

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

HOW TO READ THIS CHAPTER

Chapter 4 presents the likely impacts on the human and natural environment in terms of environmental, social, and economic consequences predicted to occur from implementing the alternatives presented in Chapter 2. Chapter 2 also provides a summary comparison of the impacts in table format (see **Table 2-24**).

This chapter is divided into two main parts. The first part describes environmental consequences associated with proposed management in RMP alternatives for the Butte Field Office overall. The second part entitled “Environmental Consequences of Five Site-Specific Travel Plans” describes the effects of the site-specific travel plan alternatives (implementation decisions) for the Helena, East Helena, Lewis and Clark County NW, Boulder/Jefferson City, and Upper Big Hole River Travel Planning Areas. This portion of the chapter includes discussion of cumulative effects at the scale of each travel planning area as well as at the Decision/Planning Area scales.

The first part of this chapter describes the effects of the proposed management actions by RMP alternative on the resources, resource uses, special designations, and social and economic concerns present in the Butte Field Office Decision Area. Each section includes the following items:

- Effects Common to All Alternatives – this section describes impacts that are the same across all of the alternatives. This information is presented here to avoid repetition. Management actions that would not cause impacts are identified here and are not discussed further. Resources, resource uses, and programs that only have impacts that are common to all alternatives are only discussed in this section and are not discussed further.
- Effects of Alternative A
- Effects Common to Action Alternatives – this section provides analysis of similarities between Alternatives B, C, and D where they occur. Some resources do not have this section. **It is important to remember that these effects apply to Alternatives B, C, and D and are not restated in the individual alternative discussions.**
- Effects of Alternative B
- Effects of Alternative C
- Effects of Alternative D

Following the direct and indirect effects analysis, the following analysis appears:

- Cumulative Impacts

- Irretrievable or Irreversible Commitment of Resources; and
- Unavoidable Adverse Impacts

The *Introduction* section includes definitions of the types of effects that will be projected throughout the impact sections and the terminology used, discusses the availability of data, and identifies the BLM’s Critical Elements. This section is followed by the analysis assumptions and detailed description of impacts. Since mitigation measures and standard operating procedures have been included in the alternatives as design features, many potential impacts are reduced or eliminated. The section titled *Effects Common to All Alternatives* describes impacts that will not vary by alternative because management actions are the same in all the alternatives. These impacts are not discussed again. Additionally, for any given resource, some management actions will not affect the resource. If a management action is not discussed it is because the resource analyst determined there would be no impact.

Separate sections describing cumulative impacts, irretrievable and/or irreversible commitment of resources, and unavoidable adverse impacts are presented at the end of the chapter.

For ease of reading, analysis shown in Alternative A (or any other alternative) may be referenced in discussions of subsequent alternatives with such statements as “impacts would be the same as Alternative A” or “impacts would be the same as Alternative A, except for . . .” as applicable.

INTRODUCTION

The analysis of effects associated with the alternatives is required by BLM planning regulations and by the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA). The analysis presents best estimates of impacts. As required by NEPA, direct, indirect, and cumulative effects are discussed. When quantitative information is available, impacts have been calculated primarily through Geographic Information System (GIS) applications. This entailed using Arc Info or Arc GIS software to overlay and/or query various geographically mapped layers of resource information to generate or calculate data for various analyses. All quantitative information is approximate and could be subject to further refinement when considered at finer scales.

Because the alternatives describe an overall management framework, and not site specific locations for activities (generally), the environmental consequences are most often expressed in comparative, general terms. Impacts are quantified to the extent practical with available data.

In the absence of quantitative data, best professional judgment provides the basis for the impact analysis.

Impact analyses and conclusions are based on interdisciplinary team knowledge of the resources and the Planning Area, information provided by experts in the BLM or in other agencies, and information contained in pertinent existing literature. The baseline used for the impact analysis is the current condition or situation as described in Chapter 3 (Affected Environment).

Each resource analyst developed analysis assumptions to help guide the determination of effects, which are described in the beginning of each resource section.

TYPES OF EFFECTS

Direct, indirect, and cumulative impacts are considered in this effects analysis, consistent with direction provided in 40 CFR 1502.16.

Direct impacts are caused by an action or implementation of an alternative and occur at the same time and place. Indirect impacts result from implementation of an action or alternative, but are usually later in time or removed in distance, and are reasonably certain to occur. Cumulative impacts result from activities combined with past, present, and future actions on all jurisdictions. Cumulative impacts also result from individually minor but collectively significant actions over time. Past and present impacts are reflected in the existing conditions.

Actions anticipated over the next 20 years on all lands in the Planning Area, including private, state (MFWP and DNRC) and federal (USFS, BOR, NPS, USFWS) ownerships, have been considered in the analysis to the extent reasonable and possible. This analysis is provided for each resource and program area and is general because decisions about other actions in the Planning Area would be made by many public and private entities, and the location, timing, and magnitude of these actions are not well known.

ANALYSIS TERMINOLOGY FOR BUTTE RMP

The following list of definitions is used in the analysis of alternatives.

Irretrievable Commitment of Resources: result from actions in which resources are considered permanently lost.

Irreversible Commitment of Resources: result from actions in which resources are considered permanently changed.

Negligible: an effect at the lower level of detection; there would be no measurable change. Effects may not be readily noticeable.

Low or Minor: an effect is slight but detectable; there would be a small change.

Medium or Moderate: an effect is readily apparent; there would be a measurable change.

High or Major: an effect is severe; there would be a highly noticeable/ measurable change.

Unavoidable Adverse Effects: those that remain following the implementation of mitigation measures, and include effects for which there are no mitigation measures.

Beneficial or Positive: an effect promoting a favorable result for a specific resource or resource use. Could be used in short-term, long-term, or both short and long-term contexts.

Adverse or Negative: an effect that is detrimental or causes harm to a specific resource or resource use. Could be used in short-term, mid-term, long-term, or all three contexts.

Neutral: an effect that is neither beneficial nor adverse to a specific resource or resource use.

SCOPE OF THE ANALYSIS

The impacts disclosed are limited to the temporal and geographic scope described below unless otherwise defined in the individual resource sections.

Temporal Scope

- Short-term: effects lasting less than 5 years
- Mid-term: effects lasting 5-10 years
- Long-term: effects lasting more than 10 years

Geographic Scope

- Decision Area – refers to lands in the planning where the BLM has authority to make land use and management decisions. This includes split estate lands where the federal government has retained subsurface minerals.
- Analysis Area – lands within the area to be analyzed. The analysis area is the decision area unless otherwise defined in the individual resource section.
- Planning Area – all land within the Butte Field Office administrative boundary regardless of ownership or jurisdiction.

AVAILABLE DATA AND INCOMPLETE INFORMATION

The best available information pertinent to the decisions to be made was used in development of the RMP. Considerable effort was put forth to acquire and convert resource data into digital format for use in the plan—both from BLM sources and from outside sources such

as the Montana Natural Heritage Program. Certain information was unavailable for use, usually because inventories have either not been conducted, were not complete, or were not of consistent quality across the Planning Area. Some of the major areas where data are incomplete or substantially lacking are:

- Planning Area-wide vegetation by species
- Fire Regime Condition Classes determination and documentation for all vegetation types in the Decision Area
- Detailed soil survey for lands in Beaverhead County
- Certain wildlife inventory data (i.e. lynx denning habitat, occupied pygmy rabbit habitat)
- Wildlife monitoring data
- 100-year floodplain mapping
- Recreation monitoring data
- Route safety data

As a result, impacts cannot be quantified given the proposed management of certain resources. Where this occurs, impacts are projected in qualitative terms, or in some instances, are described as unknown. Subsequent project level analysis will provide the opportunity to collect and examine site-specific inventory data necessary to determine the appropriate application of the RMP level guidance. In addition, ongoing inventory efforts within the Planning Area continue to update and refine the information used to implement this plan.

CRITICAL ELEMENTS

BLM considers 14 items as “Critical Elements of the Human Environment” that must be addressed during environmental analysis.

Currently no Wild and Scenic Rivers (WSRs) are designated in the Planning Area and thus there are no existing WSRs to address. Impacts related to proposed designations or findings are described under each respective Wild and Scenic Rivers section by alternative.

Floodplains and Prime/Unique Farmlands are generally not present on BLM-administered lands covered by this plan. Where they may occur, subsequent project level analysis for any projects with potential to impact Floodplains or Prime/Unique Farmlands would be prepared to address potential impacts.

The remaining 11 critical elements are addressed under pertinent sections of Chapter 4. These include: Air Quality, Areas of Critical Environmental Concern, Cultural Resources (addressed under Cultural Resources and Tribal Treaty Rights), Environmental Justice, Native American Religious Concerns (addressed under Cultural Resources and Tribal Treaty Rights), Threatened or Endangered Species (addressed under Special Status Species), Hazardous or Solid Wastes, Water Quality, Wetlands/Riparian Zones (addressed under Vegetation –

Riparian and Wetlands), Wilderness, and Noxious Weeds and Non-Native Invasive Plants (addressed under Vegetation—Invasive Species including Noxious Weeds).

ANALYSIS ASSUMPTIONS AND GUIDELINES

A number of assumptions were made to facilitate the analysis of the alternative management actions. These assumptions set guidelines and provide reasonably foreseeable levels of development that would occur within the Planning Area over the analysis period (20 years). These assumptions should not be interpreted as constraining or redefining the management objectives and actions proposed for each alternative and described in Chapter 2. If a resource heading does not appear in the following sections, it is because no assumptions were made.

GENERAL ASSUMPTIONS

- Sufficient funding and personnel would be available for implementation of any alternative.
- Implementation of all alternatives would be in compliance with all valid existing rights, federal regulations, bureau policies, and other requirements.
- Local climate patterns of historic record and related conditions for plant growth would continue during the analysis period.
- Appropriate maintenance would maintain the functional capability of all developments.
- The discussion of impacts is based on the best available data. Knowledge of the Planning Area and professional judgment, based on observation and analysis of conditions and responses in similar areas, are used to infer environmental impacts where data is limited.
- Acreages and other numbers used in the analysis are approximate projections for comparison and analytical purposes only. Readers should not infer that they reflect exact measurements or precise calculations.
- Adjustments made to the Preferred Alternative for travel management between the Draft RMP/EIS and the Proposed RMP/Final EIS were assessed to be so minor as to not cause any marked changes in analyses or conclusions based on road management. Therefore, while actual road mileage changes are reflected where pertinent in the Proposed RMP/Final EIS, road-based analyses (such as road density calculations, road-based moving windows analyses, and economic analyses) were not re-done since the Draft RMP/EIS.

RESOURCE ASSUMPTIONS

Air Quality

- Demand for clean air in the Planning Area is expected to remain constant.
- Increasing uses of the area for recreational and aesthetic reasons may lend importance to maintaining the current quality of the air, especially during seasons of high visitation.
- Vegetative treatment designed to reduce wildland fuels, including prescribed burning, would reduce wildland fire severity.

Soil Resources

- Soil erosion would be mitigated through the use of best management practices and Land Health Standards described in **Appendix F**.
- This analysis assumes that any reduction in grazing preference by the BLM would cause a proportional reduction in actual use levels.
- BLM roads will continue to be maintained, with priority placed on those most heavily used by the public.
- State and major county roads will continue to be maintained to current levels and generally, county roads will not be abandoned. BLM facilities, mainly roads, will continue to be maintained, with priority placed on those most heavily used by the public.
- An increase in wildland fuel reduction activities in the analysis area will result in a decrease in fire severity.
- Natural process assumptions include: roads in the Butte Field Office will continue to erode from natural causes, increased vegetative cover would lead to reduced soil erosion, and removal of conifer encroachment could minimize accelerated soil erosion.

Water Resources

- Water quality requirements will be achieved through the use of best management practices, implementation of Land Health Standards described in **Appendix F**, and working with the MDEQ in the future development of water quality restoration plans.
- Water quality meets or is moving towards State of Montana water quality standards.
- Water quality restoration plans and the establishment of Total Maximum Daily Loads (TMDLs) will improve water quality.
- Vegetative treatment designed to reduce fuels, including prescribed burning, will reduce wildland fire severity.

- Management prescribed for rivers found suitable for designation in the National Wild and Scenic Rivers system will protect the outstandingly remarkable values, tentative classification, and free-flowing nature of those segments.
- BLM roads will continue to be maintained, with priority placed on those most heavily used by the public.
- Process assumptions include: roads in the Butte Field Office will continue to erode from natural causes resulting in potential impacts on water quality in adjacent streams, increased vegetative cover will lead to reduced soil erosion and in certain instances reduced deposition of sediments into streams.
- The discussions of impacts on water from the four alternatives are based on the best available data. Knowledge of the analysis area and professional judgment from observation and analysis of conditions and responses in similar areas are used to infer environmental impacts where data is limited.

Vegetative Communities

- Analysis of proposed vegetative treatments (except for noxious weeds unless otherwise stated) assumes that the high end of acreage treatment ranges would be implemented.
- Projections on how many decades may be necessary to reach certain vegetative conditions from proposed treatment rates are based on results from SIMPPLLE model runs.

Forest and Woodlands

- The need to manage forests and woodlands will increase to accommodate multiple uses associated with fish and wildlife habitat, water yield, livestock grazing, fire activities, forest product removal, and recreation.
- Treatments will be successful and promote the desired changes in ecological succession that will restore vigor, vegetation production, and overall forest health, especially for warm, dry forest types and woodlands.
- The RMP applies the approach that has been used in recent coordinated landscape analysis with the Forest Service to provide a range of ecological conditions needed to maintain a natural range of species that were found in the area prior to settlement.
- Historic conditions (i.e., more frequent and widespread wildland fires that burn at less intensity) provide a more stable and healthy set of conditions that local native plants are more adapted to.

Noxious Weeds

- Noxious weeds on public lands will be controlled with a variety of methods, but will not be eradicated.
- Noxious weeds and invasive species populations will increase as a result of ongoing natural and human-induced activities (e.g., livestock and wildlife foraging, roads, vegetation treatments, wildland fire and recreational activities).
- The need to control noxious weeds will increase as public knowledge about the adverse effects of noxious weeds increases, as new noxious weeds are introduced, and as existing weed populations expand.
- Infestations of noxious weeds decrease diversity and vigor of desirable and native plant communities.
- Increases in noxious weeds are dependent on conditions favorable for weed establishment (e.g., there are seed source(s), safe sites for seed germination, and insufficient competition from other species to inhibit seedling growth).
- Under the action alternatives, acreage estimates of weed spread by alternative assume a “worst case” scenario where the high end of proposed acreage ranges of vegetation treatments would occur, combined with implementation of the low end of proposed weed treatment acreage ranges by alternative.

Grasslands and Shrublands

- The need to manage rangelands will increase to accommodate multiple uses associated with fish and wildlife habitat, livestock grazing, recreation, riparian habitat, and water quality.
- Over-utilization of rangelands will increase the spread of noxious weeds and the potential for sediment to enter streams and adversely affect water quality and the aquatic biota.
- Rates of conifer encroachment into grasslands and shrublands were estimated based on current vegetation mapping compared to historic vegetation portrayed by SIMPPLLE model runs, and the assumption that conifer encroachment began 100 years ago.

Riparian and Wetlands

- Buffers of relatively intact vegetation in riparian and wetland areas will reduce impacts on water quality, channel morphology, and the aquatic biota.
- Beavers are a natural and desirable component of riparian and wetland habitats.
- In alternatives that call for Riparian Management Zones, management of RMZs with a primary focus on riparian values (such as mechanical treatments of vegetation that improve vegetative conditions while providing for down woody material and habitat

complexity) will improve the ecological functional status of streams and associated riparian areas as wildlife habitat.

- Analysis assumes 80-foot site potential tree height.
- The functioning condition on approximately $\frac{1}{3}$ of riparian areas is reduced due to factors sometimes outside the control of BLM’s management, i.e. roads, upstream dams, etc.
- Analysis assumes treatment figures for Alternative A are a continuation of what has occurred.

Wildlife

- Vegetation treatments would be effective and produce the anticipated short-term and long-term results.
- Vegetation treatments would be implemented in the manner described in Chapter 2.
- Acreage indications of habitat improvement associated with vegetation treatments do not consider potential continuing loss of a particular habitat type due to continued fire suppression.
- The availability, quality, and amount of habitat correlates to the viability, health, and size of wildlife populations dependent on the habitat.
- There is a threshold level of disturbance or habitat degradation a species can sustain before the population viability is reduced.
- Management actions intended to benefit habitat for special status and/or priority species would benefit most other species occurring in the same vicinity.
- Demand for wildlife habitat is expected to increase given listings under the Endangered Species Act and increasing wildlife-based recreational activities in the Planning Area (wildlife viewing, hunting, etc.).
- Vegetative treatments would be expected to benefit wildlife habitat by moving vegetation towards a “range of natural variability.” Although it is recognized that modifying vegetation could remove or lessen the quality of habitat for some species (i.e. removing conifer encroachment from sagebrush to increase breeding and foraging habitat for sagebrush obligate species would remove hiding habitat for elk), overall, it is assumed that vegetative treatments would have long-term benefits to wildlife habitats.
- The more acres within a No Surface Occupancy or No Lease oil and gas stipulation, the more overall protection a wildlife species would have from oil and gas development. When comparing alternatives, those alternatives with more acres in NSO or NL would provide the least negative effects to wildlife. As with NSO and NL stipulations, when comparing alternatives, the more acres an alternative has within

a timing restriction, the more wildlife species would be protected from disturbance during crucial seasons of use.

Fish

- Road decommissioning would be done properly with BMPs in place and sedimentation and other negative impacts from roads to the aquatic environment would diminish as the road becomes part of the natural landscape and topography.
- Water quality meets or is moving towards State of Montana water quality standards.
- Recreational demand, including fishing and other uses will continue to increase.
- Livestock type and stocking will remain relatively stable over the planning period.
- Management actions intended to benefit a specific habitat for special status species will likely influence other species within that same habitat. Given this, management of fisheries and other aquatic species habitat is not discrete, since actions that benefit one species, may provide adverse (or beneficial) effects on another.
- There is a direct correlation between the amount of quality habitat and fish populations and changes in habitat quality could cause an increase or decrease in fish numbers.
- The more acres within a No Surface Occupancy or No Lease oil and gas stipulation, the more overall protection a fish species would have from oil and gas development. When comparing alternatives, those alternatives with more acres in NSO or NL would provide the least negative effects to fish.

Special Status Species

- Conservation measures to improve and secure habitat would continue to receive special consideration during planning.
- There would be changes in listed and special status species in the future.

Wildlife

- Vegetation treatments would be effective and produce the anticipated short-term and long-term results.
- Vegetation treatments would be implemented in the manner described in Chapter 2.
- The availability, quality, and amount of habitat correlate to the viability, health, and size of wildlife populations dependent on the habitat.
- There is a threshold level of disturbance or habitat degradation a species can sustain before the population viability is reduced.

- The identification and delineations of habitat accurately represents the conditions on the ground; therefore, impacts to the delineated habitat areas would impact associated wildlife and wildlife habitat.

Fish

- Assumptions for special status fish are the same as those under the Fish section above.

Plants

- Harvest or collection of native plants and seeds for scientific study, medicinal, or commercial uses could increase, increasing the vulnerability of some rare species or populations.
- Noxious weed infestation and treatments will pose a risk to some special-status plants.

Wildland Fire Management

- The Forest Service and Montana DNRC will continue to assume fire suppression responsibilities on BLM-administered public lands.
- Firefighter and public safety are dependent on access and wildland fire behavior. Fire behavior is dependent on fuel loadings (including invasive species), and stand structure.
- Vegetation treatments will be designed to reduce FRCC by one condition class (i.e. FRCC 3 would go to FRCC 2) after treatments.
- Category “A” polygons in each Fire Management Unit will only receive mechanical or chemical treatments and will lose the benefits of fire.
- Category “D” polygons in each Fire Management Unit will have the most flexibility.
- Acres in Fire Regime Condition Class (FRCC) 1 will remain in FRCC 1 during the 20-year analysis period.

Cultural and Paleontological Resources

- Federal undertakings and unauthorized uses have the potential to cause irreversible disturbance and damage to non-renewable cultural and paleontological resources. BLM would continue to mitigate impacts to both resources from authorized uses through project abandonment, redesign, and if necessary data recovery investigations in accordance with the BLM National Cultural Programmatic Agreement, the Protocol for Managing Cultural Resources on Land Administered by the BLM in Montana, and Manual Series 8270 for paleontology.
- Without a 100 percent inventory of all public lands within the Decision Area, the exact number, kind, and variability of cultural and paleontological resources will be unknown. However, new sites and

localities would continue to be found and evaluated for eligibility for the National Register of Historic Places, and scientific significance, as additional inventories are completed for compliance on projects. Eligible cultural resources and significant localities would continue to be treated similarly and equally in terms of type, composition, and importance, but many would continue to deteriorate through natural agents, unauthorized public use, and vandalism. The BLM would continue to consult with Native American Tribes on traditional cultural properties and values that are of concern to them.

- All archaeological resources will be assessed according to BLM use categories. The demand for use of cultural resources is expected to increase. Interest from the general public in historical tourism and from Native Americans for traditional uses is expected to increase. The demand to use cultural resources by the academic community in scientific research would be expected to remain at current levels.
- The same pressures associated with cultural resources would be occurring with paleontological localities. BLM Manual Series 8270 integrates legislated directives from the Antiquities Act of 1906, FLPMA, and NEPA, for the protection of resources of scientific interest; and as such, outlines available protection measures and mitigation procedures for paleontological localities.

Visual Resources

- As described in the Alternatives section in Chapter 2, short-term impacts on visual quality may occur for long-term resource benefit.
- Projects would be planned to meet VRM objectives and will result in VRM being met. For example, timber harvesting activities will consider the impacts on VRM, and mitigation would be included which would eliminate the long-term impacts of the timber harvesting on VRM.
- VRM objectives will be applied to all management actions and appropriate mitigation measures will be developed to ensure compliance with established visual resource classes except in cases involving threats to human life and property.

Forestry and Woodland Products

- Estimated Probable Sale Quantities (PSQs) are reasonably achievable based on budgets and staffing levels.
- PSQ is based on all forests with over 10 percent canopy except acres with protections including Wilderness Study Areas and VRM Class I areas.
- Adequate access for forest management will be maintained. Closure of roads due to travel manage-

ment is reflected in the reduced acres of treatment proposed and anticipated PSQ.

- Land ownership adjustment would generally result in more consolidated land holdings by BLM, a reduction of isolated tracks needing management, and a reduction in tracks with poor or no access.
- Forest management, silvicultural, and treatment terms used assume definitions described in: Dictionary of Forestry, John A. Helms, editor, 1998. Society of American Foresters publisher, ISBN 0-939970-73-2.

Livestock Grazing

- Under all alternatives, livestock grazing will be managed through implementation of the Standards for Rangeland Health and Guidelines for Livestock Grazing (**Appendix F**).
- Livestock grazing will be adjusted as appropriate to ensure wildlife habitat requirements are taken into account in accordance with the Butte Field Office RMP.
- During review of grazing leases and permits, appropriate management tools and guidelines for grazing management options will be considered and prescribed as necessary to improve the condition of riparian and wetland areas.
- Under all alternatives, a range of shrubland and grassland acres to be treated per decade is given. This analysis assumes the maximum number of acres will be treated.
- Under all alternatives, a range of acres to be treated for noxious weeds per decade is given. This analysis assumes the maximum number of acres will be treated unless otherwise stated.
- The cost of administering grazing allotments as forage reserve will be higher than administering them as normally permitted allotments.
- Any lands acquired from the Iron Mask Acquisition will be managed like the existing Indian Creek allotment as described under each alternative.

Minerals and Geology

- Demand for mineral commodities, construction materials and energy resources will increase in the U.S. and within the Planning Area.
- Increased demand for energy and minerals will encourage exploration for potential resources from areas of known high and moderate potential within the Planning Area.
- It is assumed there will be no major change in the legal framework under which mineral leasing, mining claim location, or mineral material sales are conducted.

- BLM will provide opportunities and ensure accessibility to mineralized areas for mineral exploration and development.
- BLM will ensure alternatives in this plan will not compromise valid and existing mineral rights, federal regulations, bureau leasing policies and procedures, and BLM mineral sales requirements.
- There will continue to be controversy surrounding mineral development associated with a range of societal pressures. This controversy will require more BLM federal land managers' time and resources as they attempt to move federal properties forward through mineral exploration, permitting, development, and oil and gas exploration and development drilling activities.
- BLM will provide for timely permit evaluation and processing of federal energy and solid mineral exploration and development proposals.
- Adequate numbers of trained mineral personnel and sufficient funding will be available for exploration permitting, environmental analysis, permitting, and oversight during operations and reclamation.
- Potential impacts of developing mineral resources described herein are based on analysis of the best available data. Specific knowledge of the Planning Area and best professional judgment, based on observation and analysis of geologic conditions and mineral and energy occurrence in similar areas are used to infer environmental effects where data is limited.
- Acreage figures, tonnage, and ore grade values and other numbers used in the analysis are approximate projections for comparison and analytic purposes only. Readers should not infer that they reflect exact measurements or precise calculations.

