term as vegetation may be damaged, reducing available forage.	Modifying turn-out dates to provide for growing season rest would benefit livestock grazing in the long term by providing healthy rangelands. However, adverse effects would occur to livestock operations in the short term as turn-out dates would be later.
	Considering changes of class of livestock on a case-by-case basis would benefit livestock grazing operations in the long term by providing opportunities for operators to adjust to changing economic situations. However, adverse effects could occur to livestock operations in the short term until suitability reviews were completed.	Same as Preferred Alternative.	Same as Preferred Alternative.	Considering only changes to sheep use could adversely affect livestock operations by limiting opportunities to diversify management and adjust to changing economic conditions. Adverse effects could occur to livestock operations in the short term until suitability reviews were completed.
	Not plowing roads in winter for livestock access except for emergency situations could limit opportunities for moving livestock into certain areas. However, effects of adverse weather on livestock, particularly calving and lambing, would be reduced.	Consideration of plowing of roads in winter on a case-by-case basis could allow for access into areas in winter conditions. This would enhance flexibility of management; however, effects of adverse weather on livestock, particularly calving and lambing, would be increased.	Same as No Action Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
LIVESTOCK GRAZING (continued)	Limiting livestock use on upland key grass species to 40% would adversely affect livestock operations in the short term as livestock may be removed from areas earlier. Benefit to livestock grazing would occur in the long term by providing healthy rangelands.	Limiting livestock use on upland key grass species to 50% would continue current operations and benefit livestock operations in the short term as livestock would remain in areas longer. Adverse effects to livestock grazing could occur in the long term by taking longer to provide for healthy rangelands.	Same as No Action Alternative.	Same as Preferred Alternative.
	Management actions implemented to achieve proper functioning condition could impact grazing through establishment of utilization limits or reduction of permitted active preference.	No similar action.	No similar action.	No similar action.
	Establishing riparian pastures only to enhance wildlife habitat and watershed needs would reduce livestock management options.	Not establishing riparian pastures would reduce livestock management options.	Establishing riparian pastures to enhance livestock grazing management would benefit livestock grazing and increase management options.	Same as Preferred Alternative.
	Limiting placement of salt to no closer than ½ mile of water and 1/4 mile from sensitive plant species locations and historic trails would reduce options for placement but enhance distribution in certain areas.	Limiting placement of salt to no closer than 500 feet of water and sensitive plant species locations, and no closer than 1/4 mile to historic trails would increase options for placement and enhance distribution in certain areas.	Same as No Action Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
LIVESTOCK GRAZING (continued)	Closure of areas to surface disturbing activities (no surface occupancy) would adversely affect project placement and development aimed at improving livestock distribution.	Same as Preferred Alternative.	A reduction in closed areas (no surface occupancy) would allow project placement and development aimed at improving livestock distribution in more areas. This would have a beneficial effect on livestock distribution.	Same as Preferred Alternative.
	Placing range improvements outside crucial habitats would limit opportunities for placement and affect livestock distribution.	Not developing any range improvements would adversely affect management opportunities and livestock distribution.	Allowing range improvement placement where necessary would enhance livestock management opportunities and improve livestock distribution.	Considering range improvements only in areas where wildlife and wildlife habitat would benefit would limit opportunities for placement and opportunities to improve livestock distribution.
LIVESTOCK GRAZING (Core)	Effects would be similar as described for the general area. However, limitations on placement of livestock water facilities would limit livestock grazing management opportunities.	Effects would be similar as described for the general area. Not allowing any new livestock management facilities would limit livestock management opportunities.	Effects would be similar as described for the general area. Allowing new livestock management facilities would provide the most livestock management opportunities.	Same as No Action Alternative.
LIVESTOCK GRAZING (Cumulative)	Approximately 2,400 acres would be disturbed by various activities. This surface disturbance could cause displacement of wildlife into the surrounding herd areas. This could affect the ability of these areas to support existing wildlife populations and livestock numbers.	Approximately 2,500 acres would be disturbed by various activities. This surface disturbance could cause displacement of wildlife into the surrounding herd areas. This could affect the ability of these areas to support existing wildlife populations and livestock numbers.	Approximately 2,900 acres would be disturbed by various activities. This surface disturbance could cause displacement of wildlife into the surrounding herd areas. This could affect the ability of these areas to support existing wildlife populations and livestock numbers.	Approximately 2,200 acres would be disturbed by various activities. This surface disturbance could cause displacement of wildlife into the surrounding herd areas. This could affect the ability of these areas to support existing wildlife populations and livestock numbers.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
LIVESTOCK GRAZING (Cumulative) (continued)	A combination of activities could result in future displacement of wildlife and fewer livestock numbers and/or shorter periods of livestock use. If livestock numbers remain the same, the impact from displaced wildlife should be minimal. The guidelines for vegetative management in riparian and upland areas should mitigate any impact to vegetative resources. However, in concentrated areas of surface disturbance livestock grazing could be impacted by limiting the length of time grazing is allowed on public lands or by decreasing livestock AUMs.	Same as Preferred Alternative.	A combination of activities would result in future displacement of wildlife. If livestock numbers increase for the planning area, the impact from displaced wildlife could be severe. The guidelines for vegetative management in riparian and upland areas should mitigate any impact to vegetative resources. However, increased livestock numbers with displaced wildlife would result in an impact to livestock by limiting the length of time grazing is allowed on public lands.	Same as Preferred Alternative.
MINERALS Oil and Gas and Coalbed Methane	Fewer wells would be drilled than under Alternative A, reducing production.	About 64 wells would be drilled, resulting in production of 116 thousand barrels of oil and 84,177 million cubic feet of gas.	More wells would be drilled than under any alternative, increasing production.	Fewer wells would be drilled than under Alternative A, reducing production.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<p>MINERALS <i>Oil and Gas and Coalbed Methane</i> <i>(continued)</i></p>	<p>Approximately 27% of the planning area would be designated no leasing and about 10% would have no surface occupancy/surface disturbance activity prohibitions. About 60% of the planning area would be affected by seasonal restrictions. About 72% of the area would be affected by controlled surface use restrictions. Restrictions would increase the costs of doing business and possibly preclude some activities.</p>	<p>Approximately 34% of the planning area would be designated no leasing and about 5% would have no surface occupancy/surface disturbance activity prohibitions. About 60% of the planning area would be affected by seasonal restrictions. About 56% of the area would be affected by controlled surface use restrictions. Restrictions would increase the costs of doing business and possibly preclude some activities.</p>	<p>Approximately 20% of the planning area would be designated no leasing and about 5% would have no surface occupancy/surface disturbance activity prohibitions. About 60% of the planning area would be affected by seasonal restrictions. About 56% of the area would be affected by controlled surface use restrictions. Restrictions would increase the costs of doing business and possibly preclude some activities. However, this impact would be greatly reduced from the No Action Alternative, Preferred Alternative, and Alternative B.</p>	<p>Approximately 38% of the planning area would be designated no leasing and about 6% would have no surface occupancy/surface disturbance activity prohibitions. About 60% of the planning area would be affected by seasonal restrictions. About 80% of the area would be affected by controlled surface use restrictions. Restrictions would increase the costs of doing business and possibly preclude some activities. This impact would be greater than Alternative A.</p>
	<p>The reasonable foreseeable development (RFD) scenario projected that 202 wells (including 5 coalbed methane wells) could be drilled if the entire planning area were open to exploration and development.</p>	<p>The reasonable foreseeable development (RFD) scenario projected that 202 wells (including 10 coalbed methane wells) could be drilled if the entire planning area were open to exploration and development.</p>	<p>Same as No Action Alternative.</p>	<p>Same as Preferred Alternative.</p>
	<p>5 coalbed methane wells would not be drilled because of use restrictions. 55 oil and gas wells would not be drilled because of no leasing stipulations. 67 oil and gas wells would not be drilled because of use restrictions. Operating costs would increase.</p>	<p>An unknown number of coalbed methane wells would not be drilled because of use restrictions. 61 oil and gas wells would not be drilled because of no leasing stipulations. 67 oil and gas wells would not be drilled because of use restrictions. Operating costs would increase.</p>	<p>An unknown number of coalbed methane wells would not be drilled because of use restrictions. 35 oil and gas wells would not be drilled because of no leasing stipulations. 47 oil and gas wells would not be drilled because of use restrictions. Operating costs would increase.</p>	<p>5 coalbed methane wells would not be drilled because of use restrictions. 92 oil and gas wells would not be drilled because of no leasing stipulations. 50 oil and gas wells would not be drilled because of use restrictions. Operating costs would increase.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<p>MINERALS <i>Oil and Gas and Coalbed Methane</i> <i>(continued)</i></p>	<p>In the short term (through 2007) the number of producing wells would increase from 48 to 58. In the long term (through 2017) the number of producing wells would decrease to 41.</p>	<p>In the short term (through 2007) the number of producing wells would increase from 48 to 61. In the long term (through 2017) the number of producing wells would decrease to 43.</p>	<p>In the short term (through 2007) the number of producing wells would increase from 48 to 71. In the long term (through 2017) the number of producing wells would decrease to 64.</p>	<p>In the short term (through 2007) the number of producing wells would increase from 48 to 56. In the long term (through 2017) the number of producing wells would decrease to 33.</p>
	<p>Not drilling 122 wells during the 20-year analysis period represents a loss of opportunity for royalty and tax revenue to the government on 143 billion cubic feet of gas; and an opportunity loss for direct and indirect employment. The opportunity loss for coalbed methane gas is not known. These losses of opportunity could be considered significant.</p>	<p>Not drilling 128 wells during the 20-year analysis period represents a loss of opportunity for royalty and tax revenue to the government on 150 billion cubic feet of gas; and an opportunity loss for direct and indirect employment. The opportunity loss for coalbed methane gas is not known. These losses of opportunity could be considered significant.</p>	<p>Not drilling 82 wells during the 20-year analysis period represents a loss of opportunity for royalty and tax revenue to the government on 116.6 billion cubic feet of gas; and an opportunity loss for direct and indirect employment. The opportunity loss for coalbed methane gas is not known. These losses of opportunity could be considered significant.</p>	<p>Not drilling 142 wells during the 20-year analysis period represents a loss of opportunity for royalty and tax revenue to the government on 165 billion cubic feet of gas; and an opportunity loss for direct and indirect employment. The opportunity loss for coalbed methane gas is not known. These losses of opportunity could be considered significant.</p>
	<p>At least one and possibly up to three average natural gas “fields” would not be developed due to direct impacts of staged leasing and indirect impacts of applying no surface occupancy and surface use restrictions.</p>	<p>At least one and possibly up to three average natural gas “fields” would not be developed due to direct impacts of not leasing and indirect impacts of applying surface use restrictions.</p>	<p>At least one and possibly two average natural gas “fields” would not be developed due to direct impacts of not leasing and indirect impacts of applying surface use restrictions.</p>	<p>At least one and possibly up to four average natural gas “fields” would not be developed due to direct impacts of not leasing and indirect impacts of applying surface use restrictions.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<p>Minerals <i>Oil and Gas and Coalbed Methane (Core)</i></p>	<p>47 wells have been completed of which 35 wells currently produce in the core and migratory corridor area. Over the long term, 33 of these wells are expected to be abandoned due to depletion of reservoir rocks in the area leaving 2 producing wells. Under the RFD, 35 wells could be drilled and 18 would be expected to be productive which means 20 wells could still be producing after 20 years.</p>	<p>30 wells currently produce in the core area. Over the long term, 29 of these wells are expected to be abandoned due to depletion of reservoir rocks in the area leaving 1 producing well. With restrictions on leasing, exploration and development activity, no new wells could be drilled to replace abandoned wells which means 1 well could still be producing after 20 years.</p>	<p>30 wells currently produce in the core area. Over the long term, 29 of these wells are expected to be abandoned due to depletion of reservoir rocks in the area leaving 1 producing well. Under the RFD, 28 wells could be drilled and 15 would be expected to be productive which means 16 wells could still be producing after 20 years.</p>	<p>47 wells have been completed of which 35 wells currently produce in the core and migratory corridor area. Over the long term, 33 of these wells are expected to be abandoned due to depletion of reservoir rocks in the area leaving 2 producing wells. Under the RFD, 20 wells could be drilled and 11 would be expected to be productive which means 13 wells could still be producing after 20 years.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<p>MINERALS <i>Oil and Gas and Coalbed Methane</i> <i>(Cumulative)</i></p>	<p>The cumulative impact on the oil and gas resource would be a greater or lesser depletion/use of that resource within the time frame of the plan, and the total preservation of some potential resources. Economic and market factors are the major controlling influences that determine the actual rate and extent of oil and gas exploration and development. Land use restrictions result in higher costs, and therefore influence to an unknown and variable degree the rate of resource exploration and development. No lease areas remove potential resources from exploration and development consideration, as can some NSO stipulations if they block the perceived only feasible access route to a reservoir. This would eliminate from depletion/use potential resources which might lay beneath these restrictions. Somewhat lesser amounts of resource depletion would be found in this alternative than Alternative A, but more than Alternative B.</p>	<p>The impact on the oil and gas resource would be a greater or lesser depletion/use of that resource within the time frame of the plan, and the total preservation of some potential resources. Economic and market factors are the major controlling influences that determine the actual rate and extent of oil and gas exploration and development. Land use restrictions result in higher costs, and therefore influence to an unknown and variable degree the rate of resource exploration and development. No lease areas remove potential resources from exploration and development consideration, as can some NSO stipulations if they block the perceived only feasible access route to a reservoir. This would eliminate from depletion/use potential resources which might lay beneath these restrictions. Depletion/use of the oil and gas resource would occur over much of the area due to accessibility and limited restrictions.</p>	<p>The impact on the oil and gas resource would be similar to the Preferred Alternative. However, depletion/use of the oil and gas resource would be greatest with this alternative.</p>	<p>The impact on the oil and gas resource would be less than Alternative A. Depletion/use of the oil and gas resource would be least with this alternative due to the additional areas closed or restricted to resource uses.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
MINERALS <i>Coal</i>	More opportunities for coal exploration would occur over the No Action Alternative.	Opportunities for coal exploration could occur but would be limited due to about 218,420 acres that would be closed to coal exploration activities.	The greatest opportunity for coal exploration would occur in this alternative.	Same as No Action Alternative.
MINERALS <i>Coal</i> <i>(Cumulative)</i>	No additional effects would occur.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
MINERALS <i>Sodium</i>	Closing areas to sodium prospecting would preclude any potential development in these areas. Potential for development is low so these impacts should be minor. The impact to exploration and development would be an increased cost of doing business, but would not likely preclude activities.	Closing areas to sodium prospecting would preclude any potential development in these areas; however, potential for development is low. Resource management prescriptions for other activities would increase the cost of development and may inhibit some further development in this area. Specifically, the number of facilities and their locations may be relocated or even denied. Development of sodium brine would result in an irreversible irretrievable loss of the resource.	Same as No Action Alternative.	Same as Preferred Alternative.
MINERALS <i>Sodium</i> <i>(Cumulative)</i>	No additional effects would occur.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
MINERALS <i>Mineral Materials</i>	Increased mitigation (about 235,100 acres closed to salable minerals) would increase costs of doing business over Alternative A, in both the short and long term. Some unauthorized use would continue. Materials sold would be an irreversible irretrievable loss of the mineral resource but would provide an economic benefit.	Mitigation (about 207,850 acres closed to salable minerals) would increase costs of doing business in both the short and long term. Some unauthorized use would continue. Materials sold would be an irreversible irretrievable loss the mineral resource but would provide an economic benefit.	Mitigation (about 207,490 acres closed to salable minerals) would decrease from the Preferred Alternative, resulting in reduced costs of doing business in both the short and long term. Some unauthorized use would continue. Materials sold would be an irreversible irretrievable loss of the mineral resource but would provide an economic benefit.	Mitigation (about 406,080 acres closed to salable minerals) would increase costs of doing business over Alternative A in both the short and long term. Some unauthorized use would continue. Materials sold would be an irreversible irretrievable loss the mineral resource but would provide an economic benefit.
MINERALS <i>Mineral Materials (Cumulative)</i>	Additional areas would be available for mineral material sales than in Alternative B.	Areas closed to mineral material sales would reduce the amount of materials available from within the planning area.	More areas would be available for mineral material sales than for any alternative.	Fewer areas would be available for mineral material sales than for any alternative.
MINERALS <i>Locatable Minerals</i>	Approximately 211,130 acres of withdrawals would be revoked thus opening the lands to mineral location. Approximately 46,270 acres would be subject to new withdrawals and 4,150 acres of existing withdrawals would be retained. These withdrawals close the lands to mineral location; however, effects would be much reduced from Alternative B.	Existing withdrawals on approximately 211,130 acres would be revoked and 37,290 acres of new withdrawals close the lands to mineral location. This would cause an adverse effect to the exploration and development of mineral resources.	Approximately 211,130 acres of withdrawals would be revoked thus opening the lands to mineral location. Approximately 37,290 acres would be subject to new withdrawals and about 4,150 acres of existing withdrawals would be retained. These withdrawals close the lands to mineral location. Adverse effects would be less than either Alternative B or the Preferred Alternative.	Approximately 211,130 acres of withdrawals would be revoked thus opening the lands to mineral location. Approximately 267,590 acres would be subject to new withdrawals. These withdrawals close the lands to mineral location. Adverse effects would be more than Alternative A and the Preferred Alternative.
	Additional requirements and mitigation for Special Management Areas would increase costs of doing business for both short- and long-term periods.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
MINERALS <i>Locatable Minerals</i> <i>(Cumulative)</i>	See discussion under Lands and Realty.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
MINERALS <i>Geophysical</i>	Areas closed to geophysical activity result in a loss of data, which would be considered an unavoidable adverse impact. Increased costs for mitigation would affect operations.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
MINERALS <i>Geophysical</i> <i>(continued)</i>	Areas open to off-road vehicle use and exploration activity provide beneficial effects because retrieval of information is allowed.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
MINERALS <i>Geophysical</i> <i>(Cumulative)</i>	About 245,580 acres would be closed to geophysical vehicles and explosive charges which affects the off-road use of vehicles in retrieval of information and can increase costs of operations.	About 119,890 acres would be closed to geophysical vehicles and explosive charges which affects off-road use of vehicles in retrieval of information and can minimally increase costs of operations. Effects would be substantially less than the Preferred Alternative.	Same as the No Action Alternative.	About 245,580 acres would be closed to geophysical vehicles and explosive charges. Effects would be the same as the Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
OFF-ROAD VEHICLES	80% of the planning area would remain available for off-road vehicle use. All-terrain vehicle (ATV) or 4-wheeler use will continue to grow in popularity (300-400% over the next 5 years). 10,500 acres in the Sand Dunes ORV open area would remain open as an off-road vehicle play area. Existing health and safety issues between vehicles and oil and gas facilities in the Sand Dunes would continue.	Same as Preferred Alternative.	80% of the planning area would remain available for off-road vehicle use. ORV use in the Greater Sand Dunes open area would be limited to 5,500 acres because of increased oil and gas production. Safety concerns would be reduced because there would be fewer hazards in the reduced open area. Reducing the ORV open acreage in the planning area would be an adverse impact to ORV users. Removing the 16,000-acre Steamboat Mountain seasonal closure would benefit some ORV enthusiasts.	Same as Preferred Alternative.
OFF-ROAD VEHICLES (continued)	ORV use would be more restricted by limiting winter access to identified roads and accessing areas off identified roads by over-the-snow vehicles only.	ORV use would be somewhat less restricted than for the Preferred Alternative.	Same as No Action Alternative.	Same as Preferred Alternative.
OFF-ROAD VEHICLES (Cumulative)	Long-term beneficial effects would result from the large number of existing roads and trails available for vehicle use, and from newly constructed roads anticipated with additional development which would provide access to new areas. The areas closed or limited to designated roads and trails are small in comparison.	Long-term beneficial effects would result from the large amount of area available to off-road vehicle use. The off-road vehicle user enjoys few restrictions on vehicle use.	Long-term beneficial effects would be similar to the Preferred Alternative. There would be additional ORV opportunities over Alternative A in areas with the increased access development. However, the ORV open area would be reduced in size, restricting some ORV use.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
RECREATION	Because of increasing demand for recreation opportunities, visitor use in the planning area would continue to grow. Non-consumptive recreation days are projected to increase by 2% per year during the planning period. About 1.18 million resident and nonresident non-consumptive recreation days would be used in the 20-year live of the project.	Same as Preferred Alternative.	Non-consumptive recreation days were projected to increase by 1% per year during the planning period. About 1.07 million resident and nonresident non-consumptive recreation days would be used in the 20-year life of the project.	Same as Preferred Alternative.
	As developments occur and recreation pressure increases, opportunities for unconfined and solitary recreation experiences would diminish and the “quality” of recreation would be affected.	Same as Preferred Alternative.	Increased development would affect recreation more than the other alternatives.	Same as Preferred Alternative.
RECREATION (Cumulative)	Recreation demand and uses could increase to a point where conflicts would occur to unconfined dispersed recreation opportunities. However, management prescriptions would mitigate these impacts somewhat, to lessen the effects identified in Alternative A.	It is anticipated that as developments occur, populations increase, and other traditional recreation use areas become saturated, more demands would continue to be placed on recreation sites and facilities in the planning area.	More impacts would occur to recreation users than for No Action Alternative. The settings available for dispersed recreation opportunities would be further diminished over a larger area by increased development activity, vehicular travel and access into previously undeveloped areas. This would create lost opportunities for unconfined recreation experiences for some recreation users.	Impacts would be lessened from Alternative A as more areas would remain unmodified, providing areas for dispersed recreation opportunities.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
	<p>Some hunting opportunities may diminish for the general public in areas where development occurs due to the displacement of animals and because of measures applied to protect public health and safety. The ability of some pristine habitat areas to support wildlife may also be diminished due to increased recreation uses and access into these areas.</p>	<p>Some hunting opportunities may diminish for the general public but these would be less than the Preferred Alternative.</p>	<p>Same as Preferred Alternative.</p>	<p>Same as the No Action Alternative.</p>
<p>SOCIOECONOMICS ("Cumulative economic output" includes direct, indirect, and induced economic values)</p>	<p>Mineral development and exploration (oil, gas, and coalbed methane), recreation related businesses (travel, tourism, and hunting) and agricultural livestock would remain the area's major economic activities.</p>	<p>Same as Preferred Alternative.</p>	<p>Same as Preferred Alternative.</p>	<p>Same as Preferred Alternative.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<p>SOCIOECONOMICS Oil and Gas</p>	<p>65 oil and gas wells and 20 coalbed methane wells would be drilled over the 20-year period of 1998 to 2017. Almost 116 thousand barrels of oil and 83,669.4 MMCF of natural gas would be produced. The total economic impact for drilling and production would be approximately \$242 million. Employment produced by the oil and gas activity over the life of the project would be 734 annual job equivalents with a total earnings of about \$22.5 million.</p>	<p>64 oil and gas wells and 25 coalbed methane wells would be drilled over the 20-year period of 1998 to 2017. Almost 116 thousand barrels of oil and 84,177 MMCF of natural gas would be produced. The total economic impact for drilling and production would be approximately \$246 million. Employment produced by the oil and gas activity over the life of the project would be 711 annual job equivalents with a total earnings of about \$23 million.</p>	<p>100 oil and gas wells and 25 coalbed methane wells would be drilled over the 20-year period of 1998 to 2017. Almost 138 thousand barrels of oil and 99,489.6 MMCF of natural gas would be produced. The total economic impact for drilling and production would be approximately \$303.5 million. Employment produced by the oil and gas activity over the life of the project would be 915 annual job equivalents with a total earnings of about \$29 million.</p>	<p>45 oil and gas wells and 20 coalbed methane wells would be drilled over the 20-year period of 1998 to 2017. Approximately 104 thousand barrels of oil and 75,534.2 MMCF of natural gas would be produced. The total economic impact for drilling and production would be approximately \$212 million. Employment produced by the oil and gas activity over the life of the project would be 587 annual job equivalents with a total earnings of about \$19 million.</p>
<p>SOCIOECONOMICS Livestock Grazing</p>	<p>316,280 cattle AUMs and 42,540 sheep AUMs would be available for livestock grazing during the 20-year life of the project. The total economic impact of livestock grazing would be \$22.3 million. Employment in the livestock sector would be 252 annual job equivalents earning \$16,353 average per year.</p>	<p>347,580 cattle AUMs and 43,120 sheep AUMs would be available for livestock grazing during the 20-year life of the project. The total economic impact of livestock grazing would be \$24.4 million. Employment in the livestock sector would be 274 annual job equivalents earning \$16,373 average per year.</p>	<p>455,340 cattle AUMs and 65,300 sheep AUMs would be available for livestock grazing during the 20-year life of the project. The total economic impact of livestock grazing would be \$32.3 million. Employment in the livestock sector would be 365 annual job equivalents earning \$16,337 average per year.</p>	<p>177,220 cattle AUMs and 19,800 sheep AUMs would be available for livestock grazing during the 20-year life of the project. The total economic impact of livestock grazing would be \$12.4 million. Employment in the livestock sector would be 139 annual job equivalents earning \$16,396 average per year.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<p>SOCIOECONOMICS Recreation</p>	<p>Non-consumptive recreation days were projected to increase by two percent per year during the planning period. 1.18 million resident and nonresident non-consumptive recreation days would be used in the 20-year life of the project. The total economic impact of the non-consumptive nonresident recreation days would be \$62.7 million. 19,070 nonresident hunting days (elk, deer, and antelope) with a total economic impact of \$6 million would be realized over the life of the project. Employment in the recreation sector would be 875 annual job equivalents earning approximately \$12,521 average per year.</p>	<p>Same as Preferred Alternative.</p>	<p>Non-consumptive recreation days were projected to increase by one percent per year during the planning period. The growth rate is lower under this alternative due to potential impacts from development that could impact open spaces and opportunities for solitude. 1.07 million resident and nonresident non-consumptive recreation days would be used in the 20-year life of the project. The total economic impact of the non-consumptive nonresident recreation days would be \$56.8 million. 19,070 nonresident hunting days (elk, deer, and antelope) with a total economic impact of \$6 million would be realized over the life of the project. Employment in the recreation sector would be 798 annual job equivalents earning approximately \$12,521 average per year.</p>	<p>Same as Preferred Alternative.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<p>SOCIOECONOMICS (Cumulative)</p>	<p>The Preferred Alternative is basically comparable to the No Action Alternative and represents a midpoint between Alternative A and Alternative B. Direct impacts, total impacts, total earnings, total employment, local government revenue, and resident recreation benefits are all 99 to 100 percent of the No Action Alternative.</p> <p>The total economic impact for all economic sectors (oil and gas, recreation, and livestock grazing) over the 20-year life of the project is \$333.6 million. The total employment or annual job equivalents is 1,860.2 with total earnings of \$37.7 million. Revenues to local governments is approximately \$10.9 million.</p>	<p>The total economic impact for all economic sectors (oil and gas, recreation, and livestock grazing) over the 20-year life of the project is \$338.9 million. The total employment or annual job equivalents is 1,860.1 with total earnings of \$38.4 million. Revenues to local governments is approximately \$11 million.</p>	<p>Due to the increased emphasis on production, Alternative A generates the most economic activity in southwest Wyoming of all the alternatives in the long term. Under Alternative A, direct and total economic impacts are 18 percent higher than the No Action Alternative. Total labor earnings are 17 percent higher than the No Action Alternative. Total employment is 12 percent higher than the No Action Alternative. Revenues to local governments are 16 percent higher than the No Action Alternative. Because there is less emphasis on protection of resources, Alternative A generates the least resident recreation benefits of all alternatives with 7 percent less net economic benefits than the No Action Alternative.</p> <p>The total economic impact for all economic sectors (oil and gas, recreation, and livestock grazing) over the 20-year life of the project is \$398.8 million. The total employment or annual job equivalents is 2,078 with total earnings of \$45.1 million. Revenues to local governments is approximately \$12.8 million.</p>	<p>Due to the increased emphasis on protection, Alternative B generates the least economic activity in southwest Wyoming of all alternatives. Under Alternative B, direct and total economic impacts are about 13 percent lower than the No Action Alternative and 26 percent lower than Alternative A. Total employment is 14 percent lower than the No Action Alternative and 23 percent lower than Alternative A. Revenues to local government are 12 percent lower than the No Action Alternative and 24 percent lower than Alternative A. Resident recreation benefits under Alternative B are the same as the No Action Alternative. Because there is more emphasis on protection, Alternative B generates 8 percent more resident recreation benefits than Alternative A.</p> <p>The total economic impact for all economic sectors (oil and gas, recreation, and livestock grazing) over the 20-year life of the project is \$292.6 million. The total employment or annual job equivalents is 1,600.5 with total earnings of \$32.5 million. Revenues to local governments is</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
SPECIAL STATUS PLANT SPECIES MANAGEMENT	Given standard BLM mitigation measures (avoidance), actions related to Air Quality Management, Cultural Resource Management, Fire, Hazardous Materials, Coal Exploration, Sodium Leasing, Leasable Minerals, Mineral Materials, Geophysical Activities, Reclamation and Monitoring, Recreation Management, Riparian/Wetlands, Special Management Areas, Vegetation/Woodlands/Weeds, Visual Resource Management, Watershed/Water Quality Management, Wild Horses, and Wildlife would have little, no, or slightly beneficial impacts on Special Status Plant Species resources.	Same as Preferred Alternative.	Generally, actions taken under Alternative A are slightly less beneficial to special status plant species than the other alternatives.	Generally, actions taken under Alternative B are slightly more beneficial to special status plant species than the other alternatives.
	Increased activity could cause unintentional plant removal and habitat alteration. Chemical control of weeds along rights-of-way could cause significant loss of plant populations if their habitat is on or adjacent to the right-of-way.	Chemical control of weeds along rights-of-way could cause significant loss of plant populations if their habitat is on or adjacent to the right-of-way.	Same as No Action Alternative and increased activity could cause unintentional plant removal and habitat alteration to a greater extent than the Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
SPECIAL STATUS PLANT SPECIES MANAGEMENT (continued)	Activities related to livestock grazing such as assessing Standards and applying Guidelines, limiting upland utilization levels, and developing grazing plans would benefit special status plant species. Management prescriptions for salting, conversions, and changing seasons of use would reduce adverse effects over the No Action Alternative.	Activities related to livestock grazing such as salting or providing concentration areas, chemical control of noxious weeds, changing numbers of AUMs, conversions from sheep to cattle, and changing seasons of use could cause significant loss of plant populations.	Same as No Action Alternative.	Same as Preferred Alternative.
	There would be more potential impacts to special status plant species under this alternative than Alternative B, but fewer impacts than No Action or Alternative A.	Special status plant locations would be managed for No Surface Occupancy for surface disturbing activities, providing protection for the plants and their habitat.	Same as the No Action Alternative. Additionally, increased surface disturbing activity could negatively impact large-fruited bladderpod habitat. Controlling noxious weeds spread by increased activity could negatively impact special status plant communities.	There would be fewer impacts to special status plant communities under Alternative B because less surface disturbing activity would occur.
	Withdrawals would benefit special status plants communities. This alternative would provide more protection from mining claims for special status plant communities than No Action or Alternative A, but less than Alternative B.	Mining claim development could cause significant loss of plant populations if their habitat is on or adjacent to the claims.	Same as No Action Alternative.	Same as No Action Alternative; however, additional withdrawals would protect more area from potential mining claim activity.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
SPECIAL STATUS PLANT SPECIES MANAGEMENT (continued)	Transportation planning would benefit special status plant communities and fewer stream crossings would benefit special status plant habitat. Rehabilitation of unused roads and trails would reduce vehicular access in sensitive habitat.	Transportation planning would benefit special status plant communities. Some loss of special status plant habitat could occur from vehicle access.	Same as No Action Alternative and the number of stream crossings could increase thereby impacting habitat for Ute ladies'-tresses.	Same as Preferred Alternative.
SPECIAL STATUS PLANT SPECIES MANAGEMENT (Core)	More activity would occur than under the No Action Alternative and Alternative B, but less than in Alternative A. Conducting searches for plant species and applying protective measures would prevent adverse effects.	No surface disturbing activity would occur in the core area, providing the least potential impact to special status plant species.	The most activity would occur in this alternative, providing the greatest potential for impact. Searches for plant species and protective measures would help mitigate this impact.	Same as No Action Alternative.
SPECIAL STATUS PLANT SPECIES MANAGEMENT (Cumulative)	Development activities, such as those associated with recreation sites and minerals actions, could have an impact on Special Status Plant species in areas where several different resource concerns may limit options for placement of development facilities. However, increased inventory for these species in areas projected for development could provide more information about rare plant species and their status.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
SPECIAL STATUS PLANT SPECIES MANAGEMENT (Cumulative) (continued)	Grandfathered mining claims and unauthorized uses could impact these species through unavoidable surface disturbance. However, impacts from future mineral location activities would be minimal.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
VEGETATION/ WOODLANDS/WEEDS	Given standard BLM mitigation measures, actions related to Air Quality Management, Cultural Resource Management, Hazardous Materials, Leasable Minerals (geothermal), Geophysical Activities, Monitoring, Reclamation, Special Status Species Management, Visual Resource Management, Woodlands, Watershed/Water Quality Management, and Wildlife Management would have little, no, or slightly beneficial impacts on Vegetation.	Same as Preferred Alternative.	Generally, actions taken under Alternative A are slightly less beneficial to vegetation than the other alternatives.	Generally, actions taken under Alternative B are slightly more beneficial to vegetation than the other alternatives.
	Prescribed burning and wildfires would cause long-term decrease in sagebrush species, a short-term increase in annual weeds, and long-term increase in grasses. Two or three years after a fire, total forage production increases. Surface disturbance from fire suppression activities can damage vegetation.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
VEGETATION/ WOODLANDS/WEEDS (continued)	Rights-of-way for pipelines, access roads, and utility lines would cause short-term decreases in vegetation, but reestablishment of desirable grasses and forbs would occur 3 to 5 years after reclamation. Big sagebrush/scurfpea communities would be avoided.	Same as Preferred Alternative except big sagebrush/scurfpea communities could be impacted.	Same as No Action Alternative.	Same as Preferred Alternative.
	Direct impacts to vegetation would decrease with decreased livestock use. Less intensive grazing would promote healthier and more diverse plant communities. Vegetation would benefit from actively managed grazing turnout dates.	Direct impacts to vegetation would increase with increased livestock use, although implementing standards and guidelines would mitigate the impacts somewhat. Continuing season-long cattle use would have negative impacts on grasses. Localized overuse could result in less desirable plant species establishing. Establishing new grazing management plans with riparian objectives and desired plant communities would benefit vegetation.	Same as No Action Alternative and active AUMs would increase to full permitted use of 26,032 per year, which could increase impacts to vegetation.	Same as Preferred Alternative but with decreased livestock use.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
VEGETATION/ WOODLANDS/WEEDS (continued)	Up to 85 oil, gas, and coalbed methane wells would be drilled. Constructing drill pads, roads, pipelines, etc., associated with oil and gas operations would remove vegetation on about 2,240 acres in the long term. After reclamation, the net loss of vegetation would be about 365 acres.	Up to 89 oil, gas, and coalbed methane wells would be drilled. Constructing drill pads, roads, pipelines, etc., associated with oil and gas operations would remove vegetation on about 2,285 acres in the long term. After reclamation, the net loss of vegetation would be about 381 acres. Disturbance to big sagebrush/scurfpea communities could result in long-term loss.	Up to 125 oil, gas, and coalbed methane wells would be drilled. Constructing drill pads, roads, pipelines, etc., associated with oil and gas operations would remove vegetation on about 2,650 acres in the long term. After reclamation, the net loss of vegetation would be about 525 acres. Disturbance to big sagebrush/scurfpea communities could result in long-term loss.	Up to 65 oil, gas, and coalbed methane wells would be drilled. Constructing drill pads, roads, pipelines, etc., associated with oil and gas operations would remove vegetation on about 2,040 acres in the long term. After reclamation, the net loss of vegetation would be about 289 acres.
	Coal exploration activities would avoid sensitive plant communities, such as big sagebrush/scurfpea communities, and those communities would be closed to sodium exploration and mineral material sales (gravel pit, etc.).	Disturbance to big sagebrush/scurfpea communities from coal or sodium exploration or mineral materials sales could result in long-term loss.	Same as No Action Alternative.	Same as Preferred Alternative.
	Sensitive plant communities, such as big sagebrush/scurfpea communities, would be protected by additional mineral withdrawals, though there would be fewer withdrawals than Alternative B.	Disturbance to big sagebrush/scurfpea communities from mining claim activities could result in long-term loss as mineral withdrawals would not be pursued. Location of mining claims on Steamboat Mountain could result in vegetation loss.	Same as No Action Alternative.	Sensitive plant communities would be protected by additional mineral withdrawals.
	All vegetation classifications can be damaged and eventually destroyed by repeated off-road vehicle use.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
VEGETATION/ WOODLANDS/WEEDS (continued)	Retaining the seasonal road closure would benefit important sagebrush communities. Higher activity rates could lead to increased weed invasions resulting in vegetation loss. Recreation facilities construction would remove vegetation. Concentrated recreation use could damage vegetation.	Same as Preferred Alternative.	Removing the seasonal road closure could result in long-term loss of important sagebrush communities due to increased ORV use and driving in wet, muddy conditions.	Same as Preferred Alternative.
	Surface disturbance activities from all actions would affect about 2,500 acres in the long term resulting in loss of vegetation on about 600 acres after reclamation. Weed invasions would increase due to surface disturbing activities, but would be less than the No Action Alternative.	Surface disturbance activities from all actions would affect about 2,500 acres in the long term resulting in loss of vegetation on about 600 acres after reclamation. Weed invasions would increase due to surface disturbing activities.	Surface disturbance activities from all actions would affect about 2,900 acres in the long term resulting in loss of vegetation on about 750 acres after reclamation. Weed invasions would increase due to surface disturbing activities.	Surface disturbance activities from all actions would affect about 2,300 acres in the long term resulting in loss of vegetation on about 500 acres after reclamation. Weed invasions would increase due to surface disturbing activities, but would be less than the No Action Alternative.
	Transportation planning would benefit vegetation by avoiding riparian areas and sensitive plant communities.	Same as Preferred Alternative.	Minimal transportation planning would be done. Benefits to vegetation would be less than the other alternatives and there would be more use and disturbance in riparian areas.	Same as Preferred Alternative.
	Continued concentration of wild horses near water sources could severely damage vegetation in localized areas.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
VEGETATION/ WOODLANDS/WEEDS (continued)	Given standard BLM mitigation measures, actions related to Air Quality Management, Cultural Resource Management, Hazardous Materials, Vegetation and Weed Management, Visual Resource Management, Watershed/Water Quality Management, Wild Horses, and Wildlife/Fisheries Management would have little, no, or slightly beneficial impacts on riparian/wetlands resources.	Same as Preferred Alternative.	Generally, actions taken under Alternative A are slightly less beneficial to riparian/wetland resources than the other alternatives.	Generally, actions taken under Alternative B are slightly more beneficial to riparian/wetland resources than the other alternatives.
	Prescribed fire activity would have short-term negative impacts to water quality due to sedimentation and erosion, but would have long-term benefits to watersheds and riparian areas through increased plant health and diversity. Wildfire would have more negative impacts to watersheds and streams than prescribed fire. There would be more full suppression areas under this alternative than the No Action or Alternative A.	Same as Preferred Alternative but with fewer full suppression areas.	Same as No Action Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
VEGETATION/ WOODLANDS/WEEDS (continued)	Rights-of-way corridors and avoidance areas would be identified to minimize impacts to riparian areas. Fewer areas would be identified for mineral withdrawal than Alternative B.	Lands and realty actions for linear activities (pipelines, roads, etc) can negatively impact riparian areas in the short term after mitigation. Mineral withdrawals can protect riparian areas from disturbance. Lack of rights-of-way avoidance areas would impact sensitive resources.	Same as No Action Alternative.	Rights-of-way corridors and avoidance areas would be identified to minimize impacts to riparian areas. Additional areas identified for mineral withdrawal would benefit riparian areas by protecting them from disturbance.
	Keeping active AUMs at the 9,851 five-year average level and implementing Standards and Guidelines would recover degraded riparian areas and improve water quality.	If season-long grazing use continues, riparian areas would remain static and not move towards Proper Functioning Condition. Even with utilization levels not exceeding 50% and no change in active AUMs, riparian areas might not improve. Implementing Standards and Guidelines and setting Desired Plant Community objectives would improve riparian health.	Same as No Action Alternative except active AUMs would increase making appropriate actions taken to improve riparian areas insufficient. Intensive management would be needed to meet riparian objectives.	Same as Preferred Alternative but aggressive action for Standards and Guidelines and Desired Plant Communities would bring riparian health to Proper Functioning Condition within shorter time frames.
	Most actions associated with mineral development have adequate mitigation measures to prevent damage to riparian areas. Prospecting in the Oregon Gulch could increase erosion.	Same as Preferred Alternative.	Same as Preferred Alternative and unrestricted crossings of riparian areas and streams could increase erosion and sedimentation.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
VEGETATION/ WOODLANDS/WEEDS (continued)	Proper ORV use has no impact on riparian areas; however, ORV use causes significant damage to wetlands and riparian areas when operated outside of management prescriptions. If predicted increases in ORV sales occur, negative impacts could also increase.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	Camping and recreation in riparian areas and wetlands can have negative impacts. Enforcement of the 200-foot buffer zone protects riparian areas.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
VEGETATION/ WOODLANDS/WEEDS (Core)	Fewer surface disturbing activities in the core area would reduce short- and long-term impacts to vegetation.	No surface disturbing activities in the core area would prevent short- and long-term impacts to vegetation.	Surface disturbing activities in the core area could have both short- and long-term impacts to vegetation.	Same as Preferred Alternative.
VEGETATION/ WOODLANDS/WEEDS (Cumulative)	Vegetation and habitat quality would improve in some areas; however, more surface disturbance from development, recreational, and ORV activities could occur. Effects could become more severe when high intensity development occurs over broader areas. One result could be a reduction in forage availability and, consequently, livestock and wildlife use. However, an evaluation would be conducted of rates and levels of development and reclamation to determine if further activities, such	Development activities, such as those associated with recreation sites and minerals actions, and use authorizations such as livestock grazing, could affect vegetation quality, diversity, density, and general health; however, no activity in the core area, reclamation prescriptions and livestock management practices would reduce this effect. Weeds would increase and in some places, and impacts would be considered long term due to the difficulty of eradicating established weed	Impacts would be greater than those described under No Action as more acreage would be disturbed. The cumulative effect of surface disturbing activities, developments and use authorizations would increase effects to vegetation communities. Removal of the seasonal road closure could result in both short- and long-term loss of unique and important big sagebrush communities due to increased vehicle use and destruction of vegetation, especially when roads are	The most beneficial impacts to vegetation communities in riparian areas and wetlands would occur under this alternative. Management actions limiting surface disturbance and providing for less intensive grazing of riparian areas would benefit riparian plant communities. Less intensive grazing would promote healthier, more biologically diverse native plant communities. Implementation of more restrictive riparian utilization standards would directly benefit willows,