Leasable

- All federal mineral leases will be subject to standard lease terms.
- Oil and gas exploration will occur as described in the reasonably foreseeable development scenario (RFD scenario) which predicts that as many as 19 conventional oil and gas wildcat wells (exploratory wells drilled in an area with no existing production) might be drilled in the Butte Field Office Planning Area in the next 15 to 20 years. Of these 19 wells, it is estimated that 13 would be "dry" holes (no economically producible oil or gas is discovered). It is further estimated that six (6) of the wells could have oil or gas discoveries, two (2) of which would become producers with one located on either BLM minerals or lands administered by the Forest Service, and the other located on privately owned mineral lands. Each of the discovery wells would probably prompt additional step-out wells. A "step-out

well" is a well drilled adjacent to or near a proven well to establish the limits and continuity of the oil or gas reservoir and/or to assist with production. It was estimated that 12 step-out wells would be drilled, two for each discovery. In all approximately 31 total conventional wells would be drilled. The amount of ground affected by this drilling activity would include surface disturbances from the construction of exploration drill roads and equipment staging areas (221 acres), and drilling pads (45.5 acres). Dry holes would be plugged and abandoned with reclamation of exploration drilling sites and access roads usually being completed within one to two years of drilling,

- The RFD scenario also forecasts the discovery and development of three conventional gas fields and one conventional oil field Planning Area-wide (including non-federal mineral estate). Discovery and development of these fields would include surface disturbances associated with drill pads (42 acres), access roads and staging areas (130 acres) and pipelines (318 acres). Although all surface disturbances could be reclaimed in the long-term, short-term reclamation would reduce the total area of surface disturbance to about 83 acres, two years after development of the fields.
- In addition to conventional oil and gas wells, it is anticipated that as many as 40 wells would be drilled for coal bed natural gas in limited and scattered areas of known sub-bituminous coal resources located in Gallatin and Park Counties; most likely in the Trail Creek Road area near Bozeman Pass (Livingston and Trail Creek Coal Fields). This activity is not forecast to occur on any federal mineral estate lands. It is forecast that two commercial fields would be discovered and require additional surface disturbances related to gathering and sales pipelines, and compressor stations.
- Exploration and development of two coal bed natural gas fields could include construction of four drill pads (one acre) and access roads (three acres). Reclamation would generally be completed within two years of completion of the dry holes. Discovery and development of the forecast two coal bed natural gas fields would include surface disturbances associated with 30 drill pads (7.5 acres, six discovery and 24 step-out wells), and access roads and pipelines that follow access roads (31.6 acres). This surface disturbance could be reduced to about 21.7 acres after short-term reclamation was completed. Based on projected well depths, it is assumed that produced water would be reinjected if technically possible and not disposed of on the surface. These activities are forecast on non-federal mineral estate lands.
- No federal geothermal leasing will likely occur in the Decision Area.

- None of the lands within the Sheep Creek, Sleeping Giant, Elkhorns Tack-on, Humbug Spires, or Yellowstone Island Wilderness Study Areas will be available for oil and gas leasing under any of the alternatives unless later released from their status as Wilderness Study Areas.
- Stipulation-specific acreages by alternative in tables 4-23, 4-27, 4-30, and 4-33 are presented for individual stipulations without consideration of overlap with other, potentially more protective (more restrictive of oil and gas exploration/development) stipulations. For example, a major constraint such as No Surface Occupancy (NSO) is generally a more protective stipulation for a resource than a moderate constraint such as Timing Limitations. In Table 4-27, a total of 498,973 acres of federal mineral estate lands are identified as having a Timing Limitation stipulation for big game winter/spring range. However, when mapped areas with major constraints (No Lease, or NSO stipulations) are overlaid onto these big game winter/spring range acres, approximately 236,443 of these acres would be protected with No Lease or NSO stipulations, while the remaining 262,530 acres would be protected with the Timing Limitation stipulation. In the case of the stipulation-specific acreages in these tables for “moderate” constraint stipulations (Timing Limitations, Controlled Surface Use), these numbers do not consider the overlap of “major” constraint stipulations (NSO, or No Lease areas), and they therefore underestimate the resource protection that would actually be provided for the subject resources if exploration and development were to occur. This effect is quantitatively assessed for moderate constraint stipulations that have substantial acreages associated with them: big game winter/spring range, bighorn sheep yearlong range, soil protection, and visual resource protection stipulations. It also plays a relatively minor role in at least one action alternative for other resources with moderate constraint stipulations, and with lower acreages associated with them such as sage grouse winter/spring range, grizzly bear denning habitat, gray wolf dens, and Special Recreation Management Areas.

Locatable

- Most mineral commodities are currently at record high values when compared with values over the last 25 years. It is assumed that commodity prices will fluctuate around the current price level or increase modestly in the future. It is assumed that sustained or increasing prices will generate interest in exploration and development of mineral properties.
- The three currently operating large-scale metal mines within the Planning Area (Montana Tunnels, Continental Pit, and Golden Sunlight Mines) will either continue to operate under their respective Plans of Operations for the remainder of their planned life

(Continental Pit) or will apply for Plan Modifications that are ultimately approved to expand their operations and extend their mine-life (Montana Tunnels and Golden Sunlight Mine).

- Small-scale metal mining operations having less than 5-acres of surface disturbance are regulated by the state under a Small Miners Exclusion and by the BLM under a Plan of Operations. Active mineral exploration and mine development at this scale is expected to occur at varying levels of intensity within the Planning Area in the future.
- The Butte Field Office anticipates 4 to 10 placer mining operations operating under a Plan of Operations during any given year, with the actual number being a function of the price of gold.
- No exploration or development of phosphate resources will occur within the Decision Area.
- It is likely that modifications to the Plans of Operation will be sought for three currently operating limestone mines located on private (Montana City and Trident Quarries) and public lands (Indian Creek/Limestone Hills) within the planning area. The Indian Creek/Limestone Hills Mine is administered by BLM and DEQ, Trident and Montana City mines are administered by DEQ.

Salable

- Demand for sand and gravel, riprap, and other mineral construction materials will increase at a moderate but steady rate in the future.
- The community pit, for a flagstone material located near Montana City and Conda Mining, Inc., which operates the Pipestone Stone Quarry that produces crushed rock, are both likely to continue limited production into the foreseeable future.
- The demand for boulders for sale for landscaping uses is likely to grow substantially in the future as long as high human population growth rates continue in southwestern Montana.
- The two active slate building stone quarrying operations within the Planning Area, the Soap Gulch area north of Melrose and the Gates Stone Quarry, located in Towhead Gulch west of Holter Lake, are likely to see continued small-scale production into the foreseeable future. It is also likely that the travertine quarries located north of Gardiner would be reopened for limited production from time to time in the future. The Soap Gulch quarry is the only one of these mines located on BLM lands.

Recreation

- Demand for recreational use of public land is expected to increase in the future.

- Total visitor days, under the existing management, would increase about two-percent per year over the next 20 years.
- Increases are expected to be in water-based activities, hunting, fishing, rock climbing, hiking, wildlife viewing, and dispersed uses.
- Demand for developed recreation areas will increase, as will the demand of land for dispersed recreation.
- Developed recreation opportunities are described in detail in the management guidance for all alternatives.
- The amount of dispersed recreation opportunities were assessed by the approach each alternative took to managing the Recreation Opportunity Spectrum Settings and Special Recreation Management Areas.

Special Designations – Wilderness Study Areas

- Congress may legislate wilderness decisions in the future. Therefore, management strategies have been developed for the six WSAs should they be dropped from wilderness review under the action alternatives.

Special Designations – Wild and Scenic Rivers

- BLM can only recommend Wild and Scenic Rivers as suitable for possible designation by Congress. BLM will ensure that the outstandingly remarkable values associated with these areas are protected so that pending Congressional decisions are not compromised.

Travel Management and Access

- Roads that are currently classified, or are to be reclassified in the “Limited” designation will confine all motorized public travel to designated routes, with exceptions for the following:
- Dispersed camping will be allowed within 300 feet of existing roads open to full-size vehicle only (unless otherwise designated) by the most direct route (site selection must be made by non-motorized means).
- Firewood gathering will be allowed under permit.
- Visitor-use and demand is likely to continue to increase for both motorized as well as non-motorized users.
- Demand for adequate public and agency access to public lands will remain high in the future.
- Changes in OHV and snowmobile design and technology will continue, enabling OHV users to travel

into areas that were once thought of as inaccessible due to terrain and water or soil features.

Transportation Facilities

- State and major county roads will continue to be maintained to current levels and that in general, county roads will not be abandoned.
- BLM facilities, mainly roads, will continue to be maintained with priority placed on those most heavily used by the public.
- Road maintenance will be conducted on routes designated as open yearlong and open with restrictions.

Social and Economic

- The planning area population will continue to increase as described in Chapter 3.
- Increased recreational demands, as described in the Recreation assumptions section will influence social aspects of the planning area.
- The social groups are defined to facilitate the discussion of social impacts. These discussions simplify what are often quite complex and unique values and attitudes and the groupings presented here are by no means mutually exclusive. For example, many ranchers also participated in recreation activities. It is also worth noting that personal attitudes, interests, and values often change over time. The social analysis will cover the groups and individuals that are most likely to be affected by this plan.
- Regional economic impacts are estimated based on the assumption of full implementation of each alternative. The actual changes in the economy would depend on individuals taking advantage of the resource-related opportunities that would be supported by each alternative. If market conditions or trends in resource use were not conducive to developing some opportunities, the impact on the economy would be different than estimated herein.
- Resource specialists projected annual resource outputs based on the best available information and professional judgment. The purpose of the economic analysis is to compare the relative impacts of the alternatives and should not be viewed as absolute economic values.
- All timber harvested within the analysis area would be logged by logging contractors, not households.
- Estimated PSQ outputs by alternative in the economic analysis are based on the upper end of the PSQ ranges described in Chapter 2 by alternative.
- Timber harvested within the analysis area would be distributed among the following sectors: sawmills and planing mills (90 percent), wood preservation (other manufacturing) (2 percent), veneer, and ply-

wood (5 percent), and prefabricated wood buildings (3 percent).

- The ratios of harvest to jobs and income used to assess the impacts of the alternatives are based on statewide ratios developed for Montana by the University of Montana.
- Baseline recreation demand is assumed to increase by two percent per year.
- Recreation visits are assigned to different user groups based on primary use. This does not account for the fact that recreation visitors may engage in one or more activity as part of a visit. Overnight visitors, who camp on Butte Field Office lands, for example, are identified as camping only even though they may also be pursuing a number of other different recreation activities.
- Projected recreation visits are distributed among different types of visitors based on the results of National Visitor Use Monitoring surveys conducted for the Beaverhead-Deerlodge, Gallatin, and Helena National Forests.
- The ratios of recreation visits to jobs and income used to assess the impacts of the alternatives are based on national ratios developed through the Forest Service's National Visitor Use Monitoring program.
- Non salary-related expenditures made by the Butte Field Office are assumed to be allocated to different economic sectors based on data compiled for the Beaverhead-Deerlodge National Forest.
- Public health and safety issues would receive priority consideration in the management of public lands.
- Demand for safe visits will increase with increasing numbers of public land users.

Social and Economic Analysis Methods and Issues

- The analysis area for the social and economic analysis consists of the eight southwest Montana counties that include lands managed by the Butte FO: Beaverhead, Broadwater, Deer Lodge, Jefferson, Gallatin, Lewis and Clark, Park, and Silver Bow counties.
- Potential economic impacts are assessed using the Forest Economic Analysis Spreadsheet Tool (FEAST) developed by the USDA Forest Service Inventory and Monitoring Institute (IMI) in Fort Collins, Colorado. This model uses a Microsoft Excel workbook as the interface between user inputs and data generated using the IMPLAN input-output modeling system.
- The FEAST analysis assesses the economic impacts of the resource outputs projected under each alternative. Resource outputs in this context are the amount of a resource (e.g., timber volume, AUMs,

recreation visits, etc.) that would be available for use under each alternative. Average annual resource outputs were projected by resource specialists for each alternative for the planning period based on the best available information and professional judgment. Impacts to economic well-being are measured in terms of employment and labor income by resource area.

- Employment and labor income estimates developed for this analysis include direct, indirect, and induced economic effects. Direct employment would, for example, be generated in the logging and sawmill sectors. Additional employment would be generated as the affected logging and sawmill operations purchase services and materials as inputs ("indirect" effects) and employees spend their earnings within the local economy ("induced" effects).
- Non-market values, including natural amenities and quality of life, non-use values, and ecosystem services, are addressed under Effects Common to All Alternatives. Potential impacts are assessed in qualitative terms, as appropriate.
- Wildland fire suppression costs are addressed under Effects Common to All Alternatives. This section provides average fire suppression costs per acre by fire size class. These costs are not provided by alternative because it is not possible to predict the level of non-prescribed wildland fire that would occur under any of the alternatives.
- The social analysis assesses the potential effects of different management actions on potentially affected social groups. These groups were identified based on past studies in and around the planning area and the results of public scoping conducted for the Butte RMP. This analysis addresses the potential impacts of the alternatives based on the issues and concerns raised by these groups during the public scoping process. The analysis draws upon ongoing discussions between the BLM and potentially affected publics, as well as discussions with subject matter experts involved in other parts of the analysis. The analysis is primarily qualitative with potential impacts ranked by alternative. Quantitative measures, such as acres in protected areas, harvest volumes, and recreation visitation, are used, as appropriate.
- The environmental justice analysis presented under Effects Common to All Alternatives assesses the potential for the proposed alternatives to have disproportionately high and adverse human health or environmental effects on minority and low income populations. The fair treatment and meaningful involvement of people of all races, cultures, and incomes in this planning process is also considered.

Tribal Treaty Rights

- The BLM will continue to consult with Native American Tribes on issues relating to tribal traditional cultural properties and values.
- Interest from the general public in historical tourism and from Native Americans for traditional uses and practices is expected to increase.
- The BLM, as a governmental agency, will maintain special government-to-government relationships with federally-recognized Indian Tribes. Members of the seven recognized tribes in Montana such as the Blackfoot Tribe of the Blackfoot Reservation, Confederated Salish and Kootenai Tribes of the Flathead Reservation, and others tribes exercise their tribal treaty rights such as hunting, fishing, and gathering on non-tribal federal lands including those managed by the Butte Field Office. Native American treaty rights such as game fishing, hunting large and small game, and gathering natural resources for subsistence, medicinal, and cultural purposes are expected to continue and increase in the future.

EFFECTS ON RESOURCES

AIR QUALITY

Effects Common to All Alternatives

Under all alternatives, anticipated impacts on air quality from other resources, resource uses, or programs would be negligible to minor. An exception would be during periods of time when smoke from prescribed or wildland fires temporarily exceed air quality standards. This short-term impact could be analysis-area wide depending on the weather, location, number, and intensity of the fire(s) burning. Other potential sources of particulate emissions within the analysis area include dust from travel on unpaved roads, and dust and exhaust from construction or development activities.

Reducing the amount of forest and woodland subject to high severity impacts from wildland fire events by thinning, forest product removal, and prescribed burning methods would reduce the severity and extent of wildland fires and maintain air quality at desired future conditions to protect human health and the environment.

Burning slash in conformance with state air pollution regulations would continue to maintain the desired future condition goal of ensuring BLM authorizations and management activities comply with local, state, and federal air quality regulations, requirements, and implementation plans.

Particulate emissions of both types (PM₁₀ and PM_{2.5}) within the analysis area are commonly produced during prescribed burns, wildland fire, private debris burning, agricultural burning, slash burning, and wood burning stoves and fireplaces. All of these activities can result in

smoke and soot emissions. These emission situations are generally transitory and do not pose significant risks to human health because exposures can often be minimized or avoided. However, smoke from large fires, especially the fine particulate fraction (PM_{2.5}), can traverse great distances, sometimes thousands of miles, and can impact visibility in nearby and even distant Class I areas. Air quality and visibility can also deteriorate locally due to temporary climatological air stagnation events. Vegetation and fuel management activities that reduce the severity and extent of wildland fire would reduce impacts on visibility and the release of fine particulates throughout great distances.

Management of all resource uses to meet the Land Health Standards for air quality would maintain compliance with requisite measures for Prevention of Significant Deterioration in Federal Class I areas, such as Yellowstone National Park.

Striving to meet state and federal air quality standards in the interest of protecting human health potentially impacted by fugitive dust emissions, and meeting air quality standards for fugitive dust emissions from hazardous materials, would continue to meet the desired future condition goal of ensuring BLM authorizations and management activities comply with local, state, and federal air quality regulations, requirements, and implementation plans.

Current data indicate that both the National and Montana ambient air quality standards are currently met throughout most of the analysis area with the exception of several urban non-attainment areas within the analysis area. These non-attainment areas are guided by the state and are not within the jurisdiction of the BLM. Current BLM management practices are adequately ensuring compliance with current regulations, will not further degrade non-attainment areas, and meet the desired future condition.

Effects of Alternative A

Smoke created from prescribed burning could have short-term impacts on air quality within the local airshed. However, these impacts would be minimized by burning under controlled conditions. Prescribed burns that reduce the extent and intensity of wildfires would benefit air quality. Wildfires can produce greater impacts than prescribed fire since they can occur in less desirable conditions which can create larger more severe fires, producing more smoke, over longer periods of time.

Effects of Alternative B

Due to an increase in area potentially treated by prescribed fire producing more smoke, this alternative could have more short term impacts to air quality than Alternative A. However, by treating more acreage under controlled conditions, this alternative would reduce the

risks associated with wildfires during which smoke impacts to air quality could be severe.

Effects of Alternative C

Due to a reduction in area potentially treated, this alternative would result in less short term smoke related impacts than with Alternative A. However, by reducing the amount of fuels treated under controlled conditions, the risk of more **large, severe** wildfires would increase. The potential for smoke created from high severity wildland fire could be greater because this alternative treats the fewest acres for fuels reduction, leaving more acres available for high severity wildland fire.

Effects of Alternative D

This alternative would result in impacts very similar to alternative A. However, where fires are allowed to burn for resource benefits there could be slightly more long-term negative impacts on air quality within the airshed.

SOIL RESOURCES

Effects Common to All Alternatives

The following discussion addresses key soil concepts that are fundamental to understanding the discussion of effects to soils.

The main characteristics for evaluating the overall condition of soils are soil/site stability and hydrologic function. Soil/site stability reflects the capacity of a representative site to limit redistribution and loss of soils (including nutrients and organic matter) by wind and water. Hydrologic function reflects the capacity of the site to:

- Capture, store, and safely release water from rainfall, runoff, and snowmelt;
- Resist a reduction in this capacity; and
- Recover this capacity following degradation.

The following processes can be influenced by management activities:

- Soil compaction results from vehicles, construction equipment, people, and animals traveling over trails or land. Compaction can lessen the amount of precipitation that can infiltrate into soil and increase runoff, erosion, and sedimentation – in turn decreasing soil/site stability and hydrologic function, as well as soil productivity and plant vigor and diversity.
- Interception of precipitation results when precipitation falls on vegetation. When vegetation is removed, precipitation falls directly on the soil. This can increase surface erosion and sedimentation, and decrease the amount of time between initial precipitation arrival and peak surface runoff – in turn decreasing soil/site stability and hydrologic function.

- Infiltration is the process of precipitation entering and traveling through soil. Infiltration reduces the peak runoff during precipitation events by extending the period of runoff after a precipitation event. Infiltration also filters precipitation and reduces erosion and sedimentation. Most importantly, infiltration provides for moisture availability, which allows for the continued development of the soil profile. If infiltration is reduced, runoff and erosion will increase and soil/site stability and hydrologic function – as well as soil moisture availability, soil productivity, plant vigor and diversity – will decrease.
- Runoff can affect the amount of erosion and sedimentation, as well as flooding – both onsite and off-site. If runoff is increased, all of these effects can increase and soil/site stability and hydrologic function—as well as moisture availability, soil productivity, and plant vigor and diversity—will decrease.
- Erosion and sedimentation affect soil/site stability and hydrologic function. Erosion and sedimentation can destabilize the surface and subsurface cohesion of the soil. Increased sediment entering water bodies’ increases turbidity, increases width-to-depth ratios, and consequently increases temperature and dissolved oxygen saturation levels, and creates an adverse habitat for aquatic animals and plants.

If not properly managed, ground disturbance (such as road construction, maintenance, and use; mining activities; vegetation management activities) can lead to erosion and sedimentation, with associated degradations in soil/site stability and hydrologic function, as well as soil productivity and plant vigor and diversity.

The physical, chemical, and biological processes that occur in rangeland soils supply plants with nutrients and water. Microorganisms in the soil break down plant litter, releasing nitrogen, phosphorus, and other nutrients essential for plant growth. The texture, structure, and porosity of soil determine how much rain is captured and how much runs off during a storm. Soils are storehouses of water and nutrients for plants to draw on when they need them. The soil is a living system that is inextricably linked to nutrient cycles, energy flows, and other ecological processes of rangeland ecosystems.

Of the three principal processes involved in soil degradation—physical, chemical, and biological—livestock grazing may impact soils physically or biologically. Livestock grazing can compact soils where trampling or excessive trailing occurs. Wind or water erosion of soils may be accelerated if insufficient litter or plant cover is left after the grazing season, or if plant composition is changed by grazing practices. Soil structure can be affected by livestock grazing if biological or physical soil crusts are excessively damaged. Overgrazing can reduce the amount of organic matter, the carbon storing ability, and the kinds and numbers of microorganisms living in soils.

The following qualitative analysis of effects to soils is based on soil information for the Butte Field Office and on professional judgment. Effects to soils described above would occur to varying degrees by RMP alternative relative to the amounts and types of proposed activities by alternative. References to “effects to soils” in discussions below by alternative relate to the specific effects described above. Proposed management of the following resources, resource uses, or programs would have no anticipated impacts on soil resources: air quality, cultural resource, fisheries, paleontology, special status species, visual resources, wildlife, ACECs, wild and scenic rivers, wilderness study areas, economics, environmental justice, Indian trust resources, and social.

On Decision Area lands, the primary locations where soil compaction is occurring are roads, trails, and livestock trails. Many Decision Area soils have too many rock fragments for compaction layers to form.

Historically, some Decision Area lands were grazed by livestock excessively, reducing litter and ultimately changing plant composition which led to accelerated soil erosion. Due to modified livestock grazing practices, the extent of these impacts have been reduced in recent decades. However, localized areas where livestock congregate, particularly watering sites, livestock trails, and riparian areas, still have soil impacts described above.

Restoring vegetative communities to more historic conditions would have long-term benefits to soil stability by re-establishing more natural rates of interception, infiltration, runoff, and erosion processes.

Ground disturbance associated with timber harvest, vegetation treatments and fire management activities would generate accelerated soil erosion in the short to mid-term, and could increase soil compaction. Project design measures for these activities would contribute to the protection of soil resources and meeting the desired future condition of maintaining stable soil. Meeting the desired future condition in the long-term with these treatments would contribute to properly functioning watersheds that support productive plant communities consistent with site potential in the long-term. Requiring all forest resource uses and silvicultural practices to meet or move toward meeting Land Health Standards would contribute to properly functioning watersheds and support productive plant communities consistent with site potential.

Implementation of prescribed burning, mechanical treatments, or other appropriate methods to restore desired ecological conditions to grassland and shrubland communities would contribute to soil stability and soil productivity in the long-term.

Wildland fires change the physical, chemical, and biological properties of the soil. Severity of the impact would depend on the fuel type, duration, and fire intensity. Severe wildland fires decrease soil infiltration rates, cause accelerated erosion, and remove some nutrients.

Reduction of the extent and severity of wildland fires through prescribed burns and forest thinning while following the Montana Forestry Best Management Practices (DNRC 2004b) would reduce negative impacts on soil from severe wildland fire in the long-term. Effects to soils would generally occur to a lesser extent in areas of prescribed burning than in areas of wildland fires.

Protective measures for riparian areas would contribute to the protection of soil resources and meeting the desired future condition. Streambank erosion would be reduced in riparian areas that achieve proper functioning condition. Riparian areas in proper functioning condition have plants whose root masses are capable of withstanding high flow events and preventing streambank erosion.

Monitoring riparian and wetland areas for proper functioning condition would provide information needed to apply appropriate mitigation measures to protect soil resources.

Implementation of the Standards for Rangeland Health and BMPs would improve plant vigor and litter accumulation causing beneficial changes in organic matter content, soil structure, permeability, and productivity. Impacts on soils from management of abandoned mines and hazardous materials could also be short term if reclamation were conducted in accordance with the National Oil and Hazardous Substance Pollution Contingency Plan. Implementation of the guidelines for livestock grazing under “Standards for Rangeland Health” would benefit soil resources.

Restricting livestock grazing on the river shoreline north of Homestead Pasture in the Sleeping Giant ACEC from Memorial Day weekend through Labor Day weekend could result in an improvement in streambank stability and soil infiltration capacity.

Meeting or moving toward meeting Land Health Standards when planning for travel management would benefit soil resources by minimizing soil erosion and closing or eliminating unneeded roads.

Road and trail construction would create areas with some short-term and potential long-term accelerated soil erosion. Accelerated soil erosion from road construction, maintenance, and use would be minimized and mitigated through the changes in travel planning and management practices.

Implementing BMP’s at recreation sites could help meet Land Health Standards and benefit soil resources by minimizing ground disturbance to the extent necessary at these sites.

Requiring that all new leases, permits, rights-of-way, and easements be permitted in a manner consistent with meeting Land Health Standards would benefit soil resources by mitigating construction-related impacts on soil stability.

BLM actions to reduce or prevent accelerated soil erosion, mass movement, and streambank instability would enhance soil stability. BLM actions that would contribute to properly functioning watersheds and support productive plant communities include soil stabilization management practices and actions that preserve soil organic material and prevent or reduce soil contamination and soil compaction.

Effects of Alternative A

Treatment of up to 5,250 acres of grassland and shrubland habitat; up to 5,100 acres of dry forest; up to 2,400 acres of cool, moist forest; and up to 30 acres of riparian areas per decade to restore vegetation communities would subject these acres to increased soil erosion and in some cases soil compaction effects described above under Effects Common to All Alternatives. Short to mid-term adverse effects to soils would likely be greater than with Alternative C but less than with Alternatives B and D. Long-term benefits to soil resources associated with restored vegetative communities follow the same pattern with Alternative A having greater benefits than Alternative C, but less than Alternatives B and D.

In Alternative A, there would be no seasonal restrictions on when prescribed fire could be implemented if in prescription. There could potentially be times when prescribed fire occurs in the summer months which may have more negative effects on soils than if burning occurs in cooler, moister spring or fall months.

Alternative A provides for approximately 7,300 acres in Fire Management Unit (FMU) designation "A" where wildland and prescribed fire is not desired. Fuels reduction treatments on these acres would be by mechanical methods without the use of prescribed fire. Because prescribed fire would not be used in these areas, a greater degree of ground disturbance may occur during fuels reduction treatments than in areas with other FMU designations. Soils may be subjected to greater ground disturbance related effects. Fire suppression response in these areas may also lead to more ground disturbance and associated impacts to soils because wildland fire is not desired and suppression tactics may be more aggressive in nature than in areas with other FMU designations.

Overall, Alternatives A and D would have greater impacts to soils (described above under Effects Common to All Alternatives) associated with livestock grazing than either Alternatives B or C. Livestock grazing would occur on approximately 273,000 acres in Alternatives A and D, 265,000 acres in Alternative B, and 262,000 acres in Alternative C. Managing livestock grazing in the McMasters Hills, Spokane Hills, and Indian Creek allotments as available for general grazing permits in Alternative A would impact soil resources greater than in Alternatives B and C, but the same as in Alternative D.

Alternative A allows for general grazing permits in eight allotments (Centennial Gulch, Free Coinage, Alder Creek, Charcoal Mountain Custodial, Dickie, Maiden Rock Custodial, Quinn Creek, and Wineglass Mountain) where grazing would not be allowed in either Alternatives B or C. With the exception of the Centennial Gulch allotment, these other allotments are generally on steep, forested terrain. Livestock use in these allotments would likely be transitory with relatively few soils impacts associated with them. With the continued implementation of Rangeland Health Standards, impacts to soils in the Centennial Gulch allotment would likely be limited to riparian, trailing and congregation areas.

Under current conditions (Alternative A), approximately 172 miles of motorized routes mapped on the BLM transportation system would remain closed. Impacts to soil resources described above under Effects Common to All Alternatives would reduce over time on these routes as they revegetate and soils stabilize.

The Controlled Surface Use (CSU) stipulation for oil and gas exploration and development on slopes greater than 30 percent on non-Boulder Batholith soils, or greater than 20 percent on Boulder Batholith soils, or areas of mass wasting would be in effect on 249,137 acres Decision Area-wide. Under Alternative A, soils on approximately 120,133 of these acres would be even more protected by overlapping NSO stipulations or No Lease areas, leaving about 129,004 acres protected by the CSU stipulation.

Other effects of Alternative A are described under Effects Common to All Alternatives.

Effects Common to Action Alternatives

Implementation of a vegetation restoration program incorporating commercial harvests of forest products would contribute to soil stabilization in the long-term. Treatment of dry forest types and conifer-encroached grasslands and shrublands should reduce the soil erosion occurring in juniper dominated habitat types by increasing grass and shrub communities which would reduce the amount of bare ground. Redesigning, closing, or decommissioning roads that do not meet Land Health Standards could benefit soil resources by reducing soil erosion and compaction.

Consideration of habitat type, soils, fuel conditions, project objectives, and risk when planning prescribed fire would mitigate impacts on soil from burning.

Sites dominated by noxious weeds tend to have greater soil erosion than sites dominated by native vegetation. Active public education efforts and vegetation restoration activities proposed in Alternatives B, C, and D to control noxious weed spread could benefit soil resources by minimizing the spread of noxious weeds.

Provisions for erosion control through road management decisions would be more protective than existing requirements. Requiring road management activities to

meet, or move toward meeting Land Health Standards, including minimizing road and landing locations in RMZs; minimizing sediment delivery to streams from road surfaces; outslipping roadway surfaces where possible, and routing road drainage away from potentially unstable stream channels, fills and hillslopes would result in the protection of soil resources. Changes in designations from “Open” to “Closed” or “Limited” for routes that have accelerated soil erosion would benefit soil resources.

Requiring that relinquished allotments be subject to the maintenance of riparian values before re-offering the allotment for permit or lease would increase the likelihood that allotments adversely affecting water resources would not be reissued, or would be reissued with additional soil stability protection requirements.

Reseeding of disturbed areas where needed would contribute to soil stability.

Requiring the application of BMPs to minimize overall environmental impacts when issuing land use authorizations could improve soil stability through erosion control measures.

Watershed restoration projects designed to meet riparian standards would positively affect soil resources by moving toward proper functioning condition for riparian areas.

Change of existing travel management designations from “Open” to “Limited” for some roads in the Elkhorn Mountains, the warm-up area in the Whitetail-Pipestone area, and a portion of the 450-acre Radersburg OHV use area would result in the reduction of use intensity of some roads. This could have positive effects on soil stability through reduction in land use intensity and a lessening of effects to soils associated with ground disturbance described above under Effects Common to All Alternatives.

Continued route evaluations for site-specific TPAs using a repeatable, systematic process could result in the closure of additional roads exhibiting accelerated soil erosion.

Reduction of soil mass movement from burned areas, aboveground disturbances (primarily roads), and accelerated streambank erosion would positively impact soil resources by stabilizing soils.

Requiring erosion protection practices maintain, protect, or minimize disturbances to resources for all mineral operations would reduce the impact of surface disturbance on soil stability.

Effects of Alternative B

Treatment of up to 11,800 acres of grassland habitat; up to 3,650 acres of shrubland habitat; up to 14,750 acres of dry forest; up to 3,750 acres of cool, moist forest; and up to 700 acres of riparian areas per decade to restore vege-

tation communities would subject these acres to increased soil erosion and in some cases soil compaction effects described above under Effects Common to All Alternatives. These short to mid-term adverse effects to soils would be greater under Alternative B than under Alternatives A and C, but less than under Alternative D. Long-term benefits to soil resources associated with restored vegetative communities would be greater under Alternative B than either Alternatives A or C, but less than under Alternative D.

In Alternative B there would be seasonal restrictions on when prescribed fire could be implemented, generally limiting application of prescribed fire to cooler, moister spring and fall months. This would lead to cooler, less severe prescribed burns, and could limit adverse effects on soils compared to Alternatives A and D where no seasonal restrictions would be applied. .

Overall, Alternative B (grazing on approximately 265,000 acres) would have greater impacts to soils associated with livestock grazing than Alternative C (approximately 262,000 acres), but less than Alternatives A and D (approximately 273,000 acres). Managing livestock grazing activities in the McMasters Hills, Spokane Hills, and Indian Creek allotments as forage reserve allotments in Alternative B would impact soil resources less than in either Alternatives A or D where they would be managed as available for general grazing permits. Alternative B would pose a greater impact to soils in the Indian Creek allotment than Alternative C in which the Indian Creek allotment would be unavailable for grazing but where McMasters and Spokane Hills allotments would be managed as forage reserve allotments as in Alternative B.

There would be no impacts to soils from livestock grazing in the Centennial Gulch, Free Coinage, Alder Creek, Charcoal Mountain Custodial, Dickie, Maiden Rock Custodial, Quinn Creek, and Wineglass Mountain allotments in Alternative B as these areas would be unavailable for grazing. Alternative C manages these areas the same as Alternative B and would therefore also have no livestock grazing-related impacts. Alternatives A and D would manage these areas as available for general grazing permits and would have livestock grazing-related erosion and compaction impacts associated with them in these areas.

Alternative B would close or decommission approximately 371 miles of routes in the Decision Area currently open to use by motorized vehicles, the second most of any alternative. This reduction in ground disturbance should reduce soil erosion more than in Alternatives A and D, but less than in Alternative C.

Requiring weed and erosion control practices in burned areas having documented sedimentation where sedimentation is definitively impacting adjacent streams would minimize accelerated erosion resulting from loss of deep-rooted vegetative cover. This would be more pro-

tective of soil resources than Alternatives A and D, but less than Alternative C where any accelerated erosion in burned areas would be treated.

Allowing new roads and facilities for mining operations inside Riparian Management Zones only when an alternative does not exist would provide additional riparian soil protection beyond that provided in Alternatives A and D, but less than in Alternative C where no roads or facilities would be permitted in RMZs.

The Controlled Surface Use (CSU) stipulation for oil and gas exploration and development on slopes greater than 30 percent on non-Boulder Batholith soils, or greater than 20 percent on Boulder Batholith soils, or areas of mass wasting would be in effect on 249,137 acres Decision Area-wide. Under Alternative B, soils on approximately 112,585 120,133 of these acres (7,548 fewer acres than under Alternative A) would be even more protected by overlapping NSO stipulations or No Lease areas, leaving about 136,552 acres protected by the CSU stipulation.

Overall, Alternative B would pose more impacts to soil resources than Alternative C, but less than Alternatives A or D.

Effects of Alternative C

Treatment of up to 2,000 acres of grassland habitat; up to 750 acres of shrubland habitat; up to 4,800 acres of dry forest; up to 550 acres of cool, moist forest; and up to 200 acres of riparian areas per decade to restore vegetation communities would subject these acres to increased soil erosion and in some cases soil compaction effects as described under Effects Common to All Alternatives. These short to mid-term adverse effects to soils would be the least of all alternatives, but long-term benefits to soil resources associated with restored vegetative communities would be less in Alternative C than in any other alternative.

In Alternative C there would be seasonal restrictions on when prescribed fire and mechanical treatments could be implemented if in prescription. This could limit the effects on soils due to burning in the spring and fall when soil moisture is not as limited. It could also have the reverse effect with mechanical treatment by only allowing treatments in the spring or fall when the ground is wet and may cause more soil disturbance.

Alternative C has approximately 41,000 acres in the FMU designation "A" where wildland and prescribed fire is not desired. Fuels reduction treatments on these acres would be by mechanical methods without the use of prescribed fire. Because prescribed fire would not be used in these areas, a greater degree of ground disturbance may occur during fuels reduction treatments than in areas with other FMU designations. Soils may be subjected to greater ground disturbance related effects. Fire suppression response in these areas may also lead to more ground disturbance and associated impacts to soils

because wildland fire is not desired and suppression tactics may be more aggressive in nature than in areas with other FMU designations.

Prohibiting timber harvests in Riparian Management Zones in Alternative C would prevent some ground disturbing activities that could result in soil instability. Alternative C would more likely result in greater soil protection in riparian areas than Alternatives A, B or D.

Restricting firewood cutting to beyond 200 feet of live streams and 100 feet of intermittent streams would provide for the most down woody material as long-term nutrients for soils in riparian areas compared to any other alternative where firewood management is less restrictive (100 feet beyond live streams, 50 feet beyond intermittent streams in Alternatives B and D, SMZ law guidance in Alternative A).

Impacts to soils from livestock grazing would be slightly less in Alternative C than in Alternative B because three allotments (Indian Creek, Dog Paw, Sixmile Park County) available as either forage reserve allotments or for general grazing permits in Alternative B would not be available for grazing in Alternative C. All of these allotments would be available for general livestock grazing permits in Alternatives A and D and would therefore have soil impacts associated with them in these alternatives. Alternative C poses the least impacts to soils due to livestock grazing of all the alternatives.

Alternative C would close or decommission approximately 425 miles of routes currently open to use by motorized vehicles. This reduction in ground disturbance associated with motorized routes would reduce impacts to soils more than in any alternative.

Requiring weed and erosion control practices in burned areas having accelerated soil erosion would be more beneficial to soil resources than any other alternative where weed and erosion control practices would not necessarily be required (Alternatives A and D), or would only be required where sedimentation is observed to be impacting adjacent streams (Alternative B).

Under Alternative C new roads and facilities associated with mining operations would not be allowed in Riparian Management Zones. This would be more protective of riparian soils than any other alternative where mining-related roads and facilities could be constructed in riparian areas under certain conditions.

The Controlled Surface Use (CSU) stipulation for oil and gas exploration and development on slopes greater than 30 percent on non-Boulder Batholith soils, or greater than 20 percent on Boulder Batholith soils, or areas of mass wasting would be in effect on 249,137 acres Decision Area-wide. Under Alternative C, soils on approximately 234,076 of these acres would be even more protected by overlapping NSO stipulations or No Lease areas, leaving about 15,061 acres protected by the CSU stipulation. In the context of oil and gas exploration and

development, Alternative C would pose the least impact to soils of all alternatives.

Overall, Alternative C would be the most protective and would create the least impacts on soils.

Effects of Alternative D

Treatment of up to 19,100 acres of grassland habitat; up to 6,800 acres of shrubland habitat; up to 18,200 acres of dry forest; up to 5,050 acres of cool, moist forest; and up to 1,700 acres of riparian areas per decade to restore vegetation communities would subject these acres to increased soil erosion and in some cases soil compaction. These short to mid-term adverse effects to soils would be greatest of all alternatives, but long-term benefits to soil resources associated with restored vegetative communities would also be greatest in Alternative D of all alternatives.

In Alternative D there would be no seasonal restrictions on when prescribed fire could be implemented if in prescription. There could potentially be times where prescribed fire occurs in the summer months which may have more effects on soils than if burn projects were implemented during cooler, moister spring or fall months.

Under Alternative D, allowing timber harvest in streamside management zones would be the same as under Alternative A (implementing streamside management zone BMPs) and would result in no additional protection to soil resources. Alternative D would be less protective than Alternatives B and C to soils in riparian areas.

Impacts to soils associated with livestock grazing would be the same as described for Alternative A.

Alternative D would close or decommission approximately 310 miles of routes currently used by motorized vehicles. This reduction in ground disturbance would reduce soil erosion more than in Alternative A, but less than in Alternatives B and C.

The Controlled Surface Use (CSU) stipulation for oil and gas exploration and development on slopes greater than 30 percent on non-Boulder Batholith soils, or greater than 20 percent on Boulder Batholith soils, or areas of mass wasting would not be in effect under Alternative D. Under this alternative these areas would be protected by standard lease terms and would be subject to greater potential soils impacts than under any other alternative.

Overall, Alternative D would create the greatest amount of impacts to soil resources of the action alternatives.

WATER RESOURCES

Effects Common to All Alternatives

Under all alternatives the BLM would strive to maintain or restore water quality to levels that fully support all achievable beneficial uses. However, water quality could still vary considerably while still meeting water quality

standards. The following discussion describes potential water quality impacts that could occur following the implementation of any of these alternatives.

Water Quality is highly dependent on stream form and function. Key factors include stream flow characteristics, sediment characteristics, channel gradient, channel geometry, bank stability, floodplain connectivity, and channel and floodplain roughness. All of these factors should be able to function naturally and be characteristic of the local soil type, climate, and landform. Key characteristics of functioning streams include the following:

- Willows or other native woody vegetation should be present on those sites that are capable of supporting these life forms. In addition, sedges or other wetland/riparian species should be present on sites capable of supporting these plants. These locally adapted plants provide substantial root strength and are very effective at maintaining bank stability, trapping and filtering sediments, and filtering nutrients and fecal contamination. This vegetation should be vigorous and diverse.
- Riparian ground cover should be present at near natural levels. This would minimize the amount of exposed soils and the likelihood that these soils would wash into streams during precipitation events. A high level of ground cover would also increase sediment, nutrient, and bacterial filtration and prevent these materials from washing into the streams following hillslope and valley bottom disturbances.
- The stream water surface should have a high degree of shading, resulting in cooler water in summer and reduced icing in winter.
- Portions of the primary floodplain should be frequently flooded (inundated every 1 to 5 years).

By managing riparian areas and wetlands to be at, or moving towards, proper functioning condition (PFC), there should be improvements in water quality. For example, if a reach has a declining or static trend we'd expect sediment production (or nutrient, bacterial, and thermal inputs) to stay at or exceed current levels. Using the same logic, if trends were improving we'd expect lower levels of these pollutants. This is because improving trends suggests that banks are stabilizing and producing less sediment. In addition, since the condition of riparian vegetation and stream banks can both be used to indicate how much time livestock spends in or adjacent to streams, they can also be used to evaluate potential nutrient and bacterial inputs. If trends are improving, it is likely livestock are spending less time by water bodies and inputs of pollutants are decreasing.

Water quality is often influenced by processes and activities that take place in upstream areas of the drainage basin. In a natural system, the water quality of headwater areas depends mainly on the mineral composition of the

local geology as well as the types of rock and sediments that groundwater passes through on its way to the stream. Farther downstream, water quality becomes more influenced by land use and land management activities, including discharges from both point and non-point sources. Land management activities have the potential to affect the following key attributes: sediment, temperature, nutrients, pathogens, and dissolved oxygen.

Sediment is generated when soils are disturbed and then delivered to a water body. High concentrations of suspended sediment can cause many adverse consequences, including the following:

- Increased turbidity or impaired water clarity,
- Reduced light penetration,
- Reduced ability of predators that rely on sight to capture prey,
- Clogged gills of fish and aquatic invertebrates,
- Reduced fish spawning success,
- Reduced survival of juvenile fish

Other impacts such as smothering the benthic community and changes in the composition of the bed substrate could result when sediment is deposited in slow-moving receiving waters. Suspended sediment is also an efficient carrier of toxic organic substances and trace metals because these substances can bind to sediment particles. Once sediment falls out of suspension, pollutants in enriched bottom sediments can pose a risk to benthic life and the aquatic food chain.

In areas starved of sediment, increases in sediment can benefit channel geomorphology and development of aquatic habitat by creating spawning habitat and sites for vegetation to become established. Thus, not all sediment effects are negative.

Elevated water temperatures can substantially affect organisms adapted to a cold water environment. A rise in water temperature of only a few degrees over ambient conditions can reduce the number of or eliminate sensitive invertebrates and fish. Large daily fluctuations in temperature can also result in adverse effects.

Nutrients are needed for photosynthesis for supporting the requirements of organisms at higher trophic levels. In freshwater aquatic systems, the main nutrients are phosphorus and nitrogen. In particular, phosphorus is a controlling factor on photosynthesis in aquatic systems. High concentrations can stimulate the growth of plants and algae. Excessive growth of plants and algae can do the following:

- Reduce the aesthetic appeal of the water for recreational users,
- Clog the habitat used by other aquatic organisms,
- Cause large daily swings in dissolved oxygen concentrations, and

- Cause other nuisance conditions.

Waterborne pathogens could result in various adverse effects on warm-blooded animals drinking the water and even some possible adverse effects on human contact recreation activities. The main indicator of pathogens is the presence of coliform bacteria, which are microorganisms that live in the intestines of both warm- and cold-blooded animals, including humans. These bacteria enter the hydrologic system through fecal material that enters into water bodies. The presence of fecal coliform can also show that other harmful bacteria or viruses might be present. Fecal coliform bacteria in water bodies on BLM-administered lands are usually a result of non-point sources of human and animal waste (both domestic animals and wildlife).

The amount of oxygen that can be dissolved in water differs with temperature. Cold water can contain more dissolved oxygen than warm water. The amount of dissolved oxygen present in relation to the amount that could be dissolved at a given temperature is referred to as the saturation level. Decomposition of organic matter by microorganisms depletes levels of dissolved oxygen in slow-moving receiving waters and lakes and reservoirs. When dissolved oxygen levels drop too low, waters can become uninhabitable for aquatic organisms and might result in fish kills. Factors resulting in increased dissolved oxygen levels include the following:

- Physical mixing and agitation of the water (aeration),
- Photosynthetic production of oxygen by aquatic algae and plants, and
- Lower water temperatures.

The vegetative structure of communities dominated by noxious weeds is often less effective at providing protective ground cover than those dominated by native vegetation. Therefore, uplands or riparian areas dominated by noxious weeds will often see increases in erosion and sediment production. Noxious weed-dominated communities are also less effective than native communities at providing bank stability and sediment and nutrients filtration. The following effects are specific to these alternatives and would occur. Proposed management of the following resources or programs would have no anticipated impacts on water resources: cultural resources, paleontology, visual resources, wilderness study areas, economics, environmental justice, Indian trust resources, social and economic environment, and tribal treaty rights.

Requiring actions on Decision Area lands to be consistent with Land Health Standards (designed to prevent non-point source water pollution) would positively affect water resources. The degree to which water resources would benefit depends on the site's physical and ecological potential, the required management practices, and the extent of use restrictions.

Of the 346 miles of riparian vegetation along rivers and streams in the Decision Area, 150 miles are in proper functioning condition (43%), 147 miles are functioning at risk (42%), 40 miles are non-functional (12%), 1 mile is unknown (<1%), and 8 miles are woody draws (2%). Actions that contribute toward achieving proper functioning condition for riparian areas would positively impact water quality as noted in the discussion above on stream form and function.

Ground disturbance associated with road construction, vegetation or fuel treatments, livestock grazing, watershed restoration, recreation site development, and small scale minerals operations would have the potential to create short to mid-term impacts to water quality as described above (primarily from sediment). However poorly placed livestock facilities, poorly located roads and trails, ongoing road use and maintenance, and large scale minerals operations would have the potential for long-term impacts (primarily from sediment) as described above.

Roads and trails in riparian areas could produce long-term sediment impacts and could also alter the physical stream channel. By evaluating existing roads and trails for conformance to Land Health Standards, and closing those that are substantially contributing to non-conformance, there could be a long-term sediment reduction. This could produce a moderate to major long-term benefit to water quality.

Road or bridge construction and maintenance is the most frequently listed (303d list) cause for water impairment in the Planning Area (on BLM). Requiring road management to meet, or move toward meeting, Land Health Standards would further protect or improve water resources. This is especially true in watersheds that contain streams impaired due to road construction and maintenance. On Butte FO managed lands, approximately 35 miles of stream segments are listed due to road-related activities. These stream segments are within the following watersheds: Big Hole River (18 miles), Jefferson River (4.9 miles), Boulder River (3.7 miles), and the Upper Missouri River (8.8 miles).

Reducing the backlog of identified deferred road maintenance projects could contribute to the reduction of pollutants to surface water from erosion.

The development of silvicultural practices to contribute to meeting Land Health Standards would positively affect water quality by moving toward, and maintaining proper functioning condition of drainages or watersheds from a water, sediment, and nutrient routing perspective

The use of State of Montana BMPs to address non-point source water pollution and compliance with the Montana Water Quality Act would provide protection to water resources. Specific projects would be reviewed on a case-by-case basis to mitigate impacts to water quality and to minimize potential impacts to public health, safety, recreation, wildlife, birds, fish, and livestock. The

level of protection would depend on the needs of the resource at risk and the extent to which the BLM is a land manager in a given watershed.

Collaboration with the MDEQ and local communities in the development of Water Quality Restoration Plans and Source Water Protection Plans could contribute to the restoration of up to 77.3 miles of impaired river segments in the Decision Area. The degree to which water resources would benefit would depend on the level of participation by the BLM, MDEQ, and watershed groups; as well as plan implementation, monitoring, and enforcement.

Watershed restoration projects designed to meet riparian standards would positively affect water quality by moving the watershed and riparian areas towards proper functioning condition.

Use of emergency fire rehabilitation funds to protect water resources could help maintain water quality by reducing sedimentation. This includes reducing sediment delivery from soil mass movements, surface erosion, and accelerated streambank erosion.

On abandoned mine lands the implementing of reclamation projects would benefit water quality by reducing heavy metal concentrations. On Butte FO managed lands approximately 49 miles of stream segments are listed due to AML-related sources. These stream segments are within the following watersheds: Big Hole River (10.7 miles), Jefferson River (2.9 miles), Boulder River (11.5 miles), Upper Missouri River (22 miles), and the Blackfoot (1.9 miles).

Assessment of proposed mine waste repositories to determine potential impacts on soil and water resources would provide additional protection to water resources if proposed repositories are required to adhere to BMPs adequately protective of water resources.

Maintaining existing water rights to ensure water availability for multiple-use management and proper functioning riparian and upland areas would reduce dewatering of surface water. This is important as pollutant concentrations and routing is dependent on flows.

Requiring users to obtain all necessary permits pertaining to water quality, wetlands and streams, and managing rivers to maintain sufficient flows and water quality to comply with the MDEQ Water Quality Standards would provide additional protection of water resources.

Some potential exists for contamination of subsurface aquifers during oil and gas drilling and production operations. This potential is mitigated by the casing and cementing requirements of Federal Onshore Oil and Gas Order No.2. This order specifies that all usable water zones must be protected. Protection involves setting and cementing casing through usable water producing sections encountered during drilling. All oil and gas wells are required to have cement placed in the annulus to ensure no cross-contamination of the aquifers. This

would prevent drilling fluids, as well as fluids and gases from other formations encountered in the wellbore from contaminating aquifers. This measure, when properly completed, adequately mitigates the anticipated impacts to ground water. The BLM reviews, and modifies as needed, each proposed drilling program to determine the adequacy of the casing and cementing program. A cement bond log may be required to verify the integrity of the cement.

Operators of onshore federal and Indian oil and gas leases must comply with Onshore Order No. 7 prior to disposal of produced water. Produced water is often highly saline and the potential exists for contamination of surface and ground water, soil and vegetation. The Onshore Order provides requirements and standards for the protection of surface and subsurface resources. Injection wells that are used to dispose the produced water must be approved by the Montana Board of Oil and Gas Conservation under the Underground Injection Control program. Information submitted in support of obtaining a underground injection control permit is accepted by the BLM in approving the disposal method, provided the information submitted in support of obtaining such a permit satisfies all applicable BLM statutory responsibilities and relevant requirements (including but not limited to drilling safety, down hole integrity, and protection of mineral and surface resources). Migration of produced water from the intended disposal zone and leakage to a usable water zone could occur upon failure of the casing and the equipment used to isolate the disposal zone (tubing and packer). There are numerous standards to insure that underground injection wells do not result in pollution of usable water sources, including periodic pressure testing of well casing, tubing, and packers to confirm integrity of the system and isolation of disposal zones.