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
	<p>as leasing of areas, would be allowed and still meet stated management objectives. The evaluation would assess exploration and development activity and its effects on elk, habitat use (potential fragmentation), effects on wildlife species and habitat, and other sensitive resources. This would benefit these resources. Habitat degradation and deterioration of healthy native plant communities that promotes noxious weed invasions would be minimal. Desired Plant Community objectives would be established to enhance wildlife habitat, watershed, and biodiversity values. Livestock grazing systems would be designed to achieve desired plant communities. These actions would have a long-term positive impact on uplands and riparian areas.</p>	<p>infestations. Surface disturbing activities in the stabilized dune areas would cause an increase in blowout areas, and long-term loss of vegetation. Disturbance of the unique big sagebrush/lemon scurfpea plant community on the stabilized dunes would likely result in the long-term loss of this unique vegetation type. Desired plant community objectives for upland and riparian areas would be established for the planning area through individual site specific activity and implementation planning, and as updated ecological site inventory data become available. Establishment of these objectives would have a positive long-term impact to plant community biological diversity and health.</p>	<p>impassable due to wet muddy conditions. A long-term loss of native vegetation due to weed invasions would be expected to increase with the higher rate of activity in the area, especially with unauthorized use of ORVs through previously undisturbed areas. Not limiting access through riparian areas or sensitive plant communities would cause irreversible damage to vegetation, by direct removal, habitat degradation and deterioration of healthy native plant communities that promotes noxious weed invasions. In addition, woodland habitat would be open to road construction which would have direct negative impacts to aspen and associated woodland species and their habitat.</p>	<p>grasses, and sedges by maintaining plant vigor, community structure, and diversity. The quickest progress toward riparian health and Desired Plant Communities would be achieved. Minimal development would occur in the big sagebrush/lemon scurfpea communities and long-term beneficial effects would occur. Transportation planning would benefit sensitive vegetation resources, such as riparian areas, mountain shrubs, and big sagebrush/scurfpea and cushion plant communities, by channeling access to certain areas, allowing other areas to remain undisturbed or to revegetate. In addition, seasonal road closures and limitations on riparian area crossings would reduce impacts to vegetation.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
VISUAL RESOURCES	<p>Allowing communication sites would cause potential visual impacts on Essex Mountain and Pacific Butte. The Red Desert Watershed would remain a VRM Class III area. Avoiding unsuitable areas for rights-of-way would protect visual resources. Visual values for National Historic Trails and the South Pass Historic Landscape would be protected. Not allowing surface mining and surface occupancy around the Boars Tusk and Steamboat Mountain-Killpecker Dune Fields would retain and enhance visual resources.</p>	<p>No additional development in the core would maintain current VRM classes in the Greater Sand Dunes and Steamboat Mountain ACECs. Visual values for National Historic Trails and the South Pass Historic Landscape would be protected. Not allowing surface mining and surface occupancy around the Boars Tusk and Steamboat Mountain-Killpecker Dune Fields would retain and enhance visual resources.</p>	<p>Visual values on Steamboat Mountain and Pacific Butte would be impacted by communication sites. VRM Class III lands in Eden Valley would be downgraded to Class IV. Visual values for National Historic Trails and the South Pass Historic Landscape would be protected.</p>	<p>Not allowing communications sites on Steamboat Mountain, Essex Mountain, and Pacific Butte would maintain visual values. Increasing VRM Class II lands on Steamboat Mountain would benefit visual values, Native American respected places, and protect soil and plants. Upgrading the Red Desert Watershed Area from Class III to Class II would enhance visual values. Visual values for National Historic Trails and the South Pass Historic Landscape would be protected. Not allowing surface mining and surface occupancy around the Boars Tusk and Steamboat Mountain-Killpecker Dune Fields would retain and enhance visual resources.</p>
VISUAL RESOURCES (Cumulative)	<p>No additional effects would occur.</p>	<p>Same as Preferred Alternative.</p>	<p>Same as Preferred Alternative.</p>	<p>Same as Preferred Alternative.</p>
WATERSHED/WATER QUALITY	<p>More benefits than for Alternative A would occur to watershed resources from management prescriptions for mitigation measures and particularly no surface occupancy restrictions and right-of-way avoidance/exclusion areas preventing disruption of soil and watershed values.</p>	<p>Same as Preferred Alternative.</p>	<p>Generally, actions taken under Alternative A are slightly less beneficial to watersheds than the other alternatives.</p>	<p>Generally, actions taken under Alternative B are slightly more beneficial to watersheds than the other alternatives.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
WATERSHED/WATER QUALITY (continued)	Prescribed fire activity would have short-term negative impacts to water quality due to sedimentation and erosion, but would have long-term benefits to watersheds and riparian areas through increased plant health and diversity. Wildfire would have more negative impacts to watersheds and streams than prescribed fire. There would be more full suppression areas under this alternative than the No Action Alternative or Alternative A.	Same as Preferred Alternative but with fewer full suppression areas. Full suppression would not take place in as many areas.	Same as No Action Alternative.	Same as Preferred Alternative.
	Achieving proper functioning condition on streams and riparian areas would greatly benefit watershed and soil resources.	Same as Preferred Alternative.	Achieving proper functioning condition on riparian areas over a longer period would benefit watershed and soils less than the Preferred Alternative.	Achieving proper functioning condition on riparian areas in a shorter time frame would benefit watershed and soils more than the Preferred Alternative.
	Hazardous materials are generally confined to areas such as drilling sites and transportation systems. Soil contamination can occur from drilling fluids and chemicals. These effects should be minor due to applied mitigation measures.	Same as Preferred Alternative.	Same as Preferred Alternative; however, this alternative has the greatest activity and therefore the greatest anticipated potential for problems involving hazardous material.	Same as Preferred Alternative and has the least activity and therefore the lowest potential for problems involving hazardous materials.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
WATERSHED/WATER QUALITY (continued)	Closing areas to potential communication sites and limiting rights-of-way to existing disturbances would concentrate activity and decrease overall disturbance but might create a greater level of disturbance for an individual project.	Same as Preferred Alternative.	More communication sites and rights-of-way are proposed under this alternative than the others which would result in more surface disturbance over a wider area and potential water quality degradation.	Similar to Preferred Alternative as location of communication sites and transportation corridors would be limited.
	Livestock grazing has a major influence on land and stream conditions and thus erosion and water quality. Assessing Standards and implementing appropriate Guidelines benefits watersheds and helps achieve water quality goals.	Similar to Preferred Alternative.	Increased grazing use, winter road plowing, extended grazing seasons, and managing riparian areas for grazing would conflict with watershed goals. Negative impacts to watersheds would be the greatest under this alternative.	This alternative provides the most positive effects and potential for achieving water quality goals.
	More development activity and resulting surface disturbance could impact water quality. Standard mitigation measures would offset the level of disturbance. Creating an unleased corridor could reduce water quality impacts by reducing development activity on steep areas.	Similar to Preferred Alternative, except that an unleased corridor would not be established.	This alternative has the most potential development activity and therefore the greatest potential for water quality degradation.	This alternative has the least potential development activity and therefore the least potential for water quality degradation.
	Disposal methods of water obtained from coalbed methane operations is a concern and would be addressed on a case-by-case basis. Standard mitigation measures for surface disturbance associated with coalbed methane operations would offset the level of disturbance and protect watershed values.	Higher levels of potential coalbed methane development activities would have higher potential to impact watershed values.	Same as No Action Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
WATERSHED/WATER QUALITY (continued)	Maintaining seasonal road closures for existing roads and seasonal closures for new roads would mitigate erosion impacts.	Same as Preferred Alternative.	Reducing seasonal road closures would increase erosion potential by allowing traffic on roads during a time when soils are vulnerable to erosion.	Same as Preferred Alternative.
	Transportation planning benefits watersheds by effectively managing road networks thereby reducing erosion. Planning other linear facilities in conjunction with roads increases benefits.	By not using effective transportation planning, there is a greater potential for erosion.	Same as No Action Alternative.	Same as Preferred Alternative.
	Oil and gas drilling, completion, and plugging operations, and water well plugging could impact groundwater resources. Adhering to BLM and Wyoming DEQ guidelines for protecting groundwater quality would make impacts unlikely. Likewise, cleaning up spills and following guidelines for evaporation ponds and fluid pits would prevent groundwater impacts.	Same as Preferred Alternative with more potential for impacts as much of the planning area is open to new oil and gas development with fewer restrictions than the Preferred Alternative.	Same as No Action Alternative.	Alternative B has the lowest level of projected oil and gas activity and therefore the lowest potential for impacting groundwater and surface water resources.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
WATERSHED/WATER QUALITY (continued)	<p>Coalbed methane development involves dewatering the coalbed to stimulate gas production. Dewatering aquifers would be a direct impact that would last until methane production ceased and the aquifer is recharged. Water wells and surface waters connected to the affected aquifer could be affected by water table drawdown. Hydrological investigations to determine the extent of impacts would be required of proponents before development is allowed. Appropriate mitigation would be applied to protect water quality and quantity.</p>	<p>Same as Preferred Alternative with more potential for impacts as much of the planning area is open to new coalbed methane development with fewer restrictions than the Preferred Alternative.</p>	<p>Same as No Action Alternative.</p>	<p>Alternative B has the lowest level of projected coalbed methane activity and therefore the lowest related potential for impacting groundwater and surface water resources.</p>
WATERSHED/WATER QUALITY (Core)	<p>The potential for water quality degradation would be closely related to the level of disturbance that would occur under each alternative. The potential for this alternative would be somewhere between the No Action Alternative and Alternative B.</p>	<p>The potential level of disturbance under this alternative would be moderate overall. However, because of the areas that would be closed to surface disturbing activities, there is a potential for areas of concentrated disturbance outside the core area.</p>	<p>The greatest amount of surface disturbance would be allowed under this alternative and therefore it has the highest potential for water quality degradation of all the alternatives.</p>	<p>Although the level of activity proposed under this alternative is slightly greater than that proposed under the No Action Alternative, it would have a greater distribution over the landscape, which would lower the potential for water quality degradation.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
WATERSHED/WATER QUALITY (Core) (continued)	New oil and gas leases would not be issued within the Greater Sand Dunes ACEC; however, existing leases could be developed. Portions of the remaining core area and the connectivity area would be open to new oil and gas leases. Existing leases within those areas could be developed as well. See general discussion of impacts under the Preferred Alternative.	No new oil and gas development would occur within the core area. Therefore, no impacts from new development would occur. Accidental spills from existing facilities would be cleaned up under existing guidelines.	The core area, connectivity area, and Greater Sand Dunes ACEC would be open to development of existing oil and gas leases and new leases. See general discussion of impacts under the No Action Alternative. Alternative A has the highest potential among all alternatives for impacting groundwater and possibly surface water resources in the core area.	The core area and the connectivity area would not be open to issuing new oil and gas leases. Existing leases; however, would be developed. Projected development is greater than the No Action Alternative, but less than the Preferred Alternative or Alternative A.
	Coalbed methane development within the core area, especially on existing leases within the Greater Sand Dunes ACEC, could impact certain groundwater aquifers. See the general discussion of coalbed methane impacts under the Preferred Alternative.	No new coalbed methane development would occur within the core area.	The core area, connectivity area, and Greater Sand Dunes ACEC would be open to development of coalbed methane leases. See the general discussion of impacts under the No Action Alternative. Alternative A has the highest potential among all alternatives for impacting groundwater and possibly surface water resources in the core area.	Same as Preferred Alternative.
	It would be expected that riparian/wetland areas in the core area would recover quickly from degraded states or would achieve Desired Plant Communities in a timely manner because greater attention would be given to those resources.	It would be expected that riparian/wetland areas in the core area would recover from degraded states or would achieve Desired Plant Communities in a timely manner.	Same as No Action Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<p>WATERSHED/WATER QUALITY (Cumulative)</p>	<p>Impacts would be less than described for Alternative A. This alternative would provide for reclamation of current and future surface disturbances. Constraints on surface disturbing activities on steep slopes would help maintain soil stability thereby reducing sediment load. Revoking withdrawals and allowing increased locatable mineral development has the potential of causing adverse effects on a local scale.</p>	<p>The greater the degree of surface disturbance the greater the potential for adverse impacts to water quality. Soil productivity would continue to be disrupted in areas with surface disturbance, but with no new activity in the core area and proper management this would be temporary and short term. This principle applies to immediate and cumulative impacts.</p>	<p>Alternative A would produce the greatest disturbance, and thus the greatest potential impact. Increased development of resources would cause a temporary increase in disturbed landscapes and consequently could increase soil loss and subsequent sedimentation.</p>	<p>This alternative would provide for the greatest conservation of watershed resources due to a decline in surface disturbing activities and implementation of management prescriptions.</p>
	<p>With mitigation and proper management practices, increased sedimentation should be containable. Not leasing areas for mineral development, constraining road location and rights-of-way, and requiring designed road plans should reduce soil erosion. Application of guidelines from EPA's Stormwater Discharge policy would aid in maintaining landscape stability.</p>	<p>Increased sedimentation could result from any activity which disturbs vegetation and causes soil compaction, such as road and pad construction, livestock trampling, and recreational use (especially off-road vehicle activity). Concomitant with loss of vegetative cover and soil loss is increased runoff from denuded surfaces which could de-stabilize drainages. Appropriate mitigation and project design during site specific analysis would minimize off-site sedimentation to a lesser extent than the Preferred Alternative.</p>	<p>This alternative would produce the greatest amount of sediment.</p>	<p>Long-term benefits should occur to soils resources as a result of mitigation measures and pro-active efforts to prevent long-term disruption of landscapes, decreasing sedimentation.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
WILD HORSES	Given standard BLM mitigation, actions related to Air Quality management, Cultural Resource management, Reclamation, Recreation, Special Status Species management, Surface Disturbance, Vegetation management, Visual Resource management, Watershed management, and Wildlife Habitat management would have little, no, or slightly beneficial impacts on wild horses.	Same as Preferred Alternative.	Generally, actions taken under this alternative are slightly less beneficial to wild horses than the other alternatives.	Generally, actions taken under this alternative are slightly more beneficial to wild horses than the other alternatives.
	Natural and prescribed fires have the potential to benefit wild horses by converting shrub communities to grass communities.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	The use of hazardous materials poses a threat to wild horses if they come into contact with them or consume contaminated forage or water.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	Transportation planning for linear rights-of-way using existing roads and locating utility corridors to avoid critical habitat areas would mitigate impacts to wild horses from land and realty actions.	Pipelines, utility corridors, and other linear rights-of-way have the potential to impact wild horses. Linear facilities and frequent human activity located adjacent to water sources can negatively impact wild horses. Impacts can be mitigated with transportation planning.	Same as No Action Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
WILD HORSES (continued)	New fencing in the Great Divide Wild Horse Herd Management Area could cause negative impacts to wild horses including riparian fencing which precludes access to water. Cattle conversions to sheep would benefit wild horses and sheep conversions to cattle would negatively impact wild horses.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	Current seasons of livestock use would continue or be modified and no additional impact to wild horses would occur.	Same as Preferred Alternative.	Early turnout of livestock and season-long use would negatively impact wild horses and their habitat.	Same as Preferred Alternative.
	Oil and gas developments inside the HMA could impact wild horses because of surface disturbance and human activity. Developments outside HMA would have no impact.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	Locatable minerals withdrawals inside the HMA would benefit wild horses.	Same as Preferred Alternative.	Fewer withdrawals could allow for increased activity which could impact wild horses by reducing habitat.	Same as Preferred Alternative.
	Retaining the seasonal Steamboat Mountain road closure would benefit wild horses.	Same as Preferred Alternative.	Modifying the Steamboat Mountain seasonal closure allowing for increased human activity would negatively impact wild horses and their distribution during the period.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
WILD HORSES (continued)	The existing Great Divide Basin Wild Horse Herd Management Area boundary would be maintained. Horses residing outside the HMA would be removed.	Same as Preferred Alternative.	Same as Preferred Alternative.	Expanding the boundaries of the Great Divide Basin Wild Horse Herd Management Area to include the Jack Morrow Hills planning area would benefit existing horses by decreasing density and competition for forage and water.
WILD HORSES (Core)	A small portion of the Great Divide Basin Wild Horse Herd Management Area lies within the core area, and no impacts to wild horses are anticipated.	Same as Preferred Alternative.	Same as Preferred Alternative.	The Great Divide Basin Wild Horse Herd Management Area boundary would be expanded to include the core area. Management actions would benefit wild horses and their habitat.
WILD HORSES (Cumulative)	Wild horses would not be adversely affected by activities largely due to their ability to move into other areas, and the large amount of area they have to move into. Long-term displacement would not necessarily affect wild horses as they seem to adapt to activities.	Same as Preferred Alternative.	Same as Preferred Alternative.	Wild horses would not be adversely affected by activities in the expanded area largely due to their ability to move into other areas, and the large amount of area they have to move into. Long-term displacement would not necessarily affect wild horses as they seem to adapt to activities.
WILDLIFE	Management actions under this alternative would result in fewer adverse impacts to wildlife and their habitat than Alternative A and the No Action Alternative.	Activities would continue to have direct and indirect effects to wildlife habitat, although impacts would be less than under Alternative A. Continuation of existing management would show continued impacts to wildlife habitat both beneficial and adverse.	Increased activity overall and emphasis on production of other commodities would increase adverse effects to wildlife habitat and populations.	Wildlife habitat would benefit the most under this alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
WILDLIFE (continued)	Seasonal constraints would be used to mitigate impacts to wildlife during crucial periods and would provide short-term protection for wildlife. Long-term maintenance and operations activities in crucial wildlife habitats would continue to cause displacement of wildlife from crucial habitats, including disruption of nesting, fawning and calving areas, and crucial big game winter habitats, creating long-term adverse impacts. Effects would be less than Alternative A.	Same as Preferred Alternative.	Impacts would be greatest under this alternative, as more activity would take place and some roads currently closed seasonally would remain open year round.	Same as Preferred Alternative.
	Management prescriptions under this alternative would provide long-term benefits to wildlife habitat by providing for continued use of crucial habitats. However, displacement and loss of habitat from development and disruptive activities would create an unavoidable adverse impact.	The combination of mineral and livestock activities in crucial wildlife habitats would continue to create impacts that may be unacceptable in some locations. Displacement of part of the Steamboat Mountain elk herd could result in an inability to maintain this herd objective. Displacement and loss of habitat from development and disruptive activities would create an unavoidable adverse impact.	The effects of activities causing displacement would be greatest under this alternative.	Effects of activities causing displacement would be less than for the Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
WILDLIFE (continued)	Wildfire would generally result in a short-term loss of habitat but would generally benefit wildlife habitat over the long term. Wildfire could result in a long-term loss of habitat and could be considered an unavoidable adverse impact to the habitat if livestock graze the burned area immediately after the fire.	Same as Preferred Alternative; however, no activity in the core area would reduce this effect.	Same as Preferred Alternative.	Same as Preferred Alternative.
	Conducting a resource evaluation of activities prior to issuing oil and gas leases or other actions in crucial habitats would benefit wildlife resources.	A resource evaluation would not be conducted prior to issuing oil and gas leases or other actions in crucial habitats which could adversely affect wildlife resources.	A resource evaluation would not be conducted prior to issuing oil and gas leases or other actions in crucial habitats which could adversely affect wildlife resources to the greatest extent under this alternative as the most development activity would take place.	A resource evaluation would not be conducted prior to issuing oil and gas leases or other actions in crucial habitats which could adversely affect wildlife resources. However, other management prescriptions proposed for this alternative would reduce these effects and provide benefits to wildlife resources.
	Rights-of-way construction and use, especially road construction and use would cause adverse effects to wildlife and wildlife habitat. Management prescriptions for the locations of rights-of-way in identified windows and transportation planning would reduce these effects.	Rights-of-way construction and use, especially road construction and use would cause adverse effects to wildlife and wildlife habitat. Management prescriptions for the locations of rights-of-way in identified windows and transportation planning would reduce these effects to a lesser extent than the Preferred Alternative.	Rights-of-way construction and use, especially road construction and use would cause adverse effects to wildlife and wildlife habitat. Management prescriptions for the locations of rights-of-way in identified windows and transportation planning would not reduce these effects as much as the other alternatives.	Rights-of-way construction and use, especially road construction and use would cause adverse effects to wildlife and wildlife habitat. Management prescriptions for the locations of rights-of-way in identified windows and transportation planning would reduce these effects to a greater extent than the Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
WILDLIFE (continued)	Pursuing withdrawals for portions of the planning area, particularly for parturition areas, would benefit wildlife and wildlife habitat.	Fewer withdrawals would be pursued than for the Preferred Alternative, providing fewer benefits for wildlife and wildlife habitat.	Same as No Action Alternative.	Pursuing withdrawals for portions of the planning area, particularly for parturition areas, would benefit wildlife and wildlife habitat to the greatest extent under this alternative as more areas would be withdrawn.
	Livestock grazing management prescriptions for conversions, water developments, and utilization levels would benefit wildlife and wildlife habitat.	Fewer livestock grazing management prescriptions for conversions, and utilization levels would benefit wildlife and wildlife habitat to a lesser extent than the Preferred Alternative.	Livestock grazing management prescriptions for conversions, water developments, and utilization levels would provide the least benefit wildlife and wildlife habitat of any alternative.	Livestock grazing management prescriptions for conversions, water developments, and utilization levels would provide the greatest benefit to wildlife and wildlife habitat of all alternatives.
	Substantial progress would be expected in improving trends in riparian/wetland areas and achieving Desired Plant Community objectives with the application of mitigation measures and guidelines proposed in this alternative.	Under this alternative, currently, all possible mitigation measures to correct problems in riparian/wetland areas would not be applied. With the assumptions of this alternative in effect, reversing the downward trends or correcting the problems in the riparian areas might be achievable but the progress may be very slow in coming and not constitute a “significant” rate.	Same as No Action Alternative.	Assumptions under this alternative require very stringent mitigation measures and “tools” to be applied that protect and/or correct adverse conditions in riparian/wetland areas (and thus fishery habitat). Progress in reversing downward trends and achieving the Desired Plant Community objectives would be expected to be very rapid.
	Surface mining exploration activity could result in an irreversible irretrievable loss of wetlands and springs, and although mitigation occurs, the original site would be lost.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
WILDLIFE (Core)	Closing portions of the core area to surface disturbing activities would reduce the potential for habitat fragmentation, animal displacement, and provide protection for some of the most crucial habitats, such as elk and deer wintering and parturition areas. Benefits would be somewhat less than the No Action Alternative but greater than Alternative A.	The entire core area would be closed to surface disturbing and disruptive activities. The greatest benefits would occur to wildlife and wildlife habitat in the core area under this alternative.	A larger portion of the core area would be open to surface disturbing and disruptive activities. The greatest adverse effects would occur to wildlife and wildlife habitat under this alternative.	Limiting surface disturbing and disruptive activities in the core area would benefit wildlife and wildlife habitat. These benefits would be somewhat less than the No Action Alternative but greater than for Alternative A.
WILDLIFE (Cumulative)	The effects to wildlife habitat would be lessened somewhat from Alternative A mostly due to transportation planning, and management prescriptions for oil and gas leasing, livestock grazing management, and surface disturbing and disrupting activities. However, the capability of crucial habitats to support some herd objective numbers for big game would still be adversely affected.	The combined effects of habitat fragmentation, access, surface and human disturbances, livestock grazing management practices, and increased recreation could adversely affect the capability of crucial habitats to support herd objective numbers in some areas.	The effects would be greatest for this alternative. Fewer prescriptions for habitat protection would be applied, which would have a direct effect on the ability of a crucial winter range to support population objectives, especially for elk.	The effects would be lessened from those described for Alternative A and the Preferred Alternative due to transportation planning, fewer developments, and management prescriptions for livestock grazing. However, the combined effects of habitat fragmentation, access, surface and human disturbances and availability of forage could still affect the capability of some crucial habitats to support herd objective numbers.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<p>WILDLIFE (Cumulative) (continued)</p>	<p>Conducting a resource evaluation of activities prior to issuing oil and gas leases or other actions in crucial habitats would benefit wildlife resources. Activity could occur on existing leases which could have some adverse effects on wildlife resources.</p>	<p>Not conducting a resource evaluation of activities prior to issuing oil and gas leases or other actions in crucial habitats would have no effect on wildlife resources in the core area as no additional areas would be leased and no activity would occur under this alternative. Wildlife resources in the core would benefit the most under this alternative. However, activities could be concentrated outside the core area which could adversely affect the capability of crucial habitats to support herd objective numbers in some areas.</p>	<p>Not conducting a resource evaluation of activities prior to issuing oil and gas leases or other actions in crucial habitats could adversely affect wildlife resources to the greatest extent under this alternative. New leases would be issued and activity would occur on existing leases providing for the most development activity to take place.</p>	<p>A resource evaluation would not be conducted prior to issuing oil and gas leases or other actions in crucial habitats which could adversely affect wildlife resources. However, limitations on new activities such as leasing and livestock grazing improvements would provide the greatest benefit to wildlife resources.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
DESIGNATED SPECIAL MANAGEMENT AREAS				
Greater Sand Dunes ACEC Western Portion	No impacts are anticipated with implementation of the prescribed management actions and restrictions, and with implementation of the Interim Management Guidelines for Lands Under Wilderness Review.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
Greater Sand Dunes ACEC Eastern Portion	Management prescriptions would minimize effects to geological, cultural, visual, and wildlife habitat. Effects from mineral development, rights-of-way construction, ORV use, and residual effects would be minor but would include:	Same as Preferred Alternative.	Adverse effects would occur to geological, cultural, and visual values and wildlife habitat. Additional impacts would occur from increased mineral development and rights-of-way construction. Off-road vehicle use would be reduced on 5,000 acres and residual effects would include:	Same as Preferred Alternative.
	-Seasonal displacement of elk and deer through ORV activity.	-Same as Preferred Alternative.	-Same as Preferred Alternative.	-Seasonal displacement of elk, deer, and wild horses through ORV activity.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<p><i>Greater Sand Dunes ACEC Eastern Portion (continued)</i></p>	<p>-Additional development on existing leases in the Sand Dunes ACEC would have a direct effect on the ability of the area to support deer and elk. This would place more importance on other undeveloped areas such as Steamboat Rim. Displacement of deer and elk into smaller habitat locations would increase competition and could lead to deterioration of these areas.</p>	<p>-No additional development would result in no direct effects to deer and elk distribution.</p>	<p>-The effects to deer and elk distribution would be greatest under this alternative.</p>	<p>-Same as Preferred Alternative.</p>
	<p>-Reductions in the visual integrity of the Greater Sand Dunes area through surface facilities (e.g., pump jacks, tanks, dehydrators, etc.) associated with the development of new oil and gas wells.</p>	<p>-No reductions in visual integrity through surface facilities associated with development would occur.</p>	<p>-Reductions in visual integrity through surface facilities associated with the development of new oil and gas wells. This would affect the ability to retain the scenic quality for the area.</p>	<p>-Same as Preferred Alternative.</p>
	<p>-An increase in safety hazards to ORV users through the development of oil and gas related surface facilities (e.g., pipelines, snow fencing, etc.). This alternative would be less hazardous to off-road vehicle users than Alternative A.</p>	<p>-No increases in safety hazards would occur.</p>	<p>-Although 5,000 acres may not be open to off-road vehicle use, there would still be an increase in safety hazards to ORV users through the development of oil and gas related surface facilities (e.g., pipelines, snow fencing, etc.).</p>	<p>-Effects would be less than the Preferred Alternative or Alternative A.</p>