Plugging programs for abandoned wells are designed to secure the well bore and prevent contamination to mineral or water bearing formations. Cement is pumped into the wellbore to seal any perforations. Cement is also pumped into the wellbore at certain formations to act as plugs to prevent migration of any fluids or gases that might enter the wellbore.

The Fluid Minerals Appendix (**Appendix M**) includes a more complete description of drilling operations, disposal of produced water and abandonment procedures, and the measures employed to protect usable water.

Striving to meet state and federal water quality standards in watersheds impacted by historic mining would move water resources toward proper functioning condition.

Effects of Alternative A

The treatment of up to 5,250 acres of grassland and shrubland habitat; up to 5,100 acres of dry forest; up to 2,400 acres of cool, moist forest; and up to 30 acres of riparian areas per decade to restore vegetation communities could result in increased soil erosion and in some

cases, localized and minor short term sediment impacts (as described above in Effects Common to All Alternatives). However, there should be long-term benefits, as restored vegetative communities would lead to a more natural ground cover and reduced fuel loadings (lowering the risk of damaging high severity fires).

To reduce potential short term impacts associated with vegetative treatments, these actions would be subject to the Montana Streamside Management Zone (SMZ) Act. This law places restrictions on activities within 50 feet of streams with sideslopes less than 35 percent and 100 feet on streams with sideslopes greater than 35 percent. While the SMZ regulations would offer water quality protection, some vegetation removal could still occur within these areas. These disturbances could cause minor increases in water temperature; decreases in the amount of woody material delivered to the stream, and could cause local stream bank disturbances. These impacts would be partially mitigated through the implementation of site specific BMPs.

Livestock grazing would continue on approximately 273,000 acres. This could lead to additional inputs of sediment, nutrients, fecal contamination, and thermal loading. However, these inputs should be reduced (from current levels) through the implementation of grazing practices designed to ensure that riparian areas are either properly functioning or seeing improving trends.

Under current conditions (Alternative A) approximately 172 miles of motorized routes, mapped on the BLM transportation system, would remain closed (665 miles of roads and trails open to motorized use). Over time, erosion and sediment delivery would likely be reduced as these closed routes revegetate and soils stabilize.

Generally, road density is an indicator of overall watershed health and function. Watersheds with higher road densities tend to have lower water quality due to greater potential for erosion and subsequent sedimentation. Road density also is related to the distribution and spread of noxious weeds. Of all the alternatives, Alternative A maintains the most acres in high density roads (107,566 acres with greater than 2 mi/mi² road density) and the fewest acres in low density roads (116,236 acres with less than 1 mi/mi² road density).

Motorized routes within 300 feet of streams generally have greater potential to impact water quality through erosion and sedimentation, increased water temperatures (due to loss of shading vegetation), and direct alteration of stream channel morphology than those farther away. Under Alternative A, approximately 94.3 miles of motorized routes within 300 feet of streams would remain open to motorized use Decision Area-wide. This is the highest of any alternative and represents the greatest threat to water quality associated with motorized routes.

The continual unrestricted year-long motorized fording of the Big Hole River to access Sawlog Gulch would cause the most water quality impacts at this site relative

to any other alternative. However, this would be a localized short term impact

Managing to maintain Wild and Scenic River eligibility on all four eligible river segments (12 miles total in Upper Big Hole River, Upper Missouri River, Moose Creek, and Muskrat Creek) would likely improve water quality protection in these segments by limiting activities within a ¼-mile corridor on either side of each stream or river.

Continuing stream restoration activities associated with past mining and grazing would contribute to the general improvement of water resources. While these activities could produce short term impacts (sediment production) the long-term benefits derived from restoring natural function would outweigh these impacts.

Mineral operations permits would stipulate requirements and BMPs necessary to avoid or minimize adverse effects on water resources from structures, support facilities, and roads developed in relationship to mining activities.

Mitigating impacts to the extent possible on natural resources from extraction or salable minerals from previously disturbed sites would contribute to the maintenance of water resource quality in the vicinity of quarry or collection sites.

In the context of oil and gas development, Alternative A stipulates No Surface Occupancy within 500 feet of reservoirs, lakes, ponds and intermittent streams, or within 1,000 feet of perennial streams and rivers. This would minimize effects to water quality by requiring large buffers to aquatic features.

There are approximately 146,477 acres of federal mineral estate in the following municipal watersheds: Missouri River Siphon, Tenmile Creek Drainage, Big Hole River Intake, and Moulton Reservoir. The Reasonably Foreseeable Development scenario (RFD) for oil and gas development identified five sub-areas within the federal mineral estate where oil and gas exploration and development would most likely occur. The combined area of these sub-areas is approximately 116,295 acres. Of this total acreage, approximately 11,784 acres are located within the municipal watersheds listed above. All of these acres are located in the Missouri River Siphon municipal watershed. Under Alternative A, standard lease terms would apply in municipal watersheds that would allow relocation of proposed activity up to 200 meters (656 feet) to protect water quality.

Effects Common to Action Alternatives

Managing riparian areas to provide the amount and distribution of large, woody material characteristic of natural aquatic and riparian ecosystems would help dissipate stream energy associated with high water flow, thereby reducing erosion and improving water quality. Riparian area management would also contribute to sediment filtering, capturing bedload, and aiding in

floodplain development. Improvements in floodwater retention and ponding would also contribute to ground-water recharge.

Cooperating with federal, tribal, and state wildlife management agencies and private landowners to identify activities that adversely affect water quality would beneficially impact water resources by providing BLM with a better understanding of resource use effects on water resources.

The opportunistic enhancement or restoration of habitat for westslope and Yellowstone cutthroat trout, Arctic grayling, and other special status aquatic species would benefit water resources by increasing stream channel complexity thereby making streams more resilient in high flow events, and stabilizing streambanks where needed.

Locating and maintaining roads to reduce sedimentation and restore or maintain riparian vegetation would benefit surface water resources.

The change of existing travel management designations from “Open” to “Limited” for some areas in the Elkhorn Mountains, the warm-up area in the Whitetail-Pipestone area, and a portion of the 450-acre Radersburg OHV use area would result in the reduction of cross-country motorized use. This could have a positive effect on water quality through reduction in land use intensity, reduction of sedimentation, and other pollutants to surface water.

Continued route-by-route evaluations for site-specific TPAs using a repeatable, systematic process could result in the closure of additional roads exhibiting accelerated soil erosion, which could reduce the amount of sedimentation to surface water.

Closing the Humbug Spires Potential ACEC yearlong to all motorized travel, prohibiting the construction of new roads and trails, and mitigating erosion on the existing trails would provide additional protection to surface water resources from sedimentation.

Restrictions to livestock grazing along the river shoreline north of Homestead Pasture in the Sleeping Giant ACEC from Memorial Day weekend through Labor Day weekend would provide additional protection to surface water resources in this area from sedimentation, loss of riparian vegetation and nutrient and bacterial loading.

Prohibiting the extraction of salable minerals from the Humbug Spires Potential ACEC would reduce the likelihood of vegetation loss, road construction and use, and other activities that could result in sedimentation impacts to water quality.

The No Surface Occupancy stipulation for oil and gas exploration in wetlands, floodplains, and riparian areas would prevent direct impacts to water quality and would protect water quality. Standard Lease Terms would also apply in which locations of exploration facilities could be relocated up to 200 meters to avoid impacting water

quality. This would afford a similar level of water quality protection on lakes, ponds, reservoirs, and intermittent streams as Alternative A, but would generally be less protective than Alternative A on perennial streams and rivers. However, under specific alternatives additional NSO stipulations of various widths to protect streams with sensitive fish species and blue ribbon fisheries values would provide more protection of rivers and some streams than under Alternative A.

Monitoring water quality to establish baseline conditions, identifying areas of concern, and documenting progress from mitigation measures would enable land stewards to track impacts from resource uses and the effectiveness of BMPs on water quality.

Effects of Alternative B

While all alternatives would meet, or strive to meet, state water quality standards, Alternative B would produce better water quality than would Alternative A.

The treatment of up to 11,800 acres of grassland habitat; up to 3,650 acres of shrubland habitat; up to 14,750 acres of dry forest; and up to 3,750 acres of cool, moist forest per decade to restore vegetation communities could result in increased soil erosion and in some cases, localized and minor short term sediment impacts (as described above in Effects Common to All Alternatives). However, there should be long-term benefits as restored vegetative communities would lead to a more natural ground cover and reduced fuel loadings (lowering the risk of damaging high severity fires). These long-term benefits would be greater than those generated under Alternatives A and C, but less than those under Alternative D.

The establishment of Riparian Management Zones (RMZs), areas where the management emphasis would be on maintaining and restoring riparian processes, would increase water quality protection, when compared to Alternatives A and D. These RMZs are both wider and more protective than SMZs (used in alternatives A and D), as SMZs only apply to vegetative treatments. This could improve all aspects of water quality.

To achieve the maintenance and restoration of riparian function, mechanical treatment of up to 700 acres of riparian areas per decade could occur. This might create minor short-term sediment impacts (as noted under Effects Common to All Alternatives). However, improving the function of riparian areas would produce several long-term benefits to water quality. These long-term benefits would be greater than in Alternatives A and C (30 acres and up to 200 acres per decade, respectively), but less than in Alternative D (up to 1,700 acres per decade).

Overall, grazing related water quality impacts would be slightly reduced from alternative A (and also lower than Alternative D) because the McMasters Hills, Spokane Hills, and Indian Creek allotments would be managed as

forage reserves rather than as general grazing areas. The total amount of lands grazed (265,000 acres) would also be lower than Alternatives A and D (273,000 acres).

There would be no impacts to water quality from livestock grazing in the Centennial Gulch, Free Coinage, Alder Creek, Charcoal Mountain Custodial, Dickie, Maiden Rock Custodial, Quinn Creek, and Wineglass Mountain allotments in Alternative B as these areas would be unavailable for grazing. This would represent a reduction in grazing related impacts from alternative A (and D) and an improvement in water quality. Overall, grazing related improvements would be slightly less than those achieved under Alternative C.

Under Alternative B aerial application of herbicides to treat noxious weeds would not occur within a minimum of 100 feet of streams or wetlands. This measure would be more protective of water quality than Alternative A (no protection), and less protective than Alternative D (no spray within 200 feet) and Alternative C (no aerial application of herbicides at all).

Actions by the BLM to ensure that water quality protection provisions are followed when permitting activities would positively impact water quality.

Alternative B would close or decommission approximately 371 miles of routes in the Decision Area currently open to use by motorized vehicles, the second most of any alternative. This reduction in ground disturbance would reduce soil erosion and should produce a moderate to high long-term benefit to water quality (compared to the current conditions).

Alternative B would provide more acres of low density roads across the Decision Area (131,982 acres with less than 1mi/mi² road density) compared to Alternative A (116,236 acres) and Alternative D (123,073 acres) but less than Alternative C (141,264 acres). In the moderate road density category (1 to 2 mi/mi² road density), Alternative B would produce nearly 4,000 more acres of this category compared to Alternative A and this alternative has almost 20,000 acres less in the high road density category (greater than 2 mi/mi² road density) than Alternative A. This would represent a reduction in risks, associated with watershed conditions, from the current management situation.

Although some new permanent roads would be allowed for long-term forest management and mineral entry, both permanent and temporary road construction would be kept to a minimum. In addition, temporary roads would be decommissioned within one year of use. Alternatives B and C would both provide many protections to streams including minimizing road locations in riparian areas, minimizing sediment delivery from road surfaces, out-sloping road surfaces and minimizing disruption of natural hydrologic flow paths.

Under Alternative B, approximately 77.4 miles of motorized routes within 300 feet of streams would remain

open to motorized use Decision Area-wide. This is less than with Alternatives A and D (94.3 miles and 81.2 miles, respectively), but more than in Alternative C (73.7 miles). Alternative B would pose the second lowest threat to water quality (associated with roads in and near riparian areas) of all alternatives. It would also represent an improvement over existing conditions.

In the context of road design and maintenance, Alternative B would include measures such as minimizing road locations in RMZs, outsloping roadway surfaces where possible, routing road drainage away from streams, and installing stream crossing culverts to meet BLM standards of accommodating 25-year storm events. This is more protective of water quality and streams than Alternative A, slightly more protective than Alternative D, and less protective than Alternative C.

In the context of Wild and Scenic Rivers, Alternative B would provide more water quality protection than Alternative D (no rivers recommended as suitable), but less than Alternatives A and C. Alternative B would recommend Muskrat Creek (2.6 miles) and the Upper Missouri River (3.1 miles) as suitable for Wild and Scenic River designation. Designation and the subsequent Wild and Scenic River plans would likely protect water quality by minimizing ground disturbing activities within a ¼-mile corridor on either side of designated river segments. Alternative B would not recommend Moose Creek (4 miles) or the Upper Big Hole River (2.3 miles) as suitable for WSR designation whereas water quality in these two segments would be more protected in Alternatives A (managed to maintain eligibility) and C (recommended as suitable).

Under Alternative B, consideration to implement and meet pollutant reduction targets identified in Water Quality Restoration Plans (WQRPs) would be based on reasonableness, attainability, and available funding. This would provide more assurances that water quality would be improved than under Alternatives A and D which do not include specific provisions regarding WQRPs.

Increasing the likelihood of increasing or maintaining instream flows through consideration of water rights acquisitions (in both Alternatives B and C) could benefit water quality more than in Alternatives A and D where no consideration would be given to acquiring water rights. One stream segment on BLM-managed land is impaired due to dewatering: 0.06 miles of Pintlar Creek. Nineteen stream segments (about 32 miles of segments) on BLM-managed land are impaired due to flow alteration. Some of these stream segments would be restored by stabilizing flow rates through the control of water withdrawals.

Under Alternative B, requiring weed and erosion control practices in burned areas having documented sedimentation to surface water would benefit surface water resources more than in Alternatives A and D where no such provisions would be provided, but less than in

Alternative C where any accelerated erosion in burned areas would be mitigated.

Only allowing new roads and facilities, for mining operations, inside Riparian Management Zones when no other alternative exist would provide additional water quality protection beyond that provided in Alternatives A and D, but less than in Alternative C where no roads or facilities would be permitted in RMZs.

Under Alternative B a No Surface Occupancy stipulation for oil and gas exploration would be in place on approximately 146,477 acres in the following municipal watersheds: Missouri River Siphon, Tenmile Creek Drainage, Big Hole River Intake, and Moulton Reservoir. Protection provided by this stipulation would likely be most critical on approximately 11,784 acres of land in the Missouri River Siphon that are located within one of the sub-areas identified in the RFD as being most likely to have oil and gas exploration/development activity. This stipulation does allow for exceptions or modifications if the lessee can demonstrate that operations can occur within municipal watersheds without causing negative impacts to water quality at the intakes, or if the authorized officer determines that portions of municipal watersheds can be leased without causing water quality at intakes to violate drinking water standards. This would be more protective of municipal water supplies than standard lease terms in Alternative A and the Controlled Surface Use stipulation in Alternative D, but less protective than the No Lease stipulation in Alternative C.

Effects of Alternative C

While all alternatives would meet, or strive to meet, state water quality standards, Alternative C would improve water quality from current conditions. In fact, it would produce better water quality than possible under all the other alternatives.

The treatment of up to 2,000 acres of grassland habitat; up to 750 acres of shrubland habitat; up to 4,800 acres of dry forest; and up to 550 acres of cool, moist forest per decade to restore vegetation communities could result in increased soil erosion and in some cases, localized and minor short term sediment impacts (as described above in Effects Common to All Alternatives). These impacts would be the least of any of the alternatives because Alternative C proposes the least amount of ground disturbance associated with vegetation treatments. However, this alternative would also generate the lowest level of long-term benefits (associated with restoring vegetative communities and associated ground cover and fuel loadings) than the other alternatives.

Like Alternative B, Alternative C proposes Riparian Management Zones (RMZs) where management emphasis would be on maintaining and restoring riparian resources. Since the RMZ widths in Alternative C would be greater than those in Alternative B, Alternative C would provide the greatest level of protection from land management activities.

To achieve the maintenance and restoration of riparian function, the mechanical treatment of up to 200 acres of riparian areas may occur per decade. This might create minor short-term sediment impacts as noted under Effects Common to All Alternatives. These effects would be greater than with Alternative A (30 acres), but less than with Alternatives B and D (up to 700 acres and up to 1,700 acres per decade, respectively). However, improving the function of riparian areas would produce several long-term benefits to water quality.

Alternative C is the only alternative where timber harvest would not be allowed in riparian areas. This would provide the most water quality protection from harvest related sediment and other pollutants. However, this could make it more difficult to manage these areas for specific characteristics potentially increasing long-term risk (i.e. reduce fuel loadings).

Overall, this alternative would produce the lowest level of grazing related impacts to water quality (and an improvement from current conditions). This is because the McMasters Hills and Spokane Hills allotments would be managed as forage reserves rather than as general grazing areas. In addition, the Indian Creek, Dog Paw, Six-mile Park County allotments would not be available for grazing. These three allotments would be available as either forage or general permits under Alternative B and available for general permits under alternatives A and D. In addition, the total amount of lands available for grazing (262,000 acres) would also be lower than under any other alternative (Alternative B = 265,000 acres; Alternatives A and D = 273,000 acres).

Under Alternative C no aerial applications of herbicide to treat noxious weeds would occur. This is more protective of water quality than any other alternative where aerial applications would occur with various “no-spray” riparian buffers in Alternatives B and D and no “no-spray” riparian buffer in Alternative A.

Alternative C would close or decommission approximately 425 miles of routes currently open to use by motorized vehicles. This reduction in ground disturbance associated with motorized routes would reduce impacts to water quality (primarily sediment) more than with any other alternative as these routes re-establish vegetation. . This reduction in ground disturbance would reduce soil erosion and should provide a moderate to high long-term benefit to water quality (compared to current conditions).

Alternative C would provide the most acres of low density roads (141,264 acres with less than 1 mi/mi² road density) compared to all other alternatives. This represents 25,000 more acres than currently exists. Alternative C would also produce the fewest acres with high road densities (road density greater than 2 mi/mi²) of all alternatives (26,000 fewer acres than current conditions). Of the action alternatives, Alternative C would produce 6,500 fewer acres of high road density com-

pared to Alternative B and 14,300 less than Alternative D. Having the lowest road density would suggest that there is less chance for roads to impact streams. This would indicate a lower risk to water quality than the other alternatives.

Under Alternative C, approximately 73.7 miles of motorized routes within 300 feet of streams would remain open to motorized use Decision Area-wide. This is less than with any alternative and would represent a reduction of 21.6 miles from current conditions. Therefore, Alternative C would pose the lowest impact to water quality associated with roads in and near riparian areas of all alternatives.

In the context of road design and maintenance, Alternative C would be the most protective of water quality of all alternatives. In addition to measures taken in Alternatives B and D, Alternative C also calls for stream crossings to accommodate 100-year storm events (compared to the BLM standard of 25-year storm events in the other alternatives). This would reduce the risk of culvert failure and associated channel impacts (scour and deposition).

In the context of Wild and Scenic Rivers, Alternatives C and A would provide the greatest level of water quality protection of all the alternatives. All four segments (12 miles) would be recommended as suitable for WSR designation in Alternative C. Water quality would likely be more protected in all four of these segments compared to Alternative B where only two segments would be recommended as suitable, and Alternative D where no segments would be recommended as suitable.

Alternative C proposes the designation of the Spokane Creek ACEC (14 acres). The entire potential ACEC is essentially a riparian area. Proposed ACEC management would increase protection of water quality in this area by not allowing new road construction, closing the area to new rights-of-way and R&PP leases, and providing for No Surface Occupancy for oil and gas exploration. These measures would not be in place under any other alternative because this potential ACEC is not proposed in those alternatives.

Under Alternative C, benefits associated with considering the acquisition of water rights from willing sellers would be the same as in Alternative B.

Requiring weed and erosion control practices in all burned areas having any accelerated erosion would benefit surface water resources more than with any other alternative. This is because Alternatives A and D have no requirements for this at all and Alternative B provides for this measure only when sedimentation effects are definitively taking place.

Under Alternative C BLM would commit to reducing pollutants in streams to target levels indicated in Water Quality Restoration Plans. This would benefit water quality more than with any other alternative because no

such commitment is made under Alternatives A or D; and under Alternative B meeting targets would be considered, but not necessarily committed to.

Prohibiting new mineral operation roads and facilities inside Riparian Management Zones would provide additional water quality protection (potentially to the extent of removing some stream segments from the impaired list). Alternative C would provide more water quality protection associated with mining operations than Alternatives A, B or D.

Alternative C includes the proposed withdrawal from mineral entry of approximately 180 acres of riparian areas in the Muskrat Creek drainage and would therefore provide greater water quality protection in that area associated with mining than any other alternative.

Under Alternative C the No Lease stipulation for oil and gas exploration would be in place on approximately 146,477 acres in the following municipal watersheds: Missouri River Siphon, Tenmile Creek Drainage, Big Hole River Intake, and Moulton Reservoir. This would essentially eliminate the possibility of impacts to water quality in municipal watersheds associated the oil and gas exploration and development.

Effects of Alternative D

While all alternatives would meet, or strive to meet, state water quality standards, Alternative D would produce the least improvements to water quality than the other action alternatives. However, it would provide a slight improvement over what would occur under current management (Alternative A).

Treatment of up to 19,100 acres of grassland habitat; up to 6,800 acres of shrubland habitat; up to 18,200 acres of dry forest; and up to 5,050 acres of cool, moist forest per decade to restore vegetation communities could result in increased soil erosion and in some cases, localized and minor short term sediment impacts (as described above in Effects Common to All Alternatives). These impacts would be the greatest of all alternatives because Alternative D proposes the greatest amount of vegetation treatments. However, this alternative would also generate the greatest level of long-term benefits (associated with restoring vegetative communities and associated ground cover and fuel loadings) than the other alternatives.

Treatment of up to 1,700 acres of riparian areas per decade to restore riparian vegetation communities may occur. This might create minor short-term sediment impacts (as noted under Effects Common to All Alternatives). If at the project scale an approach that focuses on achieving site-specific riparian ecological objectives is used, this could create the potential for the greatest long-term benefits to water quality associated with improved riparian vegetative conditions of all alternatives. In many cases, treating riparian areas to meet a broad range of site-specific ecological objectives would likely lead to leaving greater quantities of trees, snags, and down

wood than if they are managed under the SMZ law. However, the riparian management prescribed under Alternative D would be SMZs as per the SMZ law. Allowing timber harvest in streamside management zones (within the up to 1,700 acres described above) would have similar effects as those described under Alternative A. If that management is conducted based on the SMZ law, Alternative D would be less protective of water quality associated with riparian timber harvest than either Alternatives B or C.

Effects to water quality associated with livestock grazing would be the same under Alternative D as those described for Alternative A.

Under Alternative D aerial spraying of herbicides to treat noxious weeds would not occur within 200 feet of streams or wetlands. This would be more protective of water quality than Alternatives A and B, but less than Alternative C.

Alternative D would close or decommission approximately 310 miles of routes currently used by motorized vehicles. This reduction in ground disturbance would reduce soil erosion and should provide a moderate to high long-term benefit to water quality (compared to current conditions). However, the improvement would be less than under Alternatives B and C.

Under Alternative D, approximately 81.2 miles of motorized routes within 300 feet of streams would remain open to motorized use Decision Area-wide. This is 13.1 miles less than currently exist but would leave more miles than under Alternatives B and C. As a result, Alternative D would pose the second greatest threat to water quality related to roads in and near riparian areas of all alternatives (but it would still represent an improvement over current conditions).

Alternative D would provide more areas with low road densities (less than 1 mi/mi² road density) than currently exists (123,073 acres versus 116,236 acres with Alternative A). However, it would have the least among the action alternatives. It would also provide a reduction in the amount of area with high road density (greater than 2 mi/mi² road density) from current conditions (95,481 acres versus 107,560 acres for Alternative A). However, this would be the lowest reduction among the action alternatives. These road densities suggest that this alternative would pose a reduced risk (to water quality) from current conditions, but the highest among the action alternatives.

In the context of road design and maintenance, Alternative D would be slightly less protective of water quality and streams than Alternative B, more protective than Alternative A, but less protective than Alternative C where stream crossings would be designed to accommodate 100-year storm events.

Alternative D would recommend no potential Wild and Scenic Rivers as suitable for WSR designation. There

would be no potential benefits to water quality in any of the four eligible river segments. This constitutes the least potential benefit to water quality of any of the alternatives.

Allowing new roads and facilities, associated with mining operations, to be built in riparian areas would impact water quality similarly to Alternative A and would be less protective than Alternative C.

Under Alternative D a Controlled Surface Use stipulation for oil and gas exploration would be in place on approximately 146,477 acres in the following municipal watersheds: Missouri River Siphon, Tenmile Creek Drainage, Big Hole River Intake, and Moulton Reservoir. This stipulation would allow for relocation of proposed roads, drilling sites, and other facilities, or application of appropriate mitigating measures to protect drinking water. This would be more protective of municipal water supplies than standard lease terms in Alternative A but less protective than the No Surface Occupancy stipulation in Alternative B or the No Lease stipulation in Alternative C.

VEGETATIVE COMMUNITIES

Effects Common to All Alternatives

General Vegetation

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to vegetation: Geology, Paleontology, Back Country Byways, National Trails, Wild and Scenic Rivers, Environmental Justice, Hazardous Materials, Indian Trust Resources and Tribal Treaty Rights.

Seasonal restrictions, project access, development, and vegetative resources management activities are designed to reduce the amount of mineral soil exposure and length of time that the soils are exposed. In 2004, the use of Forestry Best Management Practices was demonstrated to be 96 percent effective in adequately limiting non-point source pollution in the 354 practices rated on federal lands (Montana DNRC, 2004). These practices would support soil fertility and productivity and would help maintain healthy and diverse vegetation.

Special Status Species Management could restrict the timing of some restoration activities, especially spring burning. Most timing restrictions occur during winter and breeding seasons. For example wolf den sites would be avoided during the denning period while raptor nests would be avoided during the breeding season. These restrictions could make implementation more difficult, but would not prevent restoration of vegetative communities.

Fire Management Unit (FMU) Designations affect vegetation variably by determining what application (tool) is allowed to treat vegetation and what the suppression response will be.

In FMU designation A, wildland and prescribed fire is not desired. Fire management emphasis would be placed on prevention, detection, rapid response, use of appropriate suppression techniques and tools, and non-fire fuels treatments. The effects on vegetation with non-fire fuels treatments would possibly be more ground disturbance, less nutrient cycling and less overall reduction in the fuel loadings due to no fire application. The suppression response may also lead to more ground disturbance due to the fact that wildland fire is not desired.

In FMU designation B wildland and prescribed fire are likely to cause negative effects, but these effects can be minimized or avoided through fuels management. The effects on vegetation would be similar to FMU A, except prescribed fire would be an alternative tool to use if appropriate; this would allow for more nutrient cycling and more fuel load reductions. Ground disturbance would be similar to FMU A, because the emphasis would still lean toward mechanical based treatment in this FMU designation. Suppression response would also be similar to FMU A but would allow more flexibility which may limit ground disturbance.

In FMU designation C natural, wildland fire use for resource benefit and prescribed fire is desired to manage ecosystem but constraints need to be considered. The effect on vegetation would be similar to FMU B except prescribed fire is desired and would be used in wider application compared to FMU B. Ground disturbance may be less and nutrient cycling and overall fuels load reduction would be greater with prescribed fire application. These areas would receive lower suppression priority in multiple wildland fire situations and would allow more flexibility which may limit ground disturbance.

In FMU designation D, natural wildland fire use for resource benefit and prescribed fire is desired to manage ecosystems with no constraints. The effect on vegetation would be similar to FMU C except wildland fire use for resource benefit is desired and would be used in wider application. Ground disturbance may be lessened and nutrient cycling and overall fuel load reduction would be greater with prescribed fire application. These areas would receive lowest suppression priority in multiple wildland fire situations and would allow more treatment flexibility which could limit ground disturbance.

Air quality restrictions from the Montana/Idaho Airshed Group and Montana DEQ could have a moderate but localized impact on restoration treatments that include prescribed burning by limiting the amount of burning that could take place at certain times or under certain air quality conditions.

Some cultural resource sites could be encountered and could have negligible effects on vegetative restoration activities by the designation of avoidance areas or possible restriction on implementation tools.

Development of new recreation sites would directly remove vegetation from sites where facilities are con-

structed and lead to altered vegetation near recreation sites from activities such as trampling, collecting fire wood, and picking wild flowers.

Use of new and developing technologies and industries would help achieve healthy forest and biomass utilization goals by broadening and varying the tools available for treatment and increasing the number of collaborative partners. These improvements would reduce the economic and budgetary constraints, and the number of declining vegetative situations that can be feasibly treated would be increased. These would provide for more positive impacts and improve the results of the treatments.

Grassland and Shrublands

Prescribed fire, timber harvest and other mechanical treatments would reduce conifer encroachment in grasslands and shrublands, helping to establish pre-fire suppression conditions. Grasses, forbs, and shrubs would increase in density and vigor with removal of conifers. Treatments would reduce the canopy coverage, potential conifer foliage impacts on soils (acidification and changes in soil microorganisms), and the direct competition of conifers with native grasses, forbs, and shrubs, setting back succession to a more open, seral condition.

The use of low intensity fires in broadcast burning should move these vegetative communities back toward historic conditions. Prescribed fire would consume above-ground biomass but would not cause mortality to most perennial herbaceous species. Fires would move relatively quickly through grasslands and shrublands and soil temperatures would not be sufficiently high to kill roots and growing points of most grasses and forbs. Most perennial herbaceous species would generally respond within one year with vigorous regrowth. Most annual species of grasses and forbs would reproduce from seeds following prescribed fire.

Relatively high rates of mortality would occur to seedlings and saplings of conifers and some species of shrubs that do not sprout from root crowns (e.g., big sagebrush and bitterbrush). Impacts to these shrub species could persist in the mid to long-term. Other species of shrubs sprout from root crowns following fire so there could be a shift in composition to higher percentages of shrubs that regenerate from root sprouts.

Mechanical treatments (no fire) would be used in most cases to remove conifer encroachment in shrubland communities and would have negligible mortality of desired shrub species associated with them. In these areas where fire is used as a treatment, some loss of desired species, such as sagebrush and bitterbrush, is expected. Use of low intensity fire and/or combination of low intensity fire and mechanical treatments to allow for a mosaic burn in these areas would minimize mortality of desired species. These treatments would have long-term benefits to shrublands due to elimination of competition from conifers.

Conifer removal treatments would create a mosaic of multiple successional stages; reducing the dominance of woody vegetation in grassland and shrubland communities and releasing suppressed, desired plants.

Treatments within sagebrush communities would emphasize improving or maintaining habitats for sage grouse and other sagebrush dependant species by removing conifer encroachment, creating a mosaic of grassland and sagebrush habitats, and regenerating decadent sagebrush. Project level objectives would be to prevent a decline in the quality and quantity of sagebrush communities.

Livestock grazing would stimulate biomass production for some grass species and most shrubs, and reduce production of other species (mostly forbs) that are sensitive to grazing. Plant species diversity may be reduced in localized areas near water sources or salt grounds where animals congregate. Species with low palatability, including most noxious weeds and some invasive species would increase in density on some sites, particularly those with severe ground cover loss or in bunchgrass communities.

By reducing biomass production, grazing could reduce the frequency and intensity of wildland fire by reducing fine fuels, which would favor encroachment of conifers into grasslands and shrublands. Livestock grazing would recycle plant nutrients through ingestion and deposition of waste.

Implementation of livestock grazing guidelines to promote vegetative recovery and maintenance would minimize these impacts and could result in a net improvement to the health of grasslands, sagebrush communities, and shrublands where grazing has caused degradation. Prescriptive grazing could be used as a management tool to achieve specific habitat objectives such as the reduction of noxious weeds.

Treatments to reduce noxious weeds in grasslands and shrublands could have short-term localized mortality of native plants (primarily forbs) associated with them but would benefit these areas overall by reducing or eliminating competition from noxious weeds and allowing native plants to dominate. The amount affected would vary with herbicide application method. Aerial application would be used on large areas of heavy weed infestations. Ground broadcast would be used on smaller areas of heavy infestations. Hand spot application would be the most common application method and would have little effect on other vegetation as the application would be target specific to the individual weed plants.

Roads through grassland and shrubland habitats would continue to preclude re-establishment of grassland and shrubland vegetative species within their footprints. Roads would also continue to facilitate introduction and spread of noxious weeds.

Leasing solid minerals would lead to disturbances and removal of vegetation during exploration and development. Reclaimed land could have reduced plant species diversity potentially for decades following mining.

Reclamation of abandoned mine lands would increase vegetation cover, productivity, and diversity in the long-term.

Sleeping Giant ACEC management restricting livestock grazing along the river shoreline north of Homestead Pasture from Memorial Day weekend through Labor Day would improve vegetation health and vigor.

Forests and Woodlands

Due to long-term fire suppression, forests and woodlands have become dense with fuel quantities increasing such that wildland fires often are more intense and severe than under historic fire regimes (Keane *et al.* 2002). In some cases this results in widespread stand replacement. This stand replacement could result in vegetation type conversion, severe erosion or the need for extensive restoration efforts, including tree planting.

Silvicultural treatments including harvest, thinning, other mechanical treatments, and prescribed fire would reduce conifer stocking in many areas and could create openings of various sizes to stimulate development of young stands. This is expected to enhance or maintain healthy vegetative structure; density; and species composition, pattern, and distribution; which would promote forest productivity and reduce the occurrence of forest disease and insect outbreaks. In addition, the severity of vegetative impacts resulting from wildfire events would be reduced.

Harvesting of Christmas trees, firewood, and other public demand forest products would generally take place near open roads, due to effort needed to first locate, cut down, and then physically remove the purchased product to the transporting vehicle. Removal of Christmas trees would reduce the density of conifer saplings by a small amount in some locations, although this is considered to be negligible as very few naturally grown saplings are considered to have acceptable Christmas tree qualities such as good crown conformation, color, and shape. Post and pole harvesting and removal of other woody materials would also contribute to thinning smaller trees and allowing larger diameter trees to dominate in the overstory canopy. While the removal of these and other types of forest products such as Christmas boughs, wildling transplants, and specialty furniture stock, may be obvious within a specific location, the amounts removed would generally be small, typically loaded in a pick-up truck, and the area affected would usually be less than 2 acres, with the cutting and removal being selective in nature.

Regeneration harvesting (i.e., clearcutting, seed tree harvest, and shelterwood harvesting) would tend to create openings for new forest regeneration often with

tree removals at levels similar to tree mortality observed in stand replacement burning. Thinning and selection treatments including mechanical treatment, and understory burning would reduce the density of seedling, pole, and medium-sized (9 to 15 inch DBH) trees resulting in a more open overstory canopy of larger trees.

Some larger trees would be removed in regeneration harvesting, group selection removal, insect control, and access requirements. Also, some large trees would be killed with burning prescriptions. This could increase snag density per acre and the amount of down woody material. Forests would be more open with a larger proportion of larger-diameter trees.

Removal of groups or stands of trees would result in seral vegetative conditions, similar to those found in newly establishing forest. Conifer seedlings regenerated naturally or artificially, would establish under open conditions that also stimulate the grasses or shrubs, until the developing tree canopies close, and trees dominate the treatment area (about 15 to 30 years). Such openings tend to favor pine species in mixed conifer types, while shelterwood and selective treatment methods favor regeneration of Douglas-fir, and subalpine fir at higher elevations.

Post and pole harvesting and removal of other woody materials would also contribute to thinning smaller trees, which would reduce wildland fire intensity and allow larger diameter trees to dominate the overstory canopy. This acreage, however, is negligible.

Based on 2004 insect surveys, approximately 15 percent of all mature forest types may be involved with some type of silvicultural treatment or insect control. Treatments to reduce the risk of epidemic levels of forest insects or disease would result in removal of affected trees or trees at risk for sustaining insect or disease epidemics. Treatments would create and promote forest stand structure and composition that is resilient to epidemic outbreaks, and may periodically require regeneration of new stands to reduce risks or infestations of pests such as mountain pine beetle or dwarf mistletoe. Resilient forests can be characterized by more open stands with more diversity in both structure and composition.

Insect control in post-wildland fire environments would be considered and/or implemented during emergency site stabilization and restoration activities, protecting large trees that are susceptible to infestation and mortality. This is expected to increase the rate of natural forest regeneration by retention of important live seed sources for the conifer species. Only Wilderness Study Areas would be excluded from insect control through infested tree removal or salvage techniques by BLM policy.

Where serious infestations already exist, direct suppression would regenerate a new stand or stand component in the opening created by the mortality and/or salvage.

Timber salvage operations would usually result from wildfires or insect infestations, and could consist of a variety of harvest methods including even-aged management. Salvage operations would reduce fuel loading and allow regeneration of lodgepole pine and Douglas-fir. Conversely, salvage operations in the spring may reduce soil productivity by compacting moist soils, which could result in lower regeneration establishment and slower growth. This effect would rarely occur because timber removal and heavy equipment work on Decision Area lands has generally been limited to conditions when the soils are frozen or dry. This restriction is a variation on Best Management Practices (BMP) designed to protect soil productivity and reduce soil loss, and it has been universally applied to all BLM salvage operations and any other timber harvesting work conducted in the Decision Area in the past.

Fuels reduction in the wildland urban interface would result in the removal of trees and shrubs to reduce the hazards associated with high intensity and severity wildland fires. Fuels reduction would decrease the density of seedlings and saplings and ladder fuels (lower tree branches) and would result in a more open forest dominated by larger-diameter trees.

On-site dispersal of woody material created by mechanical reduction or other management actions would contribute to cycling of nutrients and organic matter and provide nutrients for fungi, bacteria, invertebrates and other organisms that are an integral part of forest ecosystems.

Wildland fire suppression would affect vegetation by preventing fires that: reduce fuel loading; decrease tree density; and regenerate lodgepole pine and aspen stands. However, suppression also prevents severe soil scorch and other detrimental effects associated with high-severity wildland fires.

VRM Classes I and II would limit some types of restoration tools available, such as creating large openings in the forest canopy. Impacts would be negligible with the majority of restrictions affecting the Big Hole River corridor, where visual quality is an important resource. Such prescriptions could be modified to smaller openings, group selections, or other means of partial cutting.

The designation of ACECs would have minor impacts to forest and woodlands. Management to protect relevant and important values could place restrictions in some ACECs that would prevent certain types of vegetative treatments.

Placement of new permanent roads for access would reduce the amount of healthy forest land by approximately 2½ to 3 acres per mile of road, as the forest vegetation would not be able to regenerate in those locations. However, the use of temporary roads for access would retain forest productivity in those locations after abandonment and rehabilitation.

Dry Forest

Dry forest treatments would help restore the historic structure and composition of dry Douglas-fir, ponderosa pine, and limber pine forests. Treatments would reduce conifer stocking and stimulate ground vegetation, thereby restoring conditions consistent with pre-fire suppression conditions. Treated Douglas-fir forests will be more resilient to western spruce budworm, as susceptible dense, multi-storied canopies are thinned (Joy and Hutton, 1990).

While most of the treated dry forest stands are expected to have over-story canopies remaining with substantial amounts of large and medium sized trees, forest and woodland manipulations may also include methods designed to regenerate areas of new forest. Individual projects themselves may vary greatly in the percentage of area where silvicultural practices and treatment techniques that promote regeneration are utilized, as these depend on the scope of the individual projects, the treatment objectives, and forest conditions. Regeneration of new stands or groups of trees with early seral forest and woodland characteristics would likely occur on approximately 20 percent of dry forest lands treated for restoration. The remaining dry forest stands would have sufficient levels of healthy forest canopy to moderate natural regeneration, particularly for the pine conifer species.

Tree planting could also be used as a technique to increase the percentage of regeneration cutting treatments, by assuring adequate re-establishment of young forest on sites where natural regeneration would normally be very slow to return in these forest types.

Continued fire suppression would extinguish and/or prevent fires that would vary in intensity and severity. Suppression of fires in dry forest types could prevent less-intense fires that would reduce fuels and the density of seedling, saplings, and pole-sized trees. Stands that continue to miss fire cycles will become more susceptible to defoliation from western spruce budworm and infestation by the Douglas-fir beetle, increasing the likelihood of mortality (DeNitto, 2007).

Cool Moist Forest

Cool moist forest treatments would reduce tree stem densities and create openings and early seral forest conditions, mimicking pre-fire suppression conditions. Lodgepole pine would be regenerated by removal of decadent overstory trees, allowing seedlings to become established.

Creation of a mosaic of lodgepole pine stands of differing sizes and densities will reduce the risk of an epidemic mountain pine beetle outbreak on BLM lands. Where treatments occur in lodgepole pine forest, infestation levels of mountain pine beetle may be reduced. Effectiveness of treatment will depend on the current level of infestation, but removing trees before the beetles are

able to reproduce and infest other trees can reduce the level of impact in adjacent lodgepole pine stands. Although treatments may affect localized stands or areas from mountain pine beetle, overall treatments will not have an impact on epidemic mountain pine beetle outbreak the DA is currently undergoing.

The Lynx Conservation Assessment and Strategy (LCAS) provide direction on the types of activities and the amount of habitat that can be modified in lynx habitat. Because lynx habitat is identified as cool, moist forests of lodgepole pine, spruce or Douglas-fir, treatments in these habitat types could be restricted. Thinning high density medium to large size trees would be the least restricted treatment in lynx habitat as long as suitable habitat is maintained. The thinning of small-diameter trees would be the most restricted type of activity. Small-diameter thinning treatments in lodgepole pine stands would be heavily restricted in order to retain forage habitat for lynx. This could slow growth and productivity, lengthening the amount of time needed to grow large diameter pine trees in these stands. The size and location of openings created through forest management could be restricted but openings may be considered beneficial if forage habitat for lynx is limited.

Riparian Types

Managing riparian areas with an emphasis on maintaining and restoring riparian function would allow forest vegetation to develop in response to disturbance regimes associated with fire and flooding, particularly riparian areas that are functioning at risk, because they would be high priority for restoration.

Implementing livestock grazing guidelines to meet Land Health Standards would treat and improve riparian areas by maintaining or improving vegetative cover and structure to trap and hold sediment to rebuild streambanks, restore/recharge aquifers, and dissipate flood energy. Deep rooted herbaceous and woody shrub species would be promoted to stabilize streambanks and reduce soil erosion.

Projects to restore riparian areas and wetlands would result in a dominance of broad-leaf trees and shrubs forming an overstory canopy in appropriate locations. With increased diversity and vigor of streamside plant communities, functional condition ratings for streams would improve. Forested riparian habitat would be managed to accelerate the development of mature forest in suitable types, while in other areas such as dry or lodgepole dominated forest types, management would emphasize the maturation of broad-leaved species.

Livestock grazing in riparian areas could reduce the extent of vegetative ground cover and vegetative species diversity. In locations of locally severe native vegetation loss, noxious weed infestations could occur. All of these effects could occur to variable extents across the Decision Area. Health and integrity of riparian vegetation would be protected and improved by livestock fencing,

development of upland water sources, and timing livestock use to avoid sensitive periods or to reduce the intensity of grazing and trampling.

Roads and trails occupying riparian areas would preclude development of riparian vegetation. (In the alternative-specific analysis at the end of this chapter, mileages of motorized routes within 300 feet of streams are used as an indirect indicator of the extent of this impact by alternative.)

Management to benefit sage grouse would protect the integrity and diversity of vegetation in riparian habitats.

Mineral exploration and development activities would continue to have localized impacts to riparian vegetation. Effects could be short, mid, or long-term and could vary in scale substantially based on the nature and size of the activity.

Locating incident bases, helibases, and other incident management activities outside of riparian zones would prevent damage to riparian vegetation and allow maintenance or improvement of functioning condition.

Any ground disturbing activities in riparian areas would promote noxious weed infestations. Pre- and post-project weed monitoring and treatments would minimize effects in riparian areas

Wild and Scenic River (WSR) designations would lead to managing a ¼-mile corridor on either side of these segments to protect the Outstandingly Remarkable Values (ORVs). Potential future land use disturbances such as utility corridors, timber harvest, or mining within the corridor would be managed in such a fashion as to maintain or enhance the ORVs. The risk of disturbance to riparian vegetation would be reduced.

Noxious Weeds

Management of noxious weeds and other invasive species would not reduce the total number of weed infested acres within the Decision Area because treatments would not exceed the rate of expansion under any alternative. Natural expansion without treatments would occur at approximately 14 percent/year (USDI-BLM 1996). Alternative prescriptions would affect the locations and quantity of weed treatments, and weed populations would decline in vigor and extent on treated sites.

Coordination of weed management with federal, state, county, and private landowners and organizations would result in more effective and cost efficient weed control because treatments would address the natural boundaries of the infestations and management resources could be shared between partners. This would result in protecting more acres from new infestations and controlling more acres of existing weed infestations. Using Integrated Weed Management would also assist with weed control by focusing the multiple methods of weed management on the conditions which affect weed population size and outbreak of new infestations.

Increases in weed acreage within the Decision Area would result primarily from expansion of existing weed infestations supplemented by new infestations and possibly by acquiring weed infested lands. However, acquisition criteria states that BLM would avoid considering acquisition proposals with an abundance of noxious weeds when those management problems outweigh the expected benefits of the acquisition. New weed species, such as the salt cedar on Canyon Ferry and St.-John's-wort in Jefferson County, may also enter the Decision Area from adjacent infested areas.

Weed population size is dependent on three conditions, the relative amount of weed seed or root sources for reproduction, the availability of safe sites for germination and/or propagation, and having access to the necessary resources for plant growth which are sunlight, water, and nutrients. Management actions which reduce these conditions would decrease or control weed population size while actions which produce these conditions would usually increase weed population size.

Promoting healthy desired vegetation is the most common and long-term reducer of weed populations because the desired plants continually compete with weeds in producing seeds, occupying germination sites, and acquiring resources for growth. Vegetation restoration and fire rehabilitation activities, including revegetation and protection of post-fire plantings, would be effective methods for improving desired vegetation populations though vegetation treatments may initially cause weeds to increase because of associated ground disturbance.

Vegetation treatments which restore grasslands, shrublands, and riparian areas would be particularly effective in reducing potential weed spread because most noxious weeds and invasive species occur in these habitats. Using weed seed free forage and cleaning vehicles and equipment would decrease weed seed and root sources; thereby reducing the number of new infestations. Education and outreach would reduce weed establishment and spread because people often act once they are informed about the effects weeds have on ecosystem health and economics if they are also taught methods for weed management.

Ground disturbing activities would be the biggest increase of both new and existing weed infestations because they often bring in seeds on equipment and vehicles, create bare spots for seed germination, and reduce competition for resources by removing desired vegetation. Wildfire would be the most uncontrollable disturbance and would create the greatest amount of new infestations as demonstrated by the Bucksnort and Boulder Complex fires of 2000. Additionally, fire retardant and burning of natural fuels release compounds useful for plant growth, thereby benefiting colonizing plants, particularly weeds and invasive species, by providing a surplus of nutrients. Therefore, forest management designed to reduce unnaturally large and severe

wildfires would reduce the potential for increased weed populations.

Motorized public travel and camping within 300 feet of existing roads, acquisition of easements and exchanges to improve access to public lands, and use of Special Recreation Management Areas could increase human use from hiking, camping, hunting, horseback riding, and driving for pleasure; thereby increasing both disturbance and the risk of igniting wildfires which could lead to expansions in weed populations.

Other management activities which cause surface disturbances would also increase the potential for new weed infestations though most activities incorporate methods to reduce introduction and expansion of noxious weed and invasive species infestations like minimizing new road construction in weed infested areas, reseeding disturbed and exposed soils where necessary, and locating new utility facilities in existing rights-of-way.

Surface disturbing activities include building fire lines, helitack sites, fire camps, and new roads, use of existing roads and transportation facility sites, vegetation treatments, mineral and energy development, continued development and maintenance of public access routes, and land use authorizations which increase traffic and disturbance such as right-of-ways. Of these, potential increases due to roads and vegetation treatments are the most quantifiable and account for the variation among alternatives for potential weed spread estimates. Road closures, road decommissioning, and restrictions on mechanized equipment in Wilderness Study Areas reduce disturbance, so they would reduce weed expansion. Road decommissioning also usually promotes healthy desired vegetation through revegetation. However, if road decommissioning removes ready access to weed populations, treatment costs would increase and fewer acres may be treated.

Restrictions on aerial weed treatments may have similar effects of protecting desired vegetation while increasing weed treatment costs which might result in a decrease of total treatment acres. This is because weed treatments within an aerial herbicide application buffer would have to be ground treatments which can often cost up to 5 times more than aerial treatments.

The degree to which weed and invasive species populations impact their environments depends on the cumulative effect of infestations on the resiliency and sustainability of the desired plant community. Infestations which are a non-dominant part of a diverse, otherwise healthy desired plant community which controls the size and density of the infestations would have a low impact. Infestations would have a high impact when they dominate the plant community and are substantially reducing its sustainability and resiliency by negatively affecting the water cycle, erosion potential, nutrient cycling, and forage availability for wildlife and livestock. Infestations which affect some or all of these things but do not yet

substantially reduce the community's sustainability or resiliency would have a medium, or moderate, impact.

Effects of Alternative A

General Vegetation

Conversions of non-native to native vegetation would be limited to noxious weed control efforts and native plant seedings on ground disturbance projects. Larger, self-perpetuating stands of non-native agronomic grasses (e.g., smooth brome, timothy, Kentucky bluegrass, orchard grass, and crested wheatgrass) would persist, usually in areas that have been cultivated. Persistent stands of agronomic grasses would be resistant to the colonization by native species.

Revegetation seed mixes would generally consist of native species of wheatgrass, fescue, bluegrass, and blue flax. These cool-season species would germinate and initiate growth in early spring and establish stands that stabilize and protect the soil, and compete with noxious weeds and other invasive species. These seeded native species are generally similar to the dominant native species occupying foothill and dryer sites. Occasionally, revegetation seedings may not establish appropriate native species for some microsites.

On burned areas and other sites with a high potential for erosion and noxious weed invasion, non-native species would sometimes be seeded to stabilize slopes and prevent proliferation of noxious weeds and other invasive species. Seeding of cereal crops such as triticale, barley, and rye would provide vegetation cover for one or two years, but these species would die out as seed production declines. These species would provide organic material and nutrients to the soil and can act as "nurse" crops to some native species.

On small areas with high potential for erosion or noxious weed invasion, seeding with perennial non-native species would occur. These seedings may produce persistent stands, which can inhibit colonization by native herbaceous species and conifers; however, vigorous stands of non-native grasses may inhibit colonization and expansion of noxious weeds, in addition to protecting soil resources.

Under Alternative A, most land in the Decision Area (258,200 acres, 85 percent) would be managed as Fire Management Unit designation C. The remainder of DA lands would be in FMU designation B (36,700 acres, 12 percent) and in FMU designation A (7,300 acres 3 percent). The effects of FMU A, B, and C designations are discussed under Effects Common to All Alternatives, General Vegetation.