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<i>Greater Sand Dunes ACEC Eastern Portion (continued)</i>	-Trampling and use of dune ponds and adjacent riparian habitat by livestock would continue in the short term.	-Same as Preferred Alternative.	-Same as Preferred Alternative.	-Same as Preferred Alternative.
	Beneficial effects realized through the implementation of the proposed management prescriptions include:	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	-Protection of sensitive cultural resource sites.	-Same as Preferred Alternative.	-Same as Preferred Alternative.	-Same as Preferred Alternative.
	-Protection of the structures and historical setting of the Crookston Ranch.	-Same as Preferred Alternative.	-Same as Preferred Alternative.	-Same as Preferred Alternative.
	-Protection of Native American religious and important geological values.	-Same as Preferred Alternative.	-Same as Preferred Alternative.	-Same as Preferred Alternative.
	-Maintaining forage and native plant composition for wildlife.	-Same as Preferred Alternative.	-Maintaining some forage and native plant composition for wildlife.	-Same as Preferred Alternative.
<i>Greater Sand Dunes ACEC (Cumulative)</i>	No additional effects would occur.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
<i>Oregon Buttes ACEC</i>	The natural values of the ACEC would benefit from resource management actions.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
<i>Oregon Buttes ACEC (Cumulative)</i>	No additional effects would occur.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<i>South Pass Historic Landscape ACEC</i>	Adverse effects to historical and scenic resources from surface disturbing activities would be reduced by implementation of management actions.	Surface disturbing activities would adversely affect historical and scenic resources more than in the Preferred Alternative.	Same as No Action Alternative.	Same as Preferred Alternative.
	Requiring proposed communication sites on Pacific Butte to conform with prescriptions in place for the South Pass Historic Landscape would greatly enhance BLM efforts to manage and protect certain classes of heritage resources and especially the South Pass Historic Landscape viewshed. The Green River RMP and other management document prescriptions would significantly enhance BLM efforts to manage and protect heritage resources of all kinds.	Closing Pacific Butte as a possible communication site would greatly enhance BLM efforts to manage and protect certain classes of heritage resources and especially the South Pass Historic Landscape viewshed. The Green River RMP and other management document prescriptions would significantly enhance BLM efforts to manage and protect heritage resources of all kinds.	Allowing Pacific Butte to remain open for consideration of communication sites would significantly diminish BLM efforts to manage and protect certain classes of heritage resources, especially the South Pass Historic Landscape viewshed. The Green River RMP and other management document prescriptions would significantly enhance BLM efforts to manage and protect heritage resources of all kinds.	Same as No Action Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
South Pass Historic Landscape ACEC (continued)	Given standard BLM mitigation measures actions related to Air Quality Management, Cultural Resource Management, Fire, Hazardous Materials, Coal Exploration, Sodium Leasing, Leasable Minerals, Mineral Materials, Geophysical Activities, Reclamation and Monitoring, Recreation Management, Riparian/Wetlands, Special Management Areas, Vegetation/Woodlands/Weeds, Visual Resource Management, Watershed/Water Quality Management, Wild Horses, and Wildlife would have little, no, or slightly beneficial impacts on the South Pass Historic Landscape.	Same as Preferred Alternative.	Generally, actions taken under Alternative A are slightly less beneficial to the South Pass Historic Landscape than the other alternatives.	Generally, actions taken under Alternative B are slightly more beneficial to the South Pass Historic Landscape than the other alternatives.
	Management prescriptions for the locatable mineral activity would reduce adverse effects to the landscape. Closure to mineral location and entry under the land laws of 4,790 acres would preclude mineral location and disposal, and benefit cultural and historical resources in the landscape.	Locatable mineral activity could create adverse effects to the landscape and cultural and historical values.	Same as No Action Alternative.	Same as Preferred Alternative.
	Exclusion and avoidance areas would protect the visual integrity of the National Historic Trails corridor.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<i>South Pass Historic Landscape ACEC (Cumulative)</i>	Impacts upon the visual integrity of historic trails would be the same as for the general area.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
<i>Special Status (Candidate) Plant Species Management</i>	Wildfire, livestock concentration areas, increased recreation use, and trampling by wild horses could cause adverse impacts to actual plant populations and potential habitat.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	Management actions for off-road vehicle use, geophysical activities, and fire suppression within the habitat area would reduce impacts to plant populations.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	Closure to mineral location and entry under the land laws would reduce effects associated with locatable mineral development and exploration.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	The Special Status Plant Species ACEC would not be expanded by 2,660 acres. These acres would remain avoidance area for rights-of-way.	Same as Preferred Alternative.	Same as Preferred Alternative.	The Special Status Plant Species ACEC would be expanded by 2,660 acres to include <u>Lesquerella macrocarpa</u> . These acres would be exclusion areas for rights-of-way.
<i>Special Status (Candidate) Plant Species Management (Cumulative)</i>	No additional effects would occur to special status plant species areas.	Same as Preferred Alternative.	Same as Preferred Alternative.	Some additional benefits would occur from including 2,660 acres in the Special Status Plant ACEC. These acres would be exclusion areas for rights-of-way.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
Steamboat Mountain ACEC	Surface disturbing activities would take place but at a reduced rate from Alternative A. Management of the area could protect wildlife values and reduce impacts to the elk and deer herds if mitigation took place.	Surface disturbing activities would not take place and displacement of the Sands elk and deer herds on Steamboat Mountain would not occur.	Surface disturbing activities would result in loss of wildlife habitat and displacement of the Sands elk and deer herds on Steamboat Mountain.	Adverse effects from surface disturbance activities would be less than for the Preferred Alternative since the area would be closed to mineral leasing.
	Closure to mineral location and entry under the lands laws of up to 960 acres would benefit wildlife habitat but could adversely affect the opportunity for development of locatable minerals.	Closure to mineral location and entry under the lands laws would not occur which would adversely affect wildlife habitat but could adversely affect benefit the opportunity for development of locatable minerals.	Same as No Action Alternative.	Closure to mineral location and entry under the land laws of up to 43,310 acres would benefit wildlife habitat but could adversely affect the opportunity for development of locatable minerals.
	Effects from not expanding the ACEC would be somewhat less beneficial than Alternative B. However, management prescriptions for this alternative would still provide protection for resources in the core area.	Same as Preferred Alternative.	Effects from not expanding the ACEC would be less beneficial than Alternative B. Management prescriptions for this alternative would provide less protection for resources in the core than the other alternatives.	Expanding the ACEC boundary to include the core area outside existing ACECs (to 65,610 acres) would provide some additional protection to the expanded area through application of ACEC management prescriptions.
Steamboat Mountain ACEC (Cumulative)	With additional management prescriptions applied, impacts would be reduced from Alternative A for the elk herd. However, similar effects would still occur to the deer herd due to development activities and intrusions into the few areas that offer good fawning, and competition with elk for parturition and winter use areas.	Beneficial effects would occur due to management prescriptions preventing surface disturbance and new roads and access. Maintenance of elk herd objectives would be very likely.	Development activities, human disturbance, competition with live-stock, and access into remote areas would significantly affect the ability of the habitat in this area to support deer and elk herd objective levels.	Due to additional management prescriptions preventing new disturbances and access, impacts would be reduced from Alternative A. The ability to meet herd objectives would not be significantly affected.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
<i>White Mountain Petroglyphs ACEC</i>	The existing withdrawal would be retained to protect cultural values which would protect the area from adverse effects associated with locatable mineral exploration and development.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	Management prescriptions for surface disturbing activities applied to ½ mile surrounding the rock art site (petroglyphs) would increase benefits to the visual integrity and traditional cultural values.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative. In addition, closing the area to fluid mineral leasing would provide additional protection.
<i>White Mountain Petroglyphs ACEC (Cumulative)</i>	No additional effects would occur.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-1 (continued)

AFFECTED RESOURCE	PREFERRED ALTERNATIVE	NO ACTION ALTERNATIVE	ALTERNATIVE A	ALTERNATIVE B
OTHER MANAGEMENT AREAS				
<i>Red Desert Watershed Management Area</i>	Management prescriptions would allow some development activities which could cause localized adverse effects; however, these would not have a significant impact on the watershed.	Same as Preferred Alternative.	Management prescriptions would allow the most development activities which would cause localized adverse effects greater than for all the alternatives.	Same as Preferred Alternative.
	Adverse effects to visual values from construction of facilities could occur, particularly in VRM Class II areas. Effects are expected to be minimal as most activity would occur adjacent to the area.	Same as Preferred Alternative.	Same as Preferred Alternative.	Increased benefits to visual values would occur from managing the entire area as a VRM Class II.
<i>Red Desert Watershed Management Area (Cumulative)</i>	No additional effects would occur relative to the Red Desert Watershed Management Area.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.

TABLE 4-2 VISIBILITY IMPAIRMENT IN SENSITIVE AREAS IN THE JACK MORROW HILLS REGION				
Sensitive Area	PSD Designation	# days > 0.5 dV	# days > 1.0 dV	Maximum dV
Bridger Wilderness Area	I	9	0	0.9
Fitzpatrick Wilderness Area	I	2	0	0.7
Washakie Wilderness Area	I	0	0	0.4
Grand Teton National Park	I	0	0	0.4
Popo Agie Wilderness Area	II	2	0	0.6
Wind River Roadless Area	II	2	0	0.7