Under Alternative A, no road density target would be set for areas in big game winter and calving ranges. Following the elk management guidelines in the Cooperative Elk-logging Study (Lyon, et al. 1982) in these areas would allow the existing road network to remain open

for public use. Conversely, each of the action alternatives specifies road density targets to be managed for in these areas. Alternative A would provide the greatest flexibility for permanent road use and construction, aiding in vegetation treatment feasibility.

No restrictions would be placed on vegetation treatments near caves and abandoned mines with bat populations. Having no related action here provides more flexibility than under Alternatives B and C where clearing would be prohibited within set distances from these population areas.

No restrictions related to activities near raptor nests would occur under Alternative A. This provides the greatest flexibility for treating vegetation in areas where these nests exist of all alternatives.

Acquisition of public access easements to construct new access routes would remove vegetation on approximately 1.5 to 3 acres per mile of road constructed. Vegetation removed could be native, introduced, weedy, or otherwise, but most easements are expected to result in a general improvement of management efficiency and feasibility of vegetative treatments.

Under Alternative A, the least amount of acres would be managed as VRM Classes I and II. This alternative provides the most flexibility to alter visual resources to accomplish vegetative treatments.

Grasslands and Shrublands

Approximately 5,250 acres of grassland and shrubland (combined) in the Decision Area would be treated per decade with prescribed fire, mechanical treatments, and other methods to improve health and resiliency of these communities. No watersheds have been identified as priorities for treatment in Alternative A.

Currently, in the Decision Area there are approximately 86,065 acres of grasslands and shrublands as compared to approximately 135,722 acres historically. This decrease in grassland and shrubland is a result of conversion to conifer-dominated stands. Treatment of 5,250 acres per decade would reduce conifer encroachment on treated acres. Assuming conifer encroachment has occurred over the last century as a result of fire exclusion (and heavy historic grazing); the rate of conifer encroachment has been approximately 4,966 acres per decade in grasslands and 1,445 acres per decade in shrublands. The combined rate of conifer encroachment in grasslands and shrublands is approximately 6,411 acres per decade. Based on these assumptions and the proposed rate of treatment, there would be a net increase in encroachment in grassland and shrubland habitats of approximately 1,161 acres per decade under Alternative A.

Under Alternatives A and D, there would be no seasonal restriction on prescribed fire implementation, if the treatment area is in prescription. There could potentially be times where prescribed fire occurs in the summer

months, which may detrimentally affect desired vegetation. Ungerminated seeds that remain in the soil would usually not be affected by prescribed fire. However, most small trees and shrubs such as sagebrush, bitterbrush, and mountain mahogany would be killed or damaged by “hot” prescribed fire, while larger ponderosa pine and Douglas-fir would usually not be killed. With Alternatives B and C, prescribed burning would be restricted between May 1 and August 30. This restriction could reduce the potential for fires with high intensity and severity that would cause unacceptable levels of mortality to desired vegetation.

Overall, Alternatives A and D would have greater effects on grasslands and shrublands associated with livestock grazing (described under “Effects Common to All Alternatives” for Grasslands and Shrublands) than either Alternatives B or C. Livestock grazing would occur on approximately 273,000 acres of Decision Area lands in Alternatives A and D, 265,000 acres in Alternative B, and 262,000 acres in Alternative C. (A subset of these acreages are grasslands and shrublands). Managing livestock grazing in the McMasters Hills, Spokane Hills, and Indian Creek allotments as available for general grazing permits in Alternative A would impact grasslands and shrublands in these areas greater than in Alternatives B and C, but the same as in Alternative D. Alternatives A and D would allow for general grazing permits in eight allotments (Centennial Gulch, Free Coinage, Alder Creek, Charcoal Mountain Custodial, Dickie, Maiden Rock Custodial, Quinn Creek, and Wineglass Mountain) where grazing would not be allowed in either Alternatives B or C. Grasslands and shrublands in these areas would be impacted by livestock grazing under Alternatives A and D, but not under Alternatives B and C.

Forests and Woodlands

Firewood removal would take place near roads and reduce standing and fallen dead trees. Under Alternative A, no diameter limits would be prescribed, so more large-diameter snags may be removed under this alternative, possibly decreasing potential late forest structure in isolated areas.

Under Alternative A, salvage may proceed without prescriptive restrictions for the management of species dependant on dead and dying forests or species dependant on down woody materials. Salvage would continue to be subject to other restrictions, resource protections, or special management considerations, such as: Best Management Practices (BMPs), Streamside Management Zones (SMZs), Interim Management Policy for Wilderness Study Areas, and management guidance for ACECs, as required for forest management activities under Alternative A.

Prescriptions for big game security habitat would be the least restrictive to vegetation treatments under Alternative A than under all the other alternatives. The guide-

lines presented in the Montana Cooperative Elk-Logging Study (Lyon et al. 1982) would be considered on a case-by case basis. Following the Logging Study would provide more flexibility and therefore increased feasibility of vegetation treatments.

Alternative A would have no buffer requirements in forested areas surrounding unoccupied raptor nests. Lack of these restrictions would provide for the most flexibility in treatments of all alternatives in these areas.

Dry Forest

Currently, there are 68,624 acres of high density, ponderosa pine and Douglas-fir dominated by medium to large-sized trees as compared to 19,042 acres historically. Approximately 3,600 acres (5 percent) of medium to large, high-density stands of ponderosa pine and dry Douglas-fir forest in the Decision Area would be treated per decade.

Treatments would reduce the density of small trees and allow larger trees to develop a more open structure with a larger component of understory grasses, forbs, and shrubs. Additional effects would be as described under “Effects Common to All Alternatives” for Forests and Woodlands

The proposed level of treatment under Alternative A may not be adequate to keep pace with the rate at which conifer density is increasing. Assuming conifer density has increased as a result of fire exclusion and past grazing practices over the past century on approximately 49,582 acres (the difference between historic and current acres of high stem density dry forest); the rate at which increased density has developed is approximately 4,958 acres per decade. Proposed treatments of 3,600 acres per decade would not keep pace with the rate of increased conifer density development in large and medium size class stands of ponderosa pine and Douglas-fir. **With Douglas-fir encroachment increasing, western spruce budworm will likely increase as more host trees become available.**

Prescribed burning and mechanical treatments in forest and woodland areas, taken together, could not exceed an average of 750 acres per year under Alternative A. This limitation may restrict the amount of forest and woodland treated per decade, so that areas having limited access or with lower priority for treatment may not be treated under this alternative.

Treatments on 500 acres of medium and large size class, low density, ponderosa pine and Douglas-fir would be implemented per decade to maintain the open character of the stands. Currently, medium and large size class, low density, ponderosa pine and Douglas-fir stands occupy 32,559 acres in the Decision Area as compared with 11,358 acres historically. As a result of fire suppression over the last century, tree densities have increased in these stands. Treating 500 acres per decade

would have a negligible effect on restoring these forest stands to historic conditions.

Additionally, 1,000 acres of dry forest would be thinned pre-commercially per decade, which would remove many smaller seedlings, saplings, and pole-sized trees, allowing larger trees to develop a dominant overstory. Up to 500 acres of treatments per decade would also be implemented to preserve the character and ecological functions of mature and old-growth stands. No watersheds have been identified as priorities for treatment. The 1,000 acres of pre-commercial thinning would have a negligible effect on restoring forests to historic conditions.

Cool, Moist Forest

Approximately 2,350 acres (17 percent of Decision Area total acreage in this type) of high-density stands of moist Douglas-fir, lodgepole pine, subalpine fir, and Engelmann spruce forest with medium to large-sized trees would be treated in the Decision Area per decade. Regeneration harvesting techniques such as seed tree harvesting, shelterwood cuts, and clearcutting may be applied to regenerate approximately 1,440 acres of cool moist forest and lodgepole pine stands per decade. Additionally, 50 acres of cool, moist forest stands would be thinned pre-commercially, which would remove smaller seedlings, saplings, and pole-sized trees, reducing the risk of intense wildland fire and allowing larger trees to develop a dominant overstory. No watersheds have been identified as priorities for treatment.

Currently, there are 13,764 acres of cool, moist forests composed of medium and large size class, high density stands in the Decision Area as compared to 8,422 acres historically. Assuming high density stands developed over the past century in response to fire suppression and livestock grazing, the rate of increase would be 534 acres per decade. The proposed level of treatment (2,350 acres) would reduce the acres of high density stands to 11,948 acres during the first decade of treatment.

Alternative A would result in the restoration of 2,400 acres per decade of cool, moist, high-density forest communities with a net gain of approximately 1,816 acres restored per decade of areas dominated by medium to large-sized trees.

Riparian Types

The Streamside Management Zone Law provides the minimum regulatory standards for forest practices meeting the timber sale definition in Streamside Management Zones (SMZs). The SMZs provide protection to water quality, streambank stability, down woody material and shade by restricting certain forest activities such as clearcutting, operation of wheeled or tracked equipment except on established roads, construction of roads, deposition of slash, and broadcast burning. Streamside Management Zones, however, would provide limited protection to overall riparian function and habitat diversity for

terrestrial species. By focusing dead and live tree retention within the first 50 feet upslope of stream margins, and by allowing smaller diameter trees to be retained (down to 8 inches DBH), SMZs could limit: size and quantity of wood recruited to streams and floodplains; trees and snags that could serve as foraging, nesting, hiding, and brood rearing habitat for many wildlife species; and quality of wildlife movement corridors.

Streamside Management Zones are 50 feet on either side of a stream on slopes less than 35 percent hillslope gradient, and 100 feet on either side of a stream with sideslopes greater than 35 percent. Under Alternatives A and D approximately 3,528 acres of riparian habitat would have restrictions on management activities in SMZs ().

Up to 30 acres (1.3 percent) per decade of riparian vegetation would be treated by mechanical means or prescribed fire, with non-functional riparian areas or areas functioning-at-risk (approximately 55 percent of Decision Area total) receiving priority for treatment. Treatment of 30 acres of riparian vegetation per decade would tend to move lower functioning condition areas toward a higher functioning condition. At this rate of treatment, it would take many decades to bring all riparian areas into proper functioning condition; however, other factors such as grazing management and improved road management practices could also improve the functional status of riparian areas.

Maintaining livestock exclosures in riparian areas would protect vegetation from grazing and trampling damage.

Overall, Alternatives A and D would have slightly greater impacts to riparian vegetation associated with livestock grazing (described above under “Effects Common to All Alternatives” for Riparian Types) than either Alternatives B or C. Livestock grazing would occur on approximately 273,000 acres in Alternatives A and D, 265,000 acres in Alternative B, and 262,000 acres in Alternative C. Managing livestock grazing in the McMasters Hills, Spokane Hills, and Indian Creek allotments as available for general grazing permits in Alternative A would potentially impact riparian vegetation greater than in Alternatives B and C, but the same as in Alternative D. Alternative A allows for general grazing permits in eight allotments (Centennial Gulch, Free Coinage, Alder Creek, Charcoal Mountain Custodial, Dickie, Maiden Rock Custodial, Quinn Creek, and Wineglass Mountain) where grazing would not be allowed in either Alternatives B or C.

Roads and trails currently impact riparian areas in a number of ways. Roads and trails are usually devoid of vegetation which causes accelerated erosion and sediment delivery to riparian vegetation and streams. Additionally, trails in the riparian zone can compromise the riparian vegetation’s ability to act as a sediment filter. Also roads and trails are active conduits for noxious weeds and invasive species to infest riparian areas. Under Alternative A, Decision Area-wide, approximately

Watershed	Alternative		
	SMZ	RMZ	RMZ
	A & D	B	C
Big Hole – Forested	519	1,031	1,856
Big Hole – Nonforested	409	409	1,048
Blackfoot – Forested	11	34	66
Blackfoot – Nonforested	20	20	66
Boulder – Forested	235	475	917
Boulder – Nonforested	93	93	219
Jefferson – Forested	199	453	851
Jefferson – Nonforested	189	189	370
Madison – Forested	5	18	40
Madison – Nonforested	9	9	36
Upper Clark Fork – Forested	9	22	42
Upper Clark Fork – Nonforested	2	2	10
Upper Missouri – Forested	709	1,369	2,651
Upper Missouri – Nonforested	961	961	2,593
Upper Yellowstone – Forested	36	105	234
Upper Yellowstone – Nonforested	122	122	394
Total – Forested	1,723	3,507	6,657
Total – Nonforested	1,805	1,805	4,736
Grand Total	3,528	5,312	11,393

94.3 miles of routes within 300 feet of streams would remain open to motorized use. While this is not a direct indication of road and trail effects on riparian vegetation, it is a relative indication when compared to the other alternatives. Alternative A leaves the greatest mileage of routes within 300 feet of streams open to motorized use of all alternatives.

Under Alternative A, all four eligible Wild and Scenic Rivers would be managed to maintain their eligibility. This would reduce the risk of various land use disturbances of riparian vegetation along 12 miles of river/stream in the Decision Area. Under Alternative C these same stream/river miles would be protected as suitable for WSR designation, whereas Alternatives B would protect 5.7 miles and Alternative D would protect none as suitable for WSR designation.

In the context of oil and gas development, Alternative A stipulates No Surface Occupancy within 500 feet of reservoirs, lakes, ponds and intermittent streams, or within 1,000 feet of perennial streams and rivers. This would minimize effects to riparian vegetation to a similar degree as in Alternatives B, C, and D in reservoirs, lakes, ponds and intermittent streams, and to a greater degree than these alternatives on perennial streams and rivers.

Noxious Weeds

Under Alternative A, noxious weeds and invasive species have the lowest potential for expansion, resulting in up to 43,000 weed acres (a rate of 9 percent/year), from predictable factors in ten years. This analysis assumes that the low end of proposed weed treatment acreage ranges would be implemented under the action alternatives. Of these acres, approximately 13 acres/year are associated with open and limited roads, 66 acres/year with grassland treatments, 38 acres/year with forest treatments, and most of the remainder with natural expansion of established weed infestations on and near the Decision Area.

Wildfires could increase these total expansion acres more in Alternative A than Alternatives B or D and less than Alternative C because wildfire potential is greatest for Alternative C, least for Alternative D, and less for Alternative B than Alternative A as a result of different vegetation management, particularly forest treatments.

Effects on weed potential from oil and gas development are similar for Alternatives A and B, less in Alternative C, and greater in Alternative D. No Surface Occupancy and no lease restrictions remove similar acreages from surface disturbance (and therefore exacerbation of noxious weed spread) in Alternatives A and B, about twice that many acres in Alternative C, and about half that many in Alternative D.

An estimated 20,000 acres per decade would be treated to reduce noxious weeds with 85 to 90 percent of these acres being repeat treatments. Therefore, up to 3,000 acres (15 percent of current populations) per decade of weed infestations would be successfully controlled or eradicated using Integrated Weed Management methods under this alternative.

Vegetation restoration of approximately 5,250 acres of grasslands/shrublands per decade would eventually produce about 4,000 acres per decade of healthy desired vegetation resistant to weed infestations.

Continuing restrictions of a 200 foot aerial herbicide application buffer for riparian areas would result in greater riparian weed control costs associated by increasing ground treatments up to 25 acres/mile of riparian corridor more for Alternative A than Alternatives B and D, but lower costs than Alternative C (by up to 50 acres/mile more).

Effects Common to Action Alternatives

General Vegetation

Restoration of habitat using prescribed fire, silvicultural practices, and other methods would result in protecting and maintaining snags, creating large woody debris and vegetation in a variety of seral stages including mature forest with old forest structure and healthy shrublands and grasslands.

Prohibiting the introduction of biological noxious weed controls that have been documented to damage desirable plant species would reduce negative effects on non-target plants.

Timing restrictions on projects that cause disturbance on big game winter and spring range, big game calving areas, grizzly bear spring and summer range, and grizzly bear denning habitat could impose constraints on vegetation treatments that alter habitat, making it more difficult to meet desired objectives for vegetation change. For example, treatment of noxious weeds is often most effective in spring; however, in the habitats mentioned above, implementation of noxious weed control may not be possible during periods when it is most effective to prevent disturbance to grizzly bear or big game within big game winter/spring range. Similarly, prescribed fire is often most effective and manageable during the spring and early summer when moisture levels are high and temperatures are low. Timing restrictions could inhibit the use of prescribed fires to meet vegetation objectives.

Watershed restoration activities would alter vegetation composition and structure and improve upland, riparian, and aquatic health and functionality.

Rehabilitation of roads would revegetate currently unvegetated roadbeds, which would increase biomass productivity of the landscape through colonization of sites with grasses, forbs, shrubs, and trees on approximately 2½ to 3 acres per mile of rehabilitated road. Eventually, reha-

bilitated roads would support plant communities consistent with site potentials which would help resist weed invasions. However, road closures and removals could in some cases make vegetation management treatments more difficult and costly, inhibit potential vegetation treatments, reduce public access for product use and removal, and slow fire detection and suppression.

Reseeding disturbed areas would increase the composition of desirable species and reduce the potential for noxious weeds and other invasive species to become established.

Revegetation seed mixes would consist of site-appropriate low-impact, non-invasive species, and native species, generally composed of cool-season species, which initiate growth in early spring in response to winter moisture. These cool-season species would establish stands that are relatively competitive with noxious weeds and other invasive species. Seeded native species sometimes differ from dominant native species occupying foothill sites (rough fescue, Sandberg's blue grass and Idaho fescue) and dryer sites (needle-and-thread, blue grama, and June grass). As a result, some revegetation seedlings may not help establish native species that typically occupy a range of sites with different growing conditions. However, where site-appropriate species are used this would not be the case.

Grasslands and Shrublands

Up to 850 acres of crested wheatgrass, agricultural fields, and weed infestations on the McMasters Hills and Ward Ranch acquisitions would be converted from non-native to native vegetation. Conversions would be labor intensive and could involve repeated cycles of cultivation and/or application of herbicides to kill non-native species followed by seeding with native species. Young stands of native species would be subject to invasion by noxious weeds and other invasive species, and would require management actions such as manual pulling or spot-spraying with herbicides to control unwanted vegetation. Conversely, Alternative A would convert none of these lands to native vegetation.

Forests and Woodlands

Silvicultural treatments including harvest, thinning, other mechanical treatments, and prescribed fire would meet Land Health Standards and improve forest health conditions, by maintaining or mimicking natural disturbance regimes with treatments that reduce conifer stocking in many areas while retaining important mature stand components.

In the treated areas, densities of smaller trees and fuel loading would decrease, and forest canopy continuity would be more open, reducing the risk of severe, high intensity crown fires. Larger trees would be maintained resulting in a more-open forest with a dominant overstory of trees that are relatively resistant to frequent, low-intensity fires that would remove fine fuels and pass

through stands without killing a high percentage of larger trees

These management actions would emphasize old-forest structure characteristics, and would develop and maintain stand structures that are relatively complex with highly variable tree densities, healthy and diverse understory composition, and site-appropriate quantities of snags and down wood.

Protecting big game security cover by maintaining blocks of at least 250 acres that are unroaded or have roads closed during the hunting season could limit vegetation treatment options such as timber harvest, fuels reduction, and tree density reductions. The restriction would not preclude restoration from occurring, but could make treatments in some areas less feasible under the action alternatives.

Riparian Types

Management of riparian areas would result in amounts and distribution of large, woody material, characteristic of healthy riparian and wetland ecosystems. Improved health of riparian vegetation would maintain proper functioning condition or move degraded areas toward proper functioning condition.

Assessing and monitoring riparian areas for proper functioning condition would help identify riparian areas that are functioning at risk or nonfunctioning. This in turn would indicate riparian areas for restorative work.

Reductions in conifer encroachment and fuels management involving removal of conifers to restore historically non-forested riparian areas would improve long-term riparian vegetative conditions. Treatments involving the sale of forest products could potentially be affected by leave tree requirements or equipment prohibitions within streamside management zones in cases where greater levels of conifer removal may be desired than that allowed by the SMZ law. In such cases, the BLM would apply for a variance to the law under “Alternative Practices” to the SMZ Law. The absence of this variance would require that treatments be modified to comply with the state law.

Riparian vegetative treatments would have variable effects on hardwood tree and shrub species. Prescribed fire treatments would likely adversely affect cottonwoods by causing direct mortality. Species such as willow and red osier dogwood would be more resilient and may benefit through stimulated growth from prescribed fire treatments.

The natural expansion and potential reintroduction of beaver could affect vegetation by creating higher water tables through dam construction, which would expand wetland and riparian vegetation. This benefit could be partially counterbalanced by beavers removing favored vegetation species (e.g., cottonwood, aspen, and willow) from areas adjacent to streams and beaver dams, reducing the density of riparian vegetation.

Management direction to minimize road and landing locations in riparian areas would benefit riparian vegetation equally in Alternatives B, C, and D and more than in Alternative A where no such direction is proposed.

Minerals exploration and development activities would remove riparian vegetation in some cases. Impacted areas would be maintained, protected, rehabilitated, and compensated to the extent practicable. This would contribute to re-establishing vegetation species diversity and productivity in the aftermath of potential riparian impacts associated with mineral development activities.

Under Alternatives B, C, and D there would be a No Surface Occupancy stipulation for oil and gas exploration in wetlands, floodplains, and riparian areas. Standard Lease Terms would also apply which would allow the relocation of proposed facilities up to 200 meters (approximately 656 feet) from any areas of concern. These measures would protect riparian vegetation identically in the action alternatives, but potentially less so than in Alternative A on perennial streams or rivers. Alternative A calls for a No Surface Occupancy stipulation within 1,000 feet of perennial streams and rivers. This stipulation would better protect riparian vegetation in rivers or streams with very wide riparian areas (wider than 656 feet) that may not be adequately protected by Standard Lease Terms. There are few, if any, such riparian areas in the Decision Area.

Noxious Weeds

Forest treatments to reduce the risk of high intensity fires would reduce the potential for the increase in weed populations commonly occurring after wildfires. The substantial increase in riparian treatment acres with all action alternatives (compared to Alternative A) would improve these areas’ resistance to weed invasion from populations within and on lands adjacent to the Decision Area.

Increasing cooperation with Weed Management Areas (WMAs) would reduce infestations in the Decision Area by comprehensively treating contiguous areas defined by a natural boundary rather than a political one. This would usually improve weed control, prevent or reduce weed expansion into weed-free areas, and decrease the costs of weed treatments. This is because a comprehensive plan would facilitate improved access for treatments, provide for shared treatment resources, allow for more effective coordination of treatment timing, and promote the use of watershed boundaries which are somewhat resistant to weed spread as WMA boundaries.

Discouraging cross-country motorized travel by placement of woody materials and placing gates and barriers on closed roads would decrease weed expansion potential by decreasing disturbance. Utilizing open roads for access requests where possible, not issuing new right-of-ways in exclusion areas, and restricting them in avoidance areas would also reduce weed expansion potential by decreasing disturbance.

Power washing heavy equipment would reduce the introduction of weed seed although heavy equipment use on vegetation treatments and other projects could increase weed spread through disturbance.

Building new roads, including temporary ones for mineral development and timber sales and salvage, using roads and travel routes otherwise closed for mineral development and timber, and building fire lines would cause disturbance, thereby increasing the potential for weed growth.

Effects of Alternative B

General Vegetation

Management to maintain and/or recruit adequate densities of snags and down woody material for wildlife could include prescribed fire, mechanical treatments, and inoculation.

No new, permanent roads would be allowed in big game winter range or calving habitat where road densities are 1 mi/mi² or less. Road restrictions could affect options for vegetation treatment (e.g., firewood and Christmas tree harvest, timber harvest, and thinning), but not as much as Alternative C, where permanent roads cannot be built in areas where road densities are 1.5 mi/mi² or less.

Restricting vegetation clearing within 250 feet of caves and abandoned mines with populations of bats would limit fuels reduction, tree density reductions, and other treatments that remove vegetation in these areas.

Alternative B restricts noise disturbance and most management activities within a 0.5-mile radius of occupied raptor nests, during the nesting and brooding period. Depending on the species of raptor, this could restrict approximately 500 acres per nest and make prescribed burning difficult in some treatment areas.

Livestock grazing could be permitted on 265,000 acres of public land. Grazing may reduce the density and production of palatable species in localized areas. However, proper grazing level requirements would maintain the density and integrity of most plant communities.

Species with low palatability, including most noxious weeds and many other invasive species would increase in density on some sites.

On burned areas and other sites with a high potential for erosion and noxious weed invasion, non-native species may be seeded to stabilize slopes and prevent proliferation of noxious weeds and other invasive species. Seeding of annual species such as triticale, barley, and rye provides vegetation cover for one or two years, but these species die out as seed production declines. Use of annual agronomic species provides organic material to the soil and can act as a nurse crop for native species. Additional seeding with perennial non-native species often initiates persistent stands, which can inhibit colonization by native herbaceous species and conifers.

Similar to Alternative A, most Decision Area land (approximately 255,000 acres, 83 percent) would be managed as Fire Management Unit designation C. The remainder of BLM lands in the Butte field office would be in FMU designation B (approximately 52,000 acres, 17 percent). The effects of FMUs B and C designations are discussed under Effects Common to All Alternatives, General Vegetation.

Alternative B manages for 75,100 acres in VRM Classes I and II where no visual changes would be allowed to be noticeable. This provides less flexibility for vegetation treatments than Alternatives A and D, but more than Alternative C.

Grasslands and Shrublands

Up to 11,800 acres (9 percent of grasslands in Decision Area) of grassland and 3,650 acres (18 percent of shrublands in Decision Area) of shrubland would be treated per decade with prescribed fire, mechanical treatments, and other methods to improve the health and resiliency of these communities by reducing the density of conifers in these habitats. Effects of treatments can be seen by comparing acres treated versus rates at which encroachment is occurring in grasslands and shrublands (Table 4-2 and Table 4-3).