**TABLE 4-3
SUMMARY OF RIGHTS-OF-WAY AVOIDANCE AND EXCLUSION AREAS
PREFERRED ALTERNATIVE¹**

Right-of-Way Avoidance Areas	Estimated Acres²
Back Country Byway Interpretive Sites	10
Big Sagebrush/scurfpea vegetation associations and mountain shrub communities	21,500
Boars Tusk ³	90
Connectivity Area	140,380
Core Area, including Steamboat Mountain ACEC	80,410
Crookston Ranch ³	40
Historic Trails and Expansion Era Roads (1/4 mile) ^{3,4}	17,890
Greater Sand Dunes ACEC (and lands within 1 mile or visual horizon) ³	70,850
Greater Sand Dunes ACEC (developed recreation sites, ORV parking lot)	50
Native American areas of concern (1 mile to 2.5 miles)	28,470
Paleosol deposition area (individual sites) ⁵	18,200
Rock Art Sites (1/2 mile) ⁶	280
Sage Grouse Lek (1/4 mile buffer) ³	8,170
South Pass Historic Landscape ACEC (not visible within landscape boundary) ³	22,190
Special Status Plants (actual sites) ^{3,7}	2,680
Special Status Plants (potential sites) ^{3,7}	4,970
White Mountain Petroglyphs (Vista) ^{3,6}	480
Estimated Total	416,660
Right-of-Way Exclusion Areas	
South Pass Historic Landscape ACEC (visible within landscape boundary) ³	23,640
Steamboat Mountain ACEC (communication sites)	43,310
Oregon Buttes ACEC ³	3,450
Continental Peak (communication sites)	90
Indian Gap	690
Face of Steamboat Mountain	9,400
Tri-Territory Marker ³	10
White Mountain Petroglyphs ^{3,6}	20
Estimated Total	80,610

¹ In accordance with transportation planning.

² Actual acreage to be determined.

³ Established in the Green River RMP (USDI 1997).

⁴ Managed in their historical context.

⁵ Only those cultural properties discovered within the identified area would be avoided by 100 feet.

⁶ Petroglyphs and vistas total 760 acres.

⁷ The actual plant sites are closed to surface disturbing rights-of-way. The existing two-track roads could be considered for non-surface disturbing uses.

**TABLE 4-4
SUMMARY OF WITHDRAWALS TO BE PURSUED
PREFERRED ALTERNATIVE**

Site	Estimated Acres ¹	Existing Withdrawal Overlap ²
Crookston Ranch ³	40	
Cultural Site	320	
Elk Calving Areas (2 northern areas)	7,440	Coal
Greater Sand Dunes ACEC ³ (Western portion)	23,850	
Native American Respected Places (White Mountain and Steamboat)	280	
Public Water Reserve ³	5,900	
South Pass Historic Landscape ³	4,790	Coal
Special Status Plant Species ³	2,680	Coal
Steamboat Mountain Area	960	Coal
Tri-Territory Marker ³	10	
Estimated Total	46,270	

¹ Actual withdrawal acreage to be determined.

² Data is unavailable at this time to delineate the actual overlap with existing withdrawals identified for revocation in the Green River RMP.

³ Established in the Green River RMP (USDI 1997).

**TABLE 4-5
SUMMARY OF AREAS CLOSED TO COAL EXPLORATION AND SODIUM PROSPECTING
PREFERRED ALTERNATIVE**

Areas Closed	Estimated Acres
Boars Tusk ¹	90
Crookston Ranch ¹	40
Floodplains ^{1,2}	41,170
NSO areas ³	29,710
Oregon Buttes ACEC ¹	3,450
Petroglyphs: White Mountain (1/2 mile vista) ¹	480
Raptor Nesting ¹	83
Sage Grouse Leks (1/4 mile buffer) ¹	8,170
South Pass Historic Landscape ¹	23,640
Special Status Plant Species Sites ¹	2,680
Steamboat Mountain Area (outside area with coal recommendation) ¹	33,530
Tri-Territory Marker ¹	10
Wilderness Study Areas ¹	117,060
Estimated Total ⁴	227,600

¹ Established in the Green River RMP (USDI 1997)

² Floodplains, wetlands, riparian areas, floodplains, waters, and the area within 500 feet

³ Exploration activities would be limited to existing roads and trails

⁴ Acres do not add due to overlap of NSO areas, Boars Tusk, Crookston Ranch, floodplains, ACECs, and WSAs. There are about 32,513 acres of overlap.