Watershed	Area Treated per Decade	Conifer Encroachment	Encroachment After Treatment	Rate of Encroachment per Decade	Net Effect on Encroachment
Big Hole	2,500	3,398	898	340	1,238
Blackfoot	50	0	0	0	0
Gallatin	200	0	0	0	0
Jefferson	3,000	16,472	13,472	1,647	15,119
Missouri	6,000	29,787	23,787	2,979	26,766
Yellowstone	50	NA	NA	NA	NA
Total	11,800	49,657	38,157	4,966	43,123

Table 4-3
Alternative B Comparison of Acres of Shrubland Treated Versus Rate of Conifer Encroachment

Watershed	Area Treated per Decade	Conifer Encroachment	Encroachment After Treatment	Rate of Encroachment per Decade	Net Effect on Encroachment
Big Hole	2,000	9,017	7,017	902	7,919
Blackfoot	50	0	0	0	0
Gallatin	50	0	0	0	0
Jefferson	1,000	3,987	2,987	399	3,386
Missouri	500	1,341	841	134	975
Yellowstone	50	100	50	10	60
Total	3,650	14,445	10,895	1,445	12,340

Grassland treatments could result in a net increase in restored habitats of approximately 6,834 acres per decade (Table 4-2). Shrubland treatments could result in a net increase in restored habitats of approximately 2,205 acres per decade (Table 4-3). These potential increases under Alternative B would be a benefit to grasslands and shrublands compared to Alternative A in which there would be a net increase in conifer encroachment of approximately 1,161 acres per decade.

Alternative C would treat even fewer acres than Alternative A and would therefore have a net increase in conifer encroachment rather than an increase in restored habitat. Alternative D would treat even more acres than Alternative B and would therefore have a greater net increase in restored habitat than Alternative B.

Overall, Alternative B would reduce conifer encroachment on up to 15,450 acres per decade of grassland and shrubland communities compared to 5,250 acres for Alternative A, up to 2,700 acres for Alternative C, and up to 25,900 acres for Alternative D.

Under Alternative B proposed treatments of grasslands would gradually reduce conifer encroachment in all watersheds; however, restoration to historic levels would require decades of treatment. Proposed treatments of shrublands would gradually reduce conifer encroachment in all watersheds; however restoration to historic levels would require more than ten years.

Under Alternative B prescribed fire projects would be planned to consume above-ground biomass on no more than 80 percent (on average) of area burned on a per treatment unit basis. Prescribed fire would substantially reduce the density of conifer seedlings and saplings on 80 percent of the area treated; however, 20 percent of the treated area would not be burned and conifer encroachment would be present in a mosaic of unburned patches. Alternative C would provide for burning no more than 60 percent of each unit's surface area while Alternative D would provide for burning no more than 90 percent of each unit's surface area.

Alternative B has a timing restriction that would restrict prescribed burning from May-August. This would allow for protection to breeding birds and to protect soil,

grasses, and forbs from fire-related mortality that could occur with burns during the hotter, drier months. Alternative C would provide for this same protection while Alternatives A and D do not provide for it.

Under Alternative B, areas identified for prescribed burning would be rested for up to one year prior to treatment (if necessary) and for a minimum of two growing seasons following burning treatments, subject to alteration of these timeframes on a case-by-case basis. This rest from livestock grazing would promote grassland and shrubland vegetative recovery before reapplying livestock grazing. Alternative C calls for similar management but without the flexibility to reduce the post-treatment rest timeframe. The flexibility available under Alternative B may be more accommodating to permittee forage needs when objectives can be met with shorter rest periods. Alternative A calls for rest before and after burning as determined through site-specific planning. Alternative D calls for rest prior to burning if needed, and for rest through one growing season, subject to alteration of these timeframes on a case-by-case basis.

Under Alternatives B and D, BLM would proactively restore the distribution and vigor to mountain mahogany and bitterbrush stands through vegetative treatments designed to reduce competing plants (e.g., encroaching conifers and weeds) and create conditions to promote natural regeneration. Because restoration of stands of these species would be a priority, the vigor and health of communities of these species would likely improve more substantially under Alternatives B and D than under Alternatives A and C where no such proactive restoration is proposed.

Reduction of conifers from bitterbrush and mountain mahogany communities by mechanical means under Alternative B as opposed to prescribed fire would reduce mortality to these species and would benefit them by eliminating competing conifers. The use of prescribed fire would have variable effects on these species depending on a variety of conditions. Bitterbrush is susceptible to fire, often taking 15 to 30 years to recover following moderate to severe fires; however, the potential to sprout after fire is variable depending on fire severity and season, genetic composition, carbohydrate reserves, and

age. Bitterbrush growing in association with plant communities that have relatively frequent fire intervals tend to sprout more frequently than bitterbrush growing on sites where fire has been excluded for long periods. Low intensity, high frequency fires would favor regrowth from sprouting, whereas higher intensity, less frequency fires would favor regeneration by seed.

Like bitterbrush, mountain mahogany is usually killed by fire, even fires of low intensity, and does not resprout. Closed, mature stands may not have sufficient understory to carry fire, so fire-induced mortality may be confined to edges of stands. Regeneration by seed may occur after fire if the soil is not rapidly colonized by other competitive plants.

Overall, Alternative B (grazing on approximately 265,000 acres of all Decision Area lands) would have greater impacts to grasslands and shrublands associated with livestock grazing than Alternative C (approximately 262,000 acres), but less than Alternatives A and D (approximately 273,000 acres). Managing livestock grazing activities in the McMasters Hills, Spokane Hills, and Indian Creek allotments as forage reserve allotments in Alternative B would impact grasslands and shrublands less than in either Alternatives A or D where they would be managed as available for general grazing permits. Alternative B would pose a greater impact to grasslands and shrublands in the Indian Creek allotment than Alternative C in which the Indian Creek allotment would be unavailable for grazing but where McMasters and Spokane Hills allotments would be managed as forage reserve allotments as in Alternative B.

Fine fuel build-up and plant decadence may occur on some grasslands and shrublands in the Centennial Gulch, Free Coinage, Alder Creek, Charcoal Mountain Custodial, Dickie, Maiden Rock Custodial, Quinn Creek, and Wineglass Mountain allotments in Alternative B as these areas would be unavailable for grazing. Alternative C manages these areas the same as Alternative B and would therefore have similar livestock grazing-related impacts. Alternatives A and D would manage these areas as available for general grazing permits and would have impacts described above in "Effects Common to All Alternatives" to grasslands and shrublands associated with them in these areas.

Forests and Woodlands

Harvesting of firewood and other public demand forest products would have effects similar to Alternative A. Firewood removal, however, is more restricted as trees greater than 24 inches diameter would be restricted from cutting under Alternative B, thus leaving more, larger diameter snags on the landscape.

Maintaining a 0.25-mile radius buffer around unoccupied raptor nests in forest habitats for a period of five years would not prevent restorative vegetative management in these areas but suitable habitat would have to be retained around the nest sites. This could restrict some

treatments in an area approximately 125 acres in size per nest site.

Dry Forest

Approximately 10,750 acres of high-density stands of dry ponderosa pine and Douglas-fir forest with medium to large-sized trees in the Decision Area would be treated per decade. Additionally, up to 2,000 acres per decade of dry forest stands, currently in ecologically healthy condition, would be treated. These treatments would result in maintenance of large overstory trees and natural regeneration that would provide diverse age and size classes that would periodically burn with low intensity wildland fire. Some regeneration harvesting would occur; probably favoring shelterwood harvesting to convert stands to earlier seral conditions.

Approximately 1,000 acres of limber pine habitat would also be treated with prescribed fire per decade. Burning would reduce the density of limber pine trees and would remove fuels that have built up due to mortality of trees from blister rust.

Approximately 1,000 acres per decade of small diameter thinning of seedlings, saplings, and pole-size trees would reduce density of small trees and reduce fuel loading, resulting in less intense wildland fires.

These actions would also reduce the effects of spruce budworm in treated Douglas-fir stands. Alternative B would have more effect on spruce budworm than Alternatives A and C because more acreage would be treated.

The majority of treatments (7,000 acres, 47 percent) with Alternative B would be in the Upper Missouri River Watershed. Currently, there are 33,973 acres of medium and large size, high density, dry Douglas-fir and ponderosa pine in the Upper Missouri watershed as compared to 6,965 acres historically. Proposed treatments would reduce the acreage of high density trees to 24,073 acres over approximately the next two decades. If it is assumed that the current rate of increase in high density stands has taken place over the past century of fire suppression, the rate of increase would be about 2,700 acres per decade. Four decades of treatments could reduce the acreage of large and medium size class, high density trees, in the Upper Missouri watershed to historic levels.

Proposed treatment of 2,750 acres of high density dry forest with medium to large-sized trees in the Jefferson watershed would reduce current acreages from 19,187 acres to 13,687 acres over a 20-year time span as compared to 4,914 acres historically. Assuming a rate of increased acreage of large and medium size class, high density trees of 1,424 acres per decade (the difference between current acres and historic acres divided by 10 decades of fire exclusion), as a result of fire exclusion, proposed levels of treatment would require nearly 11 decades to approach historic levels in the Jefferson watershed.

Proposed treatments of 1,900 acres of high density dry forest with medium to large-sized trees in the Big Hole watershed would reduce current acreages from 13,733 acres to 10,033 acres over a 20-year time span as compared to 6,768 acres historically. Assuming a rate of increased acreage of large and medium size class, high density trees of 704 acres per decade, proposed levels of treatment would require nearly 6 decades to approach historic levels in the Big Hole watershed.

A total of 14,750 acres of dry forest would be treated per decade to help restore historic conditions compared with 5,100 acres with Alternative A, 4,800 acres with Alternative C, and 18,200 acres for Alternative D. For all dry forest types, deviation from historic conditions has occurred at a rate of 4,958 acres per decade. Only Alternatives A, B and D would restore vegetation at a rate that exceeds the rate of declining forest health.

Cool, Moist Forest

Approximately 3,350 acres (24 percent) of high-density stands of moist Douglas-fir, lodgepole pine, subalpine fir, and Engelmann spruce forest with medium to large-sized trees in the Decision Area would be treated per decade. Additionally, 400 acres of cool, moist forest stands would be thinned pre-commercially, which would remove smaller seedlings, saplings, and pole-sized trees, reducing the risk of intense wildland fire and allowing larger trees to develop a dominant overstory.

Under Alternative B, more treatments are proposed in lodgepole pine stands, as compared to Alternatives A and C; treatments would result in fewer acres that are susceptible to endemic infestation by mountain pine beetle.

Treatments in cool, moist forest types would include even-aged stand management, such as seed tree harvesting, shelterwood cuts, and clearcutting treatment methods, that would regenerate approximately 2,010 acres of cool moist forest, primarily in lodgepole pine and Douglas-fir forest types.

Proposed treatments in the Big Hole watershed of 1,400 acres would reduce current acreages of medium and large size class, high density, trees from 5,533 acres to 4,133 acres, compared to 2,438 acres historically. Assuming a rate of increased acreage of large and medium size class, high density trees of 309 acres per decade, proposed levels of treatment would require 3 decades to approach historic levels in the Big Hole watershed.

Proposed treatments in the Upper Missouri watershed of 1,400 acres would reduce current acreages of stands with medium and large-sized trees with high stem densities from 6,187 acres to 4,787 acres as compared to 4,262 acres historically. Assuming a rate of increased acreage of large and medium size class, high density trees of 193 acres per decade, proposed levels of treatment would require two decades to approach historic levels in the Upper Missouri watershed.

Proposed treatments in the Jefferson watershed of 300 acres would decrease current acreages of medium and large size class, high density trees, from 1,493 acres to 1,193 acres compared to 1,518 acres historically, assuming a rate of increased acreage of large and medium size class, high density trees of 21 acres per decade. While this is 20 percent lower than the historical averages for medium and large size forest types, this action is expected to shift the treated stands toward earlier seral conditions and would start the process of developing earlier seral, seedling, saplings and pole sized stands, which are currently 610 acres or 11 percent of 5,401 acres that occurred historically.

Under Alternative B, a total of 3,750 acres of cool, moist forest per decade would be treated to help restore historic conditions, compared with 2,350 acres with Alternative A, 550 acres with Alternative C, and 5,050 acres for Alternative D. For all cool moist forest types, deviation from historic conditions has occurred at a rate of 1,100 acres per decade. Alternatives A, B and D would restore vegetation at a rate that exceeds the rate of declining forest health.

Riparian Areas

Alternatives B and C would establish Riparian Management Zones (RMZs) wider than Streamside Management Zones. Having RMZs wider than SMZs would create more benefits to riparian vegetation and stream conditions by providing for increased stream shading, increased down woody material recruitment, and wider vegetative “filters” to prevent eroded sediment from reaching streams. This differs from Alternatives A and D where no RMZs would be established and SMZs would perform these functions to a lesser degree.

With Alternative B, there would be approximately 5,312 acres in RMZs in the Decision Area as compared to approximately 11,393 acres in RMZs in Alternative C. Alternatives A and D would both have approximately 3,528 acres in Streamside Management Zones. Under Alternative B mechanical treatments and prescribed fire would maintain, restore, or enhance vegetative diversity and structure in up to 700 acres per decade of riparian communities. These acres would tend to move from a lower functional condition to a higher functional condition. An example would be moving a riparian area (in a historically non-forested area) that is functioning-at-risk to proper functioning condition by cutting or removing conifers that are closing the canopy and shading out the broadleaf tree or shrub species. Treatments to restore functioning condition would be 13 times greater than Alternative A (up to 30 acres per decade), 3.5 times greater than Alternative C (up to 200 acres per decade), but 2.5 times less than Alternative D (up to 1,700 acres per decade).

With Alternative B, timber harvest and removal of wood products would be allowed in RMZs when utilized to help meet riparian objectives. For example, recruitment

of aspen or cottonwood, reducing juniper competition, or enhancing broadleaf shrub communities would meet riparian objectives. Under Alternatives B and D fire-wood cutting would not be allowed within 100 feet of perennial streams or within 50 feet of intermittent streams. This measure would allow recruitment of woody material to streams and riparian areas to a greater extent than under Alternative A, but to a lesser extent than under Alternative C where limitations would apply within 200 feet of perennial streams and 100 feet of intermittent streams.

Overall, Alternative B (grazing on approximately 265,000 acres) would have slightly greater impacts to riparian vegetation associated with livestock grazing than Alternative C (approximately 262,000 acres), but less than Alternatives A and D (approximately 273,000 acres). Managing livestock grazing activities in the McMasters Hills, Spokane Hills, and Indian Creek allotments as forage reserve allotments in Alternative B could impact riparian vegetation less than in either Alternatives A or D where they would be managed as available for general grazing permits. Alternative B would pose a greater impact to riparian vegetation in the Indian Creek allotment than Alternative C in which the Indian Creek allotment would be unavailable for grazing but where McMasters and Spokane Hills allotments would be managed as forage reserve allotments as in Alternative B.

There would be no impacts to riparian vegetation specifically from livestock grazing in the Centennial Gulch, Free Coinage, Alder Creek, Charcoal Mountain Custodial, Dickie, Maiden Rock Custodial, Quinn Creek, and Wineglass Mountain allotments in Alternative B as these areas would be unavailable for grazing. Alternative C manages these areas the same as Alternative B and would therefore also have no specific livestock grazing-related impacts to riparian vegetation. Alternatives A and D would manage these areas as available for general grazing permits and would have slightly greater impacts to riparian vegetation associated specifically with livestock grazing.

Treating aspen stands to stimulate sprouting and then fencing treated sites to prevent cattle and wildlife browsing and trampling would regenerate aspen stands. Aspen stands would be more actively managed across the landscape in Alternatives B and D (more acres specifically targeted for aspen restoration) compared to the opportunistic management proposed under Alternative C (aspen treated through other higher priority projects) and no specific aspen management included in Alternative A. Because Alternatives B and D would actively restore aspen and propose more acres of restoration than Alternatives A and C, these alternatives would promote and sustain more aspen over the long-term.

Under Alternative B, aerial application of herbicides to treat noxious weeds would not occur within 100 feet of streams or wetlands. This measure increases the chance

of inadvertent mortality to non-target riparian vegetation more than either Alternative A (minimum buffer strip is 200 feet wide) or Alternative C which provides for no aerial application of herbicides at all.

Because ground treatments for noxious weeds are more expensive and less efficient than aerial applications, Alternatives B and D would cost more than Alternative A, which in turn would cost more than Alternative C. Because ground treatments take more time and money, the risk of not treating some noxious weed infestations on uplands adjacent to riparian areas is correspondingly higher under alternatives with greater aerial herbicide application restrictions. Under Alternative B, Decision Area-wide, approximately 77.4 miles of routes within 300 feet of streams would remain open to motorized use. This is less than Alternative A (94.3 miles) and Alternative D (81.2 miles), but more than Alternative C (73.7 miles) and suggests that Alternative B has the next to least amount of road-related impacts to riparian vegetation of the alternatives.

Under Alternative B, a total of 5.7 miles of river/stream segments would be recommended as suitable for WSR designation (Muskrat Creek and Missouri River). WSR designation would likely lead to managing a 0.25 mile corridor on either side of these segments to protect the Outstandingly Remarkable Values (ORVs). This would increase protection of riparian vegetation from various potential future land use disturbances, such as utility corridors, timber harvest, or mining along these 5.7 miles. In relation to WSRs, Alternative B would manage more miles of riparian vegetation under WSR designation than Alternative D in which no rivers would be recommended as suitable for designation, but fewer miles than Alternatives A and C where all 12 miles of eligible segments would be managed to protect ORVs.

Alternative B would allow construction of roads and facilities associated with mining activities only when no alternative to locating these facilities outside riparian areas exists. This would minimize impacts such as removal of riparian vegetation, sediment production, streambank disturbance, and invasive plant introductions more than either Alternative A or D where no such provisions would be in place, but less than in Alternative C where no mining-related roads or facilities would be permitted inside RMZs.

Noxious Weeds

Under Alternative B, noxious weeds and invasive species have a similar potential for expansion to Alternative D which is greater than Alternative A and less than Alternative C. This potential could result in up to 48,000 weed acres (a rate of 10 percent/year, assuming implementation of the low end of the proposed range of weed treatment acres), from predictable factors in ten years. Of these acres, approximately 9 acres/year are associated with open and limited roads, 193 acres/year with grassland and shrubland (combined) vegetation treatments, 93

acres/year with forest treatments, and most of the remainder with natural expansion of established weed infestations in the Planning Area.

Weed expansion from new permanent roads for forest vegetation projects would also be similar for Alternatives B and D which would be greater than under Alternative C where no new permanent roads would be permitted.

Up to 50,000 acres per decade would be treated with 85 to 90 percent of these acres being repeat treatments. Therefore, up to 7,500 acres (40 percent of current populations) per decade of weed infestations would be successfully controlled or eradicated using Integrated Weed Management methods under this alternative.

Vegetation restoration of up to 15,450 acres per decade of grasslands and shrublands (combined) could eventually produce up to 12,000 acres per decade of healthy desired vegetation resistant to weed infestations.

Restrictions of a 100-foot minimum aerial herbicide application buffer for riparian areas would result in similar riparian weed control costs as Alternative D, but lower than Alternatives A and C.

Effects of Alternative C

General Vegetation

Alternative C would emphasize the maintenance and protection of diverse habitats, but would restore fewer acres than Alternative B or D. With less acres treated under Alternative C, much treatment would occur in wildland urban interface, as this area is prioritized for treatment.

Areas of habitat enhancement, fire rehabilitation, plantings, seedings, and other restoration projects would be protected from effects of grazing by wildlife and livestock, which would facilitate development of stable, self-sustaining plant communities and stabilize soils.

Snags and down woody material would be protected rather than created (Alternative B), which may in some cases locally limit the use of prescribed fire to reduce fuel loading, thin dense forest stands, and remove conifer encroachment if high value snag/down wood patches need to be protected.

Restricting permanent, new road construction in areas of big game winter range and calving areas and reducing road densities where they currently exceed 0.5 mi/mi² could limit vegetation management options that are associated or dependent on roads (e.g., Christmas tree and fire wood gathering). Alternative C would be more restrictive than Alternative B, which limits permanent road density to 1 mi/mi², and Alternative D, which would limit permanent road density where they are 0.5 mi/mi² or less.

Snags and down woody material would be protected rather than created (Alternative B), which may limit the

use of prescribed fire to reduce fuel loading, thin dense forest stands, and remove conifer encroachment.

The restriction on clearing vegetation within 250 feet of the entrance of caves and abandoned mines with populations of bats would have the same effects on vegetation as Alternative B.

Alternative C restricts noise disturbance and most management activities within 1-mile of occupied raptor nests, during the nesting and brooding period. This is the most restrictive of noise disturbance prescriptions of all alternatives and has the greatest potential to limit vegetative restoration because approximately 2,000 acres would be affected per nest.

Only using native species for landscaping, tree plantings, and ground cover at developed campgrounds would necessitate relatively intense management in terms of weed control and establishment of vigorous, self-sustaining communities; however, once native plant communities were established, there would be little or no maintenance such as watering and fertilization, measures often required for non-native vegetation. The effects under other alternatives of using introduced annual cereal crops or other introduced perennials to stabilize slopes, to provide quick ground cover, or to provide competition with invasive species would be foregone.

Visual Resource Management (VRM) and Recreation Opportunity Spectrum (ROS) classifications may affect the potential to manage vegetation with methods that affect visual quality of some areas and that require the availability of permanently open access roads. Management practices such as regeneration harvesting (e.g., clearcutting, seed tree harvests) may conflict with visual management objectives and access would be restricted to existing roads affecting treatment feasibility in many areas, particularly in the semi-primitive motorized ROS areas. Alternative C also places the greatest area, 93,800 acres, into VRM Classes I and II of all alternatives. Although VRM does not preclude vegetation health projects from occurring, meeting objectives could be more difficult due to fewer implementation methods available to meet VRM Classifications.

The FMU designations in this alternative would be: approximately 41,000 acres (13 percent) in Category A; 23,000 acres (8 percent) in Category B; and 243,000 acres (79 percent) in Category C. This alternative is similar to Alternative A, except the percentage of acres that are in FMU Category A is five percent greater. The effects of FMU A, B, and C designations are discussed under Effects Common to All Alternatives, General Vegetation.

Alternative C would provide for a timing restriction on prescribed burning and mechanical treatment projects from May through August. Effects would be greater than with Alternative B, as implementation of many vegetation treatments would have to occur outside this re-

stricted period (unless breeding bird surveys document low impacts of project proposals to migratory birds).

Grasslands and Shrublands

Up to 2,000 acres (1 percent of grasslands in Decision Area) of grassland and 750 acres (4 percent of shrublands in Decision Area) of shrubland would be treated per decade with prescribed fire, mechanical treatments, and other methods to improve health and resiliency of these communities by reducing the density of conifers in these habitats.

Effects of treatments can be seen by comparing acres treated versus rates at which encroachment is occurring in grasslands and shrublands (Table 4-4 and Table 4-5). Grassland treatments would result in a net increase in conifer encroachment into grasslands at a rate of approximately 2,966 acres per decade (Table 4-4). Alternative C shrubland treatments would result in a net increase of conifer encroachment at a rate of approximately 695 acres per decade (Table 4-5).

Alternative C would result in the greatest reduction of grassland and shrubland habitat quality due to conifer encroachment of all alternatives. Alternative A would result in a lesser reduction of grassland and shrubland habitat quality (approximately 1,161 acres per decade combined) than Alternative C while Alternatives B and D would result in net increases in restored grassland and shrubland habitats.

Under Alternative C prescribed fire projects would be planned to consume aboveground biomass on no more

than 60 percent (on average) of areas burned on a per treatment unit basis. This would eliminate most conifer seedlings and saplings on 60 of the area and would leave live conifers in patches on 40 percent of treatment units. This would provide fewer long-term benefits to grassland and shrubland habitats than either Alternative B (burning on no more than 80 percent of surface area) and Alternative D (burning on no more than 90 percent of surface area). Alternative A would have no analogous management guidance.

Under Alternative C, areas identified for prescribed burning would be rested for up to one year prior to treatment (if necessary to produce fuels to carry the prescribed fire) and for a minimum of two growing seasons following burning treatments. As described above for Alternative B, Alternative C would enhance grassland and shrubland vegetation the most of all alternatives in this regard. Rest from livestock grazing would promote grassland and shrubland vegetative recovery before re-applying livestock grazing impacts. Alternative A calls for rest before and after burning as determined through site-specific planning. Alternative B calls for rest for up to one year prior to treatment and for two growing seasons after treatment, subject to alteration of these timeframes on a case-by case basis.

Alternative C would provide for opportunistic restorative treatments of mountain mahogany and bitterbrush communities when associated with other projects. Though the effects of these treatments would be the same as described for Alternative B, beneficial effects to these species would occur on fewer acres than in either

Table 4-4
Alternative C Comparison of Acres of Grassland Treated Versus Rate of Conifer Encroachment

Watershed	Area Treated per Decade	Conifer Encroachment	Encroachment After Treatment	Rate of Encroachment per Decade	Net Effect on Encroachment
Big Hole	250	3,398	3,148	340	3,488
Blackfoot	0	NA	0	0	0
Gallatin	0	NA	0	0	0
Jefferson	500	16,472	15,972	1,647	17,619
Missouri	1,250	29,787	28,537	2,979	31,516
Yellowstone	0	NA	NA	NA	NA
Total	2,000	49,657	47,657	4,966	52,623

Table 4-5
Alternative C Comparison of Acres of Shrubland Treated Versus Rate of Conifer Encroachment

Watershed	Area Treated per Decade	Conifer Encroachment	Encroachment After Treatment	Rate of Encroachment per Decade	Net Effect on Encroachment
Big Hole	450	9,017	8,567	902	9,469
Blackfoot	0	0	0	0	0
Gallatin	0	0	0	0	0
Jefferson	200	3,987	3,588	399	3,987
Missouri	100	1,341	1,241	134	1,375
Yellowstone	0	100	100	10	110
Total	750	14,445	13,496	1,445	14,940

Alternative B or D where a more proactive approach would be taken to maintain and restore populations of these species.