**TABLE 4-6
SUMMARY OF AREAS CLOSED TO MINERAL MATERIAL SALES
PREFERRED ALTERNATIVE**

Areas Closed	Estimated Acres
Boars Tusk ¹	90
Crookston Ranch ¹	40
Crucial habitats and other sensitive resource values	29,380
Elk Calving Areas	58,890
Mountain Sagebrush Communities (including sagebrush/scurfpea communities)	21,500
Occupied Raptor Nests ¹	83
Oregon Buttes ACEC ¹	3,450
Rock Art Sites (including White Mountain Petroglyphs ACEC) ¹	480
Sand Dunes ACEC ¹	38,650
South Pass Historic Landscape ¹	4,790
South Pass Historic Landscape (in the Vista and not including the above noted 4,790 acres) ¹	18,850
Special Status Plant Species Sites ¹	2,680
Steamboat Mountain ACEC ^{2,3}	1,710
Wilderness Study Areas ¹	117,060
Estimated Acres⁴	235,100

NOTE: Surface collecting (picking materials off the ground by hand) would be considered in these areas on a case-by-case basis.

¹ Established in the Green River RMP (USDI 1997)

² Top of Steamboat Mountain would be closed (lava material only). No pits would be developed in the Steamboat Mountain ACEC.

³ Mineral material disposal would only occur when in support of project development in this area and the core area. Appropriate mitigation would be applied to insure this activity would not detract from the important resource values of the respective areas. New road construction and upgrading of existing roads for mineral material extraction would only be allowed if in accordance with transportation planning.

⁴ Acres do not add due to overlap of WSAs, ACECs, special status plants, elk calving areas, crucial habitats and other sensitive resource values, Crookston Ranch, and Boars Tusk. There are about 62,553 acres of overlap.

**TABLE 4-7
SUMMARY OF AREAS CLOSED TO GEOPHYSICAL VEHICLES & EXPLOSIVE CHARGES
PREFERRED ALTERNATIVE and ALTERNATIVE B**

Areas Closed	Estimated Acres
Boars Tusk ¹	90
Core Area ²	80,410
Cultural Site	320
NSO Areas ²	56,550
Special Status Plant Species Locations	2,680
Crookston Ranch ¹	40
White Mountain Petroglyphs ¹	480
Wilderness Study Areas ¹	117,060
Estimated Total³	245,580

¹ Established in the Green River RMP (USDI 1997)

² Exploration activities without the use of explosive charges could occur on existing roads and trails in conformance with transportation planning.

³ Acres do not add due to overlap of core area, NSO areas, Boars Tusk, Crookston Ranch, and WSAs. There are about 12,050 acres of overlap.

**TABLE 4-8
ECONOMIC ASSUMPTIONS FOR OIL AND GAS DEVELOPMENT**

	Oil & Gas Wells		Coalbed Methane Wells		
	Drilled & Completed	Drilled & Abandoned	Drilled & Completed (Deep)	Drilled & Abandoned (Deep)	Drilled & Completed (Shallow)
Expenditures (1)	\$567,600	\$277,800	\$500,000	\$244,700	\$65,000
Total Impact (1)	\$774,600	\$377,700	\$682,400	\$332,800	\$88,705
Earnings (1)	\$119,500	\$57,600	\$105,300	\$50,800	\$13,685
Jobs – AJE* (1)	4.395	2.121	3.872	1.869	0.503

* Annual Job Equivalent (AJE)
Source: Southwest Wyoming Resource Evaluation, Socio/Economic Evaluation, 1997

**TABLE 4-9
DRILLING PROJECTIONS FOR OIL AND GAS DEVELOPMENT**

Alternative	Oil & Gas Wells		Coalbed Methane Wells		
	Drilled & Completed	Drilled & Abandoned	Drilled & Completed (Deep)	Drilled & Abandoned (Deep)	Drilled & Completed (Shallow)
No Action (1998-2007)	17	15	5	5	15
No Action (1998-2017)	34	30	5	5	15
Alternative A (1998-2007)	25	23	5	5	15
Alternative A (1998-2017)	53	47	5	5	15
Alternative B (1998-2007)	12	10	3	2	15
Alternative B (1998-2017)	24	21	3	2	15
Preferred (1998-2007)	16	15	3	2	15
Preferred (1998-2017)	34	31	3	2	15

Source: Jack Morrow Hills CAP Reasonable Foreseeable Development Scenario, 1997

**TABLE 4-10
ECONOMIC ASSUMPTIONS FOR OIL AND GAS PRODUCTION**

	Crude Oil (Barrel)	Natural Gas (MMCF)
Value of Production (1)	\$15.00	\$1,750.00*
Total Impact (2)	\$23.16	\$2,363.38
Earnings (2)	\$2.50	\$188.14
Jobs - AJE (2)	0.000072	0.005387
LG Revenue (2)	\$1.00	\$107.38

*The value of production for natural gas is based on a price of \$1.75 per MCF.

Sources:

- (1) CREG, Wyoming State Government Revenue Forecast, January 1999;
- (2) Southwest Wyoming Resource Evaluation, Socio/Economic Evaluation, 1997.

**TABLE 4-11
OIL AND GAS PRODUCTION PROJECTIONS**

Alternative	Oil (Barrels)	Gas (MMCF)
No Action (1998-2007)	62,244	45,007.2
No Action (1998-2017)	116,415	84,177.0
Alternative A (1998-2007)	66,573	48,137.4
Alternative A (1998-2017)	137,592	99,489.6
Alternative B (1998-2007)	58,734	42,469.2
Alternative B (1998-2017)	104,130	75,534.2
Preferred (1998-2007)	61,308	44,330.4
Preferred (1998-2017)	115,722	83,669.4

Source: Jack Morrow Hills CAP Reasonable Foreseeable Development Scenario

**TABLE 4-12
ECONOMIC ASSUMPTIONS FOR LIVESTOCK GRAZING**

	Cattle Grazing (Per AUM)	Sheep Grazing (Per AUM)
Production (1)	\$33.27	\$22.82
Total Impact (2)	\$65.07	\$41.16
Earnings (2)	\$11.81	\$8.99
Jobs (2)	0.000710	0.000639
LG Revenue (3)	\$1.88	\$1.44

Sources:

- (1) Five-year average derived from Wyoming Agricultural Statistic, 1993-97
- (2) Updated from Southwest Wyoming Resource Evaluation, Socio/Economic Evaluation, 1997.
- (3) Estimated.

**TABLE 4-13
ECONOMIC ASSUMPTIONS FOR RECREATION**

	Elk Hunters (Per Day)	Deer Hunters (Per Day)	Antelope Hunters (Per Day)	Non-consumptive Recreation
Expenditures (1)	\$239.40	\$139.06	\$239.62	\$55.00
Total Impact (2)	\$330.69	\$181.06	\$331.25	\$80.78
Earnings (2)	\$47.28	\$21.09	\$45.59	\$13.16
Jobs (2)	0.003307	0.001525	0.003214	0.001051
LG Revenue (3)	\$3.69	\$1.85	\$3.85	\$1.33
Net Econ Value (4)	\$41.46	\$41.46	\$41.46	\$26.57

Sources:

- (1) Wyoming Game and Fish Department, Annual Report, 1998 for hunting and Wyoming Division of Tourism, Region 2, 1997 for non-consumptive.
- (2) Updated from Southwest Wyoming Resource Evaluation, Socio/Economic Evaluation.
- (3) Estimated
- (4) USDA Forest Service, Intermountain Region, 1999.

**TABLE 4-14
SHORT-TERM CUMULATIVE PHYSICAL OUTPUTS (1998-2007)**

	No Action Alternative	Alternative A	Alternative B	Preferred Alternative
Oil & Gas Wells Drilled	32	48	22	31
Oil & Gas Wells Completed	17	25	12	16
Oil Production (BBLs)	62,244	66,573	58,734	61,308
Gas Production (MMCF)	45,007.2	48,137.4	42,469.2	44,330.4
Coalbed Wells Drilled	25	25	20	20
Coalbed Wells Completed	20	20	18	18
Livestock Grazing (AUM)	195,350	260,320	98,510	179,410
Nonresident Hunting Days	9,520	9,589	9,520	9,589
Resident Hunting Days	35,760	36,140	35,760	36,140
NRNC Rec Days	349,844	334,268	349,844	349,844
Resident NC Rec Days	183,408	175,242	183,408	183,408
Oil & Gas Wells Drilled	100.0%	150.0%	68.8%	96.9%
Oil & Gas Wells Completed	100.0%	147.1%	70.6%	94.1%
Oil Production (BBLs)	100.0%	107.0%	94.4%	98.5%
Gas Production (MMCF)	100.0%	107.0%	94.4%	98.5%
Coalbed Wells Drilled	100.0%	100.0%	80.0%	80.0%
Coalbed Wells Completed	100.0%	100.0%	90.0%	90.0%
Livestock Grazing (AUM)	100.0%	133.3%	50.4%	91.8%
Nonresident Hunting Days	100.0%	100.7%	100.0%	100.7%
Resident Hunting Days	100.0%	101.1%	100.0%	101.1%
NRNC Rec Days	100.0%	95.5%	100.0%	100.0%
Resident NC Rec Days	100.0%	95.5%	100.0%	100.0%

**TABLE 4-15
SHORT-TERM CUMULATIVE ECONOMIC EFFECTS (1998-2007)**

	No Action Alternative	Alternative A	Alternative B	Preferred Alternative
Direct Impacts	\$125,931,969	\$139,443,420	\$112,376,699	\$121,921,014
Total Impacts	\$176,547,748	\$195,991,237	\$156,320,910	\$170,781,215
Total Earnings	\$19,771,046	\$23,321,742	\$16,925,705	\$18,974,740
Total Employment (AJE)	923.9	1,022.4	796.2	891.4
Local Govt. Revenue	\$5,753,214	\$6,190,458	\$5,300,248	\$5,650,018
Resident Recreation	\$6,355,755	\$6,154,552	\$6,355,755	\$6,371,517
Direct Impacts	100.0%	110.7%	89.2%	96.8%
Total Impacts	100.0%	111.0%	88.5%	96.7%
Total Earnings	100.0%	118.0%	85.6%	96.0%
Total Employment (AJE)	100.0%	110.7%	86.2%	96.5%
Local Govt. Revenue	100.0%	107.6%	92.1%	98.2%
Resident Recreation	100.0%	96.8%	100.0%	100.2%

**TABLE 4-16
LONG-TERM CUMULATIVE PHYSICAL OUTPUTS (1998-2017)**

	No Action Alternative	Alternative A	Alternative B	Preferred Alternative
Oil & Gas Wells Drilled	64	100	45	65
Oil & Gas Wells Completed	34	53	24	34
Oil Production (BBLs)	116,415	137,592	104,130	115,722
Gas Production (MMCF)	84,177.0	99,489.6	75,534.2	83,669.4
Coalbed Wells Drilled	25	25	20	20
Coalbed Wells Completed	20	20	18	18
Livestock Grazing (AUM)	390,700	520,640	197,020	358,820
Nonresident Hunting Days	19,040	19,070	19,040	19,070
Resident Hunting Days	71,520	71,686	71,520	71,686
NRNC Rec Days	776,301	703,507	776,301	776,301
Resident NC Rec Days	406,981	368,818	406,981	406,981

Oil & Gas Wells Drilled	100.0%	156.3%	70.3%	101.6%
Oil & Gas Wells Completed	100.0%	155.9%	70.6%	100.0%
Oil Production (BBLs)	100.0%	118.2%	89.4%	99.4%
Gas Production (MMCF)	100.0%	118.2%	89.7%	99.4%
Coalbed Wells Drilled	100.0%	100.0%	80.0%	80.0%
Coalbed Wells Completed	100.0%	100.0%	90.0%	90.0%
Livestock Grazing (AUM)	100.0%	133.3%	50.4%	91.8%
Nonresident Hunting Days	100.0%	100.2%	100.0%	100.2%
Resident Hunting Days	100.0%	100.2%	100.0%	100.2%
NRNC Rec Days	100.0%	90.6%	100.0%	100.0%
Resident NC Rec Days	100.0%	90.6%	100.0%	100.0%

**TABLE 4-17
LONG-TERM CUMULATIVE ECONOMIC EFFECTS (1998-2017)**

	No Action Alternative	Alternative A	Alternative B	Preferred Alternative
Direct Impacts	\$241,042,651	\$283,759,214	\$209,623,136	\$237,640,262
Total Impacts	\$338,894,815	\$398,767,593	\$292,630,396	\$333,642,985
Total Earnings	\$38,446,126	\$45,144,903	\$32,491,821	\$37,670,140
Total Employment (AJE)	1,860.1	2,078.0	1,600.5	1,860.2
Local Govt. Revenue	\$10,973,457	\$12,776,687	\$9,679,263	\$10,858,691
Resident Recreation	\$13,778,703	\$12,771,602	\$13,778,703	\$13,785,583
Direct Impacts	100.0%	117.7%	87.0%	98.6%
Total Impacts	100.0%	117.7%	86.3%	98.5%
Total Earnings	100.0%	117.4%	84.5%	98.0%
Total Employment (AJE)	100.0%	111.7%	86.0%	100.0%
Local Govt. Revenue	100.0%	116.4%	88.2%	99.0%
Resident Recreation	100.0%	92.7%	100.0%	100.0%

TABLE 4-18 WATERSHED ANALYSIS SUMMARY	
Watershed	Comments
Nitch Creek (J2NC . .) ¹	Four of the 48 sub watersheds listed in Appendix 10 as having the highest percentage disturbance, excluding tables A and B, were in Nitch Creek. The watershed has stabilized sand dunes, that are sensitive to disturbance. It is located within a known gas producing area and also has a potential for coal and methane development.
Jack Morrow Creek (J1JM . .) ²	Seven of the 48 sub watersheds listed in Appendix 10 as having the highest percentage disturbance, excluding tables A and B, were in Jack Morrow Creek. The Proper Functioning Condition (PFC) survey of the main channel of Jack Morrow Creek showed 18 miles of stream in an at Risk condition with an apparent upward trend and 2 miles in an At Risk condition with an apparent downward trend. This indicates a stream that is in a situation that is sensitive to disturbance.
Pacific Creek (J1PC . .) ³	Eleven of the 48 sub watersheds listed in Appendix 10 as having the highest percentage disturbance, excluding tables A and B, were in Pacific Creek. The Proper Functioning Condition (PFC) survey of Pacific Creek showed 1.5 miles had achieved or exceeded the minimal condition of PFC, 1.2 miles of stream in an At Risk condition with an apparent upward trend, 4 miles in an At Risk condition with no apparent trend, and 13 miles in an At Risk condition with an apparent downward trend. The tributaries to Pacific Creek showed similar conditions. This indicates that Pacific Creek is sensitive to disturbance.

¹ Nitch Creek is a tributary to Killpecker Creek (J2KP...). Several of the subwatersheds of Killpecker Creek have similar soils and similar concerns with development.

² Jack Morrow Creek is a tributary to Pacific Creek (J1PC...). Tributaries to Jack Morrow include South Pack Saddle Creek (J1SPC...), Rock Cabin Creek (J1RCC...), Box Canyon Creek (J1BXC...), Johnson Canyon (J1JC...), LaFonte Canyon (J1LAF...), and Parnell Creek (J1PAR...).

³ Tributaries to Pacific Creek include: Jack Morrow Creek (J1JM...), North Pacific Creek (J1NPC...), North Pack Saddle Creek (J1NPS...), Alkali Creek (J1AKC...), Alkali Wash (J1AKW...), and White Horse Creek (J1WH...).

**TABLE 4-19
SUMMARY OF RIGHTS-OF-WAY AVOIDANCE AND EXCLUSION AREAS
NO ACTION ALTERNATIVE**

Right-of-Way Avoidance Areas	Estimated Acres¹
Boars Tusk ²	90
Crookston Ranch ²	40
Historic Trails and Expansion Era Roads ^{2,3} (1/4 mile)	17,890
Greater Sand Dunes ACEC (and lands within 1 mile or visual horizon) ²	70,850
Native American areas of concern (100 feet)	42
Paleosol deposition area (100 feet of individual sites) ⁴	18,200
Sage Grouse Leks (1/4 mile buffer) ²	8,170
South Pass Historic Landscape ACEC ² (not visible within landscape boundary)	22,190
Special Status Plants (actual sites) ^{2,5}	2,680
Special Status Plants (potential sites) ^{2,5}	4,970
Steamboat Mountain ACEC ²	43,310
White Mountain Petroglyphs (Vista) ²	480
Estimated Total	188,912
Right-of-Way Exclusion Areas	
South Pass Historic Landscape ACEC ² (visible within landscape boundary)	23,640

Steamboat Mountain ACEC (Communication sites)	43,310
Oregon Buttes ACEC ²	3,450
Continental Peak (Communication sites)	90
Tri-Territory Marker ²	10
White Mountain Petroglyphs ²	20
Estimated Total	70,520

¹ Actual acreage to be determined.

² Established in the Green River RMP (USDI 1997).

³ Managed in their historical context.

⁴ Only those cultural properties discovered within the identified area would be avoided by 100 feet.

⁵ The actual plant sites are closed to surface disturbing rights-of-way. The existing two-track roads could be considered for non-surface disturbing uses.

TABLE 4-20
SUMMARY OF WITHDRAWALS TO BE PURSUED¹
NO ACTION ALTERNATIVE and ALTERNATIVE A

Site	Estimated Acres	Existing Withdrawal Overlap
Crookston Ranch	40	
Greater Sand Dunes ACEC	23,870	
Public Water Reserve	5,900	
South Pass Historic Landscape ²	4,790	Coal
Special Status Plant Species	2,680	Oil Shale/Coal
Tri-Territory Marker	10	Coal
Estimated Total	37,290	

¹ Established in the Green River Resource Management Plan (USDI 1997).

² Actual withdrawal acreage to be determined.

TABLE 4-21
SUMMARY OF AREAS CLOSED TO MINERAL MATERIAL SALES¹
NO ACTION ALTERNATIVE

Areas Closed	Estimated Acres
Boars Tusk	90
Crookston Ranch	40
Occupied Raptor Nests	83
Oregon Buttes ACEC	3,450
Rock Art Sites (including White Mountain Petroglyphs ACEC)	480
Sand Dunes ACEC	38,650
South Pass Historic Landscape	4,790
South Pass Historic Landscape (in the Vista and outside the 4,790 of the ACEC)	18,850
Special Status Plant Species Sites	2,680
Steamboat Mountain ACEC	43,310
Wilderness Study Areas	117,060
Estimated Acres²	207,850

NOTE: Surface collecting (picking materials off the ground by hand) would be considered in these areas on a case-by-case basis.

¹ Established in the Green River RMP (USDI 1997).

² Acres do not add due to overlap of WSAs, ACECs, special status plants, Crookston Ranch, and Boars Tusk. There are about 21,633 acres of overlap.

TABLE 4-22
SUMMARY OF AREAS CLOSED TO GEOPHYSICAL VEHICLES & EXPLOSIVE CHARGES¹
NO ACTION AND ALTERNATIVE A

Areas Closed	Estimated Acres
Boars Tusk	90
Special Status Plant Species Locations	2,680
Crookston Ranch	40
White Mountain Petroglyphs	20
Wilderness Study Areas	117,060
Estimated Total	119,890

¹ Established in the Green River RMP (USDI 1997).

**TABLE 4-23
SUMMARY OF RIGHTS-OF-WAY AVOIDANCE AND EXCLUSION AREAS
ALTERNATIVE A**

Right-of-Way Avoidance Areas	Estimated Acres¹
Back Country Byway Interpretive Sites	10
Boars Tusk ²	90
Crookston Ranch ²	40
Historic Trails and Expansion Era Roads ^{2,3} (1/4 mile)	17,890
Greater Sand Dunes ACEC (& lands within 1 mile or visual horizon) ²	70,850
Native American areas of concern (1/4 mile)	610
Paleosol deposition area (100 feet of individual sites) ⁴	18,200
Sage Grouse LekS (1/4 mile buffer) ²	8,170
South Pass Historic Landscape ACEC ² (not visible within landscape boundary)	22,190
Special Status Plants (actual sites) ^{2,5}	2,680
Special Status Plants (potential sites) ^{2,5}	4,970
White Mountain Petroglyphs (Vista) ²	480
Estimated Total	146,180
Right-of-Way Exclusion Areas	
South Pass Historic Landscape ACEC ² (visible within landscape boundary)	23,640
Oregon Buttes ACEC ²	3,450
Continental Peak (Communication sites)	90
Tri-Territory Marker ²	10
White Mountain Petroglyphs ²	20
Estimated Total	27,210

¹ Actual acreage to be determined.

² Brought forward from the Green River RMP (USDI 1997).

³ Managed in their historical context.

⁴ Only those cultural properties discovered within the identified area would be avoided by 100 feet.

⁵ The actual plant sites are closed to surface disturbing rights-of-way. The existing two-track roads could be considered for non-surface disturbing uses.

TABLE 4-24
SUMMARY OF AREAS CLOSED TO COAL EXPLORATION AND SODIUM PROSPECTING
ALTERNATIVE A¹

Areas Closed	Estimated Acres
Boars Tusk	90
Crookston Ranch	40
Floodplains	41,170
Oregon Buttes ACEC	3,450
Petroglyphs: White Mountain (1/2 mile vista)	480
Raptor Nesting	83
Sage Grouse Leks (1/4 mile buffer)	8,170
South Pass Historic Landscape	23,640
Special Status Plant Species Sites	2,680
Tri-Territory Marker	10
Wilderness Study Areas	117,060
Estimated Total²	188,420

¹ Established in the Green River RMP (USDI 1997).

² Acres do not add due to overlap of Boars Tusk, Crookston Ranch, special status plant species, floodplains, and WSAs. There are about 8,453 acres of overlap.

TABLE 4-25
SUMMARY OF AREAS CLOSED TO MINERAL MATERIAL SALES
ALTERNATIVE A

Areas Closed	Estimated Acres
Boars Tusk ¹	90
Crookston Ranch ¹	40
Occupied Raptor Nests ¹	83
Oregon Buttes ACEC ¹	3,450
Rock Art Sites (including White Mountain Petroglyphs ACEC) ¹	480
Sand Dunes ACEC ¹	38,650
South Pass Historic Landscape ¹	4,790
South Pass Historic Landscape (in the Vista and outside the 4,790 of the ACEC) ¹	18,850
Special Status Plant Species Sites ¹	2,680
Steamboat Mountain ACEC ²	42,770
Wilderness Study Areas ¹	117,060
Estimated Acres³	207,490

NOTE: Surface collecting (picking materials off the ground by hand) would be considered in these areas on a case-by-case basis.

¹ Established in the Green River RMP (USDI 1997).

² A portion of the lava material on Steamboat Mountain proper (in SE1/4 of Section 10; W1/2W1/2 of Section 11; N1/2N1/2 of Section 15; T. 23 N., R. 102 W.) would be available for mineral material disposal. The remainder of the ACEC would be closed to disposal.

³ Acres do not add due to overlap of WSAs, ACECs, special status plants, Crookston Ranch, and Boars Tusk. There are about 21,633 acres of overlap.

TABLE 4-26
SUMMARY OF RIGHTS-OF-WAY AVOIDANCE AND EXCLUSION AREAS
ALTERNATIVE B¹

Right-of-Way Avoidance Areas	Estimated Acres²
Back Country Byway Interpretive Sites	10
Big Sagebrush/scurfpea vegetation associations and mountain shrub communities	21,500
Boars Tusk ³	90
Connectivity Area	140,380
Core Area, including Steamboat Mountain ACEC	80,410
Crookston Ranch ³	40
Historic Trails and Expansion Era Roads (1/4 mile) ^{3,4}	17,890
Greater Sand Dunes ACEC (and lands within 1 mile or visual horizon) ³	70,850
Greater Sand Dunes ACEC (developed recreation sites, ORV parking lot)	50
Native American areas of concern (1 mile)	5,490
Paleosol deposition area (entire area)	18,200
Rock Art Sites (1/2 mile) ⁵	280
Sage Grouse Leaks (1/4 mile buffer) ³	8,170
South Pass Historic Landscape ACEC (not visible within landscape boundary) ³	22,190
Special Status Plants (actual sites) ^{3,6}	2,680
Special Status Plants (potential sites) ^{3,6}	4,970
White Mountain Petroglyphs (Vista) ^{3,5}	480
Estimated Total	393,680
Right-of-Way Exclusion Areas	
South Pass Historic Landscape ACEC (visible within landscape boundary) ³	23,640
Special Status Plant (<i>Lesquerella macrocarpa</i>) ⁶	2,660
Steamboat Mountain ACEC (communication sites)	43,310
Essex Mountain (communication sites)	140
Oregon Buttes ACEC ³	3,450
Continental Peak (communication sites)	90
Pacific Buttes (communication sites)	1,010
Indian Gap	690
Face of Steamboat Mountain	9,400
Tri-Territory Marker ³	10
White Mountain Petroglyphs ⁵	20
Estimated Total	84,420

¹ In accordance with transportation planning.

² Actual acreage to be determined.

³ Established in the Green River RMP (USDI 1997).

⁴ Managed in their historical context.

⁵ Petroglyphs and vistas total 760 acres.

⁶ The actual plant sites are closed to surface disturbing rights-of-way. The existing two-track roads could be considered for non-surface disturbing uses.

**TABLE 4-27
SUMMARY OF WITHDRAWALS TO BE PURSUED
ALTERNATIVE B**

Site	Estimated Acres ¹	Existing Withdrawal Overlap ²
Connectivity Area	140,380	
Core Area	80,410	
Crookston Ranch ³	40	
Cultural Site	320	
Elk Calving Areas	58,890	
Greater Sand Dunes ACEC ³	23,870	
Public Water Reserve ³	5,900	
South Pass Historic Landscape ³	4,790	Coal
Special Status Plant Species ³	2,680	Oil Shale/Coal
Steamboat Mountain ACEC	43,310	Coal
Tri-Territory Marker ³	10	Coal
White Mountain (Native American Respected Places)	280	
Estimated Total⁴	267,590	

¹ Actual withdrawal acreage to be determined.

² Data is unavailable at this time to delineate the actual overlap with existing withdrawals identified for revocation in the Green River RMP.

³ Established in the Green River RMP (USDI 1997).

⁴ Acres do not add due to overlapping sites.

**TABLE 4-28
SUMMARY OF AREAS CLOSED TO COAL EXPLORATION AND SODIUM PROSPECTING
ALTERNATIVE B¹**

Areas Closed	Estimated Acres
Boars Tusk ²	90
Crookston Ranch ²	40
Floodplains ³	41,170
Oregon Buttes ACEC ²	3,450
Petroglyphs: White Mountain (1/2 mile vista) ²	480
Raptor Nesting ²	83
Sage Grouse Leks (1/4 mile buffer) ²	8,170
South Pass Historic Landscape ²	23,640
Special Status Plant Species Sites ²	2,680
Steamboat Mountain Area (outside area w/coal recommendation)	33,530
Tri-Territory Marker ²	10
Wilderness Study Areas ²	117,060
Estimated Total⁴	218,420

¹ The entire planning area would be closed to sodium exploration activities.

² Established in the Green River RMP (USDI 1997).

³ Floodplains, wetlands, and riparian areas (within 500 feet of 100-year floodplains and waters).

⁴ Acres do not add due to overlap of Oregon Buttes ACEC, floodplains, special status plant species, and WSAs. There are about 11,983 acres of overlap.

**TABLE 4-29
SUMMARY OF AREAS CLOSED TO MINERAL MATERIAL SALES
ALTERNATIVE B**

Areas Closed	Estimated Acres
Boars Tusk ¹	90
Core Area	80,410
Connectivity Area	140,380
Crookston Ranch ¹	40
Elk Calving Areas	58,890
Mountain Sagebrush Communities (including sagebrush/scurfpea communities)	21,500
Occupied Raptor Nests ¹	83
Oregon Buttes ACEC ¹	3,450
Rock Art Sites (including White Mountain Petroglyphs ACEC) ¹	480
Sand Dunes ACEC ¹	38,650
South Pass Historic Landscape ¹	4,790
South Pass Historic Landscape (in the Vista and outside the 4,790 of the ACEC) ¹	18,850
Special Status Plant Species Sites ¹	2,680
Split Rock	12,340
Steamboat Mountain ACEC ¹	43,310
Tri-Territory Marker	10
White Mountain	32,890
Wilderness Study Areas ¹	117,060
Estimated Acres ²	406,080

NOTE: Surface collecting (picking materials off the ground by hand) would be considered in these areas on a case-by-case basis.

¹ Established in the Green River RMP (USDI 1997).

² Acres do not add due to overlap of core area, elk calving areas, mountain sagebrush communities, and connectivity area. There are about 169,823 acres of overlap.