Under Alternative C, livestock grazing would be permitted on 262,000 acres of Decision Area lands, the lowest acreage of any alternative. Impacts to grasslands and shrublands from livestock grazing would be slightly less in Alternative C than in Alternative B because three allotments (Indian Creek, Dog Paw, Sixmile Park County) available as either forage reserve allotments or for general grazing permits in Alternative B would not be available for grazing in Alternative C. All of these allotments would be available for general livestock grazing permits in Alternatives A and D and would therefore have grassland and shrubland impacts associated with them in these alternatives. Alternative C poses the least impacts to grasslands and shrublands due to livestock grazing of all the alternatives.

Forests and Woodlands

Harvesting of Christmas trees and other forest products would have similar effects to the other alternatives with fewer products being harvested since there would be fewer open roads for public access to the forested areas.

No dead trees could be removed for firewood except in specifically designated areas, so the effects of firewood removal would be limited to those specific areas designated for firewood cutting. The current cooperative USFS-BLM permitting system for personal use firewood cutting would be dropped and would not match current public firewood cutting practices on nearby National Forest lands. Some confusion with the public is likely to occur and additional education and enforcement actions are anticipated. More dead fuel would remain, and the potential large snag and down woody material development would increase as the diameter limit for live tree firewood removal in Alternative C would be 20 inches, a firewood diameter restriction that is the smallest, and therefore most restrictive, of the alternatives.

Existing and developing old forests would be retained and protected from land use actions, stand-replacing wildland fire, and insects and disease through active treatments and restoration activities, where access to complete the treatment work is available. The amount of helicopter use in treatments is anticipated to be the highest under this alternative, however treatable stands would need to occur near accessible landing sites and have sufficient quantities of commercial materials to offset all or part of potential high costs of the equipment to remain feasible. These access factors could limit the amount of forest and woodland areas that could be effectively treated, compared to the other alternatives. Forest and woodland areas that currently do not have existing access or could not be feasibly treated by helicopter would not receive forest management or fuel reduction actions and would be left as is, subject to current stand conditions, vegetative trends, and natural events.

Alternative C requires 0.5 mile radius maintenance buffers around unoccupied raptor nests in forest habitats for a period of seven years. This is the most restrictive of the alternatives in this regard as it affects the largest acreage, 500 acres per site, for the longest period of time.

Dry Forest

Approximately 4,000 acres of high-density stands of dry ponderosa pine and Douglas-fir forest with medium to large-sized trees in the Decision Area would be treated per decade.

Additionally, 500 acres per decade of dry forest stands, currently in ecologically healthy condition, would be treated. These treatments would result in maintenance of large overstory trees and natural regeneration that would provide diverse age and size classes that would periodically burn with low intensity wildland fire.

Although treatments in Douglas-fir stands may have a localized effect on western spruce budworm, Alternative C treats the least acreage of all the alternatives, and will have the least effect on spruce budworm overall.

Proposed treatments in the Upper Missouri watershed would affect 2,300 acres, reducing the acreage of medium and large size tree class, high density ponderosa pine and Douglas-fir from approximately 33,973 acres to 29,373 acres over a 20-year time span compared to 6,965 acres historically. Assuming that the acreage of high density trees has increased at a rate of 2,700 acres per decade, as a result of fire suppression over the last century, the proposed treatments would not keep pace with the rate at which high density stands of Douglas-fir and ponderosa pine are developing.

Proposed treatments in the Jefferson watershed would affect 1,300 acres of high density forest with medium to large-sized trees, reducing the acreage of stands dominated by medium and large size class Douglas-fir and ponderosa pine from 19,187 acres to 16,623 acres over a 20-year time span. Assuming that the acreage of high density trees has increased at a rate of 1,424 acres per decade, as a result of fire suppression over the last century, the proposed treatments would not keep pace with the rate at which high density stands of Douglas-fir and ponderosa pine are developing.

Proposed treatments in the Big Hole watershed would affect 500 acres, reducing the acreage of medium and large size class Douglas-fir and ponderosa pine from 13,733 acres to 12,733 acres over a 20-year time span, compared to 6,768 historically. Assuming that the acreage of high density trees has increased at a rate of 704 acres per decade, as a result of fire suppression over the last century, the proposed treatments would not keep pace with the rate at which high density stands of Douglas-fir and ponderosa pine are developing.

Cool, Moist Forest

Approximately 550 acres (4 percent of Decision Area total) of high-density stands of moist Douglas-fir, lodgepole pine, subalpine fir, and Engelmann spruce forest with medium to large-sized trees in the Decision Area would be treated per decade.

Additionally, 50 acres of cool, moist forest stands would be thinned pre-commercially, which would remove smaller seedlings, saplings, and pole-sized trees, reducing the risk of intense wildland fire and allowing larger trees to develop a dominant overstory.

Alternative C treats the least amount of acres of cool, moist forest as compared to the other alternatives, and will have the least impact on endemic mountain pine beetle infestations, accordingly.

Treatments in cool, moist forest types would include even-aged stand management, such as seed tree harvesting, shelterwood cuts, and clearcutting treatment methods, that would regenerate approximately 330 acres of cool moist forest, primarily in lodgepole pine and Douglas-fir forest types.

Proposed treatments of medium and large tree size class, high density, stands in the Upper Missouri watershed would affect 250 acres per decade, reducing the acreage of high density stands from 6,187 acres to a total of 5,937 acres, compared to 4,262 acres historically. Assuming that the acreage of high density trees has increased at a rate of 193 acres per decade, the proposed treatments would reduce the amount of medium and large size class, high density stands by less than one percent per decade.

Proposed treatments of medium and large tree size class, high density, stands in the Big Hole watershed would affect 175 acres per decade, reducing the acreage of high density stands from 5,533 acres to a total of 5,358 acres, compared to 2,438 acres historically. Assuming that the acreage of high density trees has increased at a rate of 309 acres per decade, the proposed treatments would reduce the rate of increase by 57 percent, but would not keep pace with the rate at which high density stands of Douglas-fir and ponderosa pine are developing.

Proposed treatments in the Jefferson watershed of 50 acres per decade would decrease current acreages of medium and large size class, high density trees, from 1,493 acres to 1,464 acres assuming a rate of increased acreage of large and medium size class, high density trees of 21 acres per decade, compared to 1,518 acres historically. This is less than a two percent change in the amount of medium and large size class, high density cool, moist forest in the Jefferson watershed.

A total of 600 acres of cool, moist forest and woodland per decade would be treated per decade under Alternative C. It is the only alternative that continues the current approximate levels of cool moist forest, with a general

decline in forest health continuing in many areas with limited access.

Riparian Types

Alternative C would establish wider Riparian Management Zones (RMZs) than Alternative B. Similar to Alternative B, riparian goals, and objectives would be the primary management emphasis in these areas. Alternative C would provide for approximately 11,393 acres in RMZs, compared to approximately 5,312 acres in Alternative B. Since Alternatives A and D provide only for narrower Streamside Management Zones (approximately 3,528 acres), Alternative C would reduce the risk of more adverse human-caused disturbances than the other alternatives.

Mechanical treatments and prescribed fire would maintain, restore, or enhance vegetative diversity and structure in up to 200 acres per decade of riparian communities under Alternative C. This is a lesser rate of restorative treatments than with Alternatives B and D, but more than with Alternative A.

Woody materials cut for riparian restoration activities under Alternative C would be retained on site, providing down wood for streams and riparian function, making available organic material for fungi and invertebrates, and increasing organic matter in soil. At the site level this would benefit riparian communities on the whole more than with any other alternative. All other alternatives allow for removal of commercial forest products from riparian communities.

Under Alternative C firewood cutting would not be allowed within 200 feet of perennial streams or within 100 feet of intermittent streams. This restriction would allow recruitment of more woody material to streams and riparian areas than with any other alternative.

Natural processes would determine the structure and composition of aspen stands under Alternative C. If consistent with other project objectives, aspen would also be treated opportunistically. This would reinvigorate aspen communities less than either Alternative B or Alternative D where aspen stands would be proactively restored, but more than Alternative A where particular aspen management would not occur.

Impacts to riparian vegetation from livestock grazing would be slightly less in Alternative C than in Alternative B because three allotments (Indian Creek, Dog Paw, Sixmile Park County) available as either forage reserve allotments or for general grazing permits in Alternative B would not be available for grazing in Alternative C. All of these allotments would be available for general livestock grazing permits in Alternatives A and D and would therefore have riparian vegetation impacts associated with them in these alternatives. Alternative C poses the least impacts to riparian vegetation associated with livestock grazing of all the alternatives.

Alternative C provides for no aerial application of herbicides to treat noxious weeds. This would provide the most protection to riparian vegetation from inadvertent herbicide-related mortality of desirable vegetation of all alternatives because aerial applications would be allowed under all other alternatives.

Under Alternative C, Decision Area-wide, approximately 73.7 miles of routes within 300 feet of streams would remain open to motorized use. This is the least of all alternatives and suggests that Alternative C would have the least road-related impacts to riparian vegetation of all alternatives.

Under Alternative C, all 12 miles of eligible river/stream segments would be recommended as suitable for WSR designation (Muskrat Creek, Missouri River, Moose Creek, and Upper Big Hole River). WSR designation would likely lead to managing a ¼-mile corridor on either side of these segments to protect the ORVs. This would increase protection of riparian vegetation from various land use disturbances along these 12 miles.

Under Alternative C the potential Spokane Creek ACEC (14 acres) would be designated. Proposed ACEC management would increase protection of riparian vegetation in this area by not allowing new road construction, closing the area to new rights-of-way and R&PP leases, and providing for No Surface Occupancy for oil and gas exploration. The activities listed above could potentially disrupt the stream channel, upset the spawning gravels, and remove the vegetation that provides shade and filters sediment. These measures would not be in place in Alternatives A, B and D because this potential ACEC is not proposed in those alternatives.

Under Alternatives C, the proposed withdrawal from mineral entry of 180 acres of riparian areas in the Muskrat Creek drainage would protect riparian vegetation in these areas from impacts associated with mining activities more than under Alternatives A, B and D that do not provide for this proposed mineral withdrawal. Muskrat Creek is a particularly sensitive area because the stream supports a healthy population of westslope cutthroat trout that is used to help repopulate other creeks and streams.

Prohibiting new mineral operation roads and facilities inside RMZs under Alternative C would provide additional protection to riparian vegetation beyond that provided in any other alternative. All other alternatives would allow for mining facility and road construction in riparian areas under certain conditions.

Noxious Weeds

Under Alternative C, noxious weeds and invasive species have the greatest potential for expansion, resulting in up to 51,000 weed acres (a rate of 11 percent/year assuming implementation of the low end of the proposed range of weed treatment acres), from predictable factors in ten years. Of these acres, approximately 8 acres/year

are associated with open and limited roads, 34 acres/year with grassland and shrubland (combined) vegetation treatments, 27 acres/year with forest treatments, and most of the remainder with natural expansion of established weed infestations on and near the Decision Area.

Wildfires could increase these total expansion acres more in Alternative C than any other alternative because it has the least reduction in fire potential from vegetation treatments. Alternative C restrictions where salable minerals may be sold only to state and county sales or from community pits and not permitting new roads for mineral development would reduce potential weed spread by decreasing disturbances associated with access to salable mineral sites.

Camping restrictions on Holter and Hauser Lakes would have the greatest reduction in potential weed expansion from introducing seed sources under Alternative C because camping could only occur in developed sites. This would be more restrictive than Alternative B where camping could occur in developed or designated undeveloped sites and Alternatives A and D which have no camping restrictions.

Up to 38,000 acres per decade would be treated to reduce noxious weeds with 85 to 90 percent of these acres being repeat treatments. Therefore, up to 5,700 acres (30 percent of current populations) per decade of weed infestations would be successfully controlled or eradicated using Integrated Weed Management methods under this alternative.

Vegetation restoration of up to 2,750 acres of grasslands and shrublands (combined) per decade could eventually produce up to 2000 acres per decade of healthy desired vegetation resistant to weed infestations.

Riparian weed treatments would be the most expensive under Alternative C because no aerial treatments would be permitted in riparian areas, so more expensive ground treatments would be required. Also, restrictions on using sheep grazing for weed control near bighorn sheep habitat exclude the most area under Alternative C which would also increase treatment costs; thereby decreasing the acres possible to treat in the Decision Area.

Impacts from the revegetation seed mix would be the same as with Alternative B.

No new, permanent roads would be allowed in big game winter range or calving habitat where road densities are mines with bat populations. Having no related action provides more flexibility in these areas than under Alternatives B and C.

Effects of Alternative D

General Vegetation

Livestock grazing would be permitted on 273,000 acres of public land. Effects would be the same as those described under “Effects Common to All Alternatives” for

Grasslands and Shrublands, 0.5 mi/mi² or less. Road restrictions could affect options for vegetation treatment (e.g., firewood and Christmas tree harvest, timber harvest, and thinning), but less than with the other action alternatives.

Similar to Alternative A, no restrictions would be placed on vegetation treatments near caves and abandoned mines with populations of bats.

Alternative D restricts noise disturbance and most management activities within 0.25-mile, or 125 acres, of occupied raptor nests, during the nesting and brooding period. This is the least restrictive of noise disturbance prescriptions under the action alternatives and is less likely to impede vegetative treatments than Alternatives B and C.

Prescribed burning could take place at any time of the year, which could affect mortality of vegetation if burning were to occur during conditions that would lead to high burn intensity and severity. No timing restrictions on burning would also increase the feasibility of implementing burning treatments.

The FMU designation in this alternative would be approximately 42,000 acres (14 percent) in Category B; 82,000 acres (27 percent) in Category C; and 183,000 acres (59 percent) in Category D. In FMU Category D, fire is desired with no constraints. These areas offer the greatest opportunity to use the full range of options

available for managing wildland fire under the appropriate management response, including wildland fire use for resource benefit. The effects of FMUs B, C, and D designations are discussed under Effects Common to All Alternatives, General Vegetation.

Alternative D places the fewest acres, 32,800 in VRM Classes I and II. This alternative provides for the greatest flexibility in the VRM classes to accomplish vegetation health objectives without potentially conflicting with VRM objectives. With fewer visual restrictions, project planning and implementation could utilize a wider range of available tools.

Grasslands and Shrublands

Up to 19,050 acres (14 percent of grasslands in Decision Area) of grassland and 6,800 acres (34 percent of shrublands in Decision Area) of shrubland would be treated per decade with prescribed fire, mechanical treatments, and other methods to improve health and resiliency of these communities by reducing the density of conifers in these habitats. Effects of treatments can be seen by comparing acres treated versus rates at which encroachment is occurring in grasslands and shrublands (Table 4-6 and Table 4-7).

Grassland treatments could result in a net increase in restored habitats of approximately 13,373 acres per decade under Alternative D (Table 4-6). Shrubland treatments could result in a net increase in restored habi-

Table 4-6
Alternative D Comparison of Acres of Grassland Treated Versus Rate of Conifer Encroachment

Watershed	Area Treated per Decade	Conifer Encroachment	Encroachment After Treatment	Rate of Encroachment per Decade	Net Effect on Encroachment
Big Hole	3,500	3,398	0	399	399
Blackfoot	100	NA	0	0	0
Gallatin	400	NA	0	0	0
Jefferson	6,000	16,472	10,472	1,647	12,119
Missouri	9,000	29,787	20,787	2,979	23,766
Yellowstone	50	NA	NA	NA	NA
Total	19,050	49,657	31,259	5,025	36,284

Table 4-7
Alternative D Comparison of Acres of Shrubland Treated Versus Rate of Conifer Encroachment

Watershed	Area Treated per Decade	Conifer Encroachment	Encroachment After Treatment	Rate of Encroachment per Decade	Net Effect on Encroachment
Big Hole	4,000	9,017	5,017	902	5,919
Blackfoot	100	0	0	0	0
Gallatin	100	0	0	0	0
Jefferson	1,500	3,987	2,487	399	2,886
Missouri	1,000	1,341	341	134	475
Yellowstone	100	100	0	10	10
Total	6,800	14,445	7,845	1,445	9,290

tats of approximately 5,155 acres per decade (Table 4-7). These potential increases in restored grassland and shrubland habitats are greater than with any alternative and would represent the greatest potential long-term benefits of any alternative.

Proposed treatments would exceed the rate at which conifers are encroaching on grasslands; however, restoration of historic conditions would take approximately 3.5 decades if the upper end of proposed Alternative D treatment rates were applied. Restoration of historic conditions in shrublands would take nearly 3 decades if the upper end of proposed Alternative D treatment rates were applied.

Under Alternative D prescribed fire projects would be planned to consume aboveground biomass on no more than 90 percent (on average) of areas burned on a per treatment unit basis. This would eliminate most conifer seedlings and saplings on 90 of the area and would leave live conifers in patches on 10 percent of treatment units.

This would provide greater long-term benefits to grassland and shrubland habitats than either Alternative B or C. Alternative A would have no analogous management guidance.

Unlike Alternatives B and C, Alternative D (along with Alternative A) would not provide for a summer seasonal restriction on prescribed fire projects. Prescribed fires during the summer months could be more severe and intense than those in either spring or fall. Such burns under Alternative D could have more severe, longer term adverse effects to grasslands and shrublands associated with mortality of desired vegetation (as described for Alternative A) than in Alternatives B and C where prescribed fire would not be applied from May through August.

Alternative D calls for rest from livestock grazing prior to prescribed burning projects (if needed to produce fine fuels to carry prescribed fire), and for rest through one growing season after burning projects to allow vegetative recovery, subject to alteration of these timeframes on a case-by-case basis. Post-burn recovery of grassland and shrubland vegetation may be slower due to the plants' increased palatability to livestock after one growing season of recovery than under Alternatives B and C that both call for two growing seasons of rest from livestock grazing after prescribed burning projects.

Like Alternative B, Alternative D would provide for proactive restoration of mountain mahogany and bitterbrush communities. Effects would be the same as described for Alternative B.

Effects of livestock grazing on grasslands and shrublands in Alternative D would be the same as those described for Alternative A.

Forests and Woodlands

Impacts on late forest structure would be the same as Alternative B.

The effects of Christmas tree harvest would be similar to Alternative B, though removal of more trees in Alternative D would potentially remove more encroachment. Similarly, the effect of firewood removal would be the same as with Alternative B.

The 0.25-mile protection buffer (affecting 125 acres) surrounding unoccupied raptor nests for a period of 3 years would have the least effect on vegetative treatments of the action alternatives. The area affected would be the same as Alternative B but the maintenance period would be 2 years less.

Dry Forest

Approximately 12,200 acres of high-density stands of dry ponderosa pine and Douglas-fir forest with medium to large-sized trees in the Decision Area would be treated per decade.

Additionally, 3,500 acres per decade of dry forest stands, currently in ecologically healthy condition, would be treated. These treatments would result in maintenance of large overstory trees and natural regeneration that would provide diverse age and size classes that would periodically burn with low intensity wildland fire.

About 1,000 acres of limber pine habitat would also be treated with prescribed fire per decade. Burning would reduce the density of limber pine trees and would remove fuels that have built up due to mortality of trees from blister rust.

Approximately 1,500 acres per decade of small diameter thinning of seedlings, saplings, and pole-size trees would reduce density of small trees and reduce fuel loading, resulting in less intense wildland fires.

Alternative D would have the greatest effect on reducing potential impacts by western spruce budworm since the greatest acreage of dry Douglas-fir forest is treated under this alternative. Thinning stands and removing encroachment will reduce defoliation and leave stands less vulnerable to insect infestation. Less spruce budworm defoliation will also make dry forests less susceptible to Douglas-fir beetle infestation as stands will be more vigorous after treatment.

Proposed treatments in the Upper Missouri watershed would affect 5,500 acres of medium and large tree size class, high density ponderosa pine and Douglas-fir, reducing the acreage from 33,973 acres to 22,973 acres over a 20-year time span, compared to 6,965 acres historically. Assuming that the acreage of high density trees has increased at a rate of 2,700 acres per decade as a result of fire suppression over the last century, the proposed treatments would result in a reduction in the acreage of high density stands to historic levels with nearly 10 decades of repeated treatments.

Proposed treatments in the Jefferson watershed would affect 3,000 acres of medium and large tree size class Douglas-fir and ponderosa pine, reducing the acreage from 19,187 acres to 13,187 acres over a 20-year time span, compared to 4,914 acres historically. Assuming that the acreage of high density trees has increased at a rate of 1,424 acres per decade as a result of fire suppression over the last century, the proposed treatments would result in a reduction in the acreage of high density stands to historic levels with approximately 9 decades of repeated treatments.

Proposed treatments in the Big Hole watershed would affect 2,300 acres of medium and large tree size class Douglas-fir, reducing the acreage from 13,733 acres to 9,133 acres over a 20-year time span, compared to 6,690 acres historically. Assuming that the acreage of high density trees has increased at a rate of 704 acres per decade as a result of fire suppression over the last century, the proposed treatments would result in a reduction of the acreage with high density stands to historic levels with over 4 decades of repeated treatments.

Cool Moist Forest

Approximately 4,450 acres (32 percent) of high-density stands of moist Douglas-fir, lodgepole pine, subalpine fir, and Engelmann spruce forest dominated by medium to large-sized trees in the Decision Area would be treated per decade. Additionally, 600 acres of cool, moist forest stands would be thinned pre-commercially, which would remove smaller seedlings, saplings, and pole-sized trees, reducing the risk of intense wildland fire and allowing larger trees to develop a dominant overstory.

Treatments in cool, moist forest types would include even-aged stand management, such as seed tree harvesting, shelterwood cuts, and clearcutting treatment methods, that would regenerate approximately 2,670 acres of cool moist forest, primarily in lodgepole pine and Douglas-fir forest types.

Alternative D has the greatest potential to impact future and existing and endemic mountain pine beetle infestations within the DA. Treatments would result in the fewest acres susceptible to pine beetle infestation, as compared to all other alternatives.

Proposed treatments of medium and large tree size class, high density, stands in the Upper Missouri watershed would affect 2,050 acres per decade, reducing the acreage of high density stands from 6,187 acres to 4,137 acres, compared to 4,262 acres historically. Assuming that the acreage of high density trees has increased at a rate of 193 acres per decade as a result of fire suppression over the last century, the proposed treatments would result in a reduction of the acreage with high density stands to historic levels with about 1 decade of treatments.

Proposed treatments of medium and large tree size class, high density, stands in the Big Hole watershed would affect 1,500 acres per decade, reducing the acreage of high density stands from 5,533 acres to 4,033 acres, compared to 2,438 acres historically. Assuming that the acreage of high density trees has increased at a rate of 309 acres per decade as a result of fire suppression over the last century, the proposed treatments would result in a reduction of the acreage with high density stands to historic levels after 3 decades of treatments.

Proposed treatments of medium and large size class, high density, stands in the Jefferson watershed would affect 500 acres per decade, reducing the acreage of high density stands from 1,493 acres to 993 acres, compared to 1,518 acres historically, assuming the acreage of high density trees has increased at a rate of 21 acres per decade. While this is 32 percent lower than the historical averages for medium and large size forest types, this action is expected to shift the treated stands toward earlier seral conditions and would start the process of developing earlier seral, seedling, saplings and pole sized stands, which are currently 610 acres or 11 percent of 5,401 acres that occurred historically.

Alternatives D would restore cool moist forest vegetation at a rate higher than all the other alternatives.

Riparian Types

Like Alternative A, Alternative D would provide for Streamside Management Zones. Approximately 3,528 acres within the Decision Area would be in SMZs. Effects of this would be the same as described for Alternative A.

Under Alternative D mechanical treatments and prescribed fire would maintain, restore, or enhance vegetative diversity and structure in up to 1,700 acres per decade of riparian communities. This is the greatest treatment rate of any alternative, so Alternative D would potentially restore riparian vegetative communities at a greater rate than any of the alternatives. However, if the minimum constraints of SMZs would be applied to these treatments, then site-level benefits would be less than under Alternatives B and C where RMZs and associated site-specific riparian objectives would be applied. Timber harvest within SMZs could occur in Alternative D with effects the same as in Alternative A.

Alternative D would provide for the same firewood cutting limitations in riparian areas as would Alternative B. Effects would be the same as in Alternative B.

Like Alternative B, maintaining and restoring aspen stands would be a priority under Alternative D. Alternative D would affect aspen stands similarly to Alternative B at the site scale and on more acres than any other alternative Decision Area-wide.

Aerial application of herbicides to treat noxious weeds would not occur within 100 feet of streams or wetlands in Alternative D. This would provide less protection to

riparian vegetation from inadvertent mortality than under Alternatives A or C.

Under Alternative D, approximately 81.2 miles of motorized routes within 300 feet of streams would remain open to motorized use Decision Area-wide. This is less than in Alternative A but more than in Alternatives B and C. This suggests that Alternative D would pose the next greatest amount of impact associated with roads to riparian vegetation of all alternatives.

Under Alternative D none of the four river segments eligible for Wild and Scenic River designation would be recommended as suitable for designation. The effects associated with WSR designations would be foregone.

Alternative D would allow for construction of mining-related roads and facilities in riparian areas using BMPs to minimize adverse effects. This would allow more disturbance of riparian vegetation than with either Alternative B or C and effects would be similar to Alternative A.

Noxious Weeds

Under Alternative D, noxious weeds and invasive species would have a similar potential for expansion as Alternative B which would be greater than Alternative A and less than Alternative C. This potential could result in up to 47,000 weed acres (a rate of 10 percent/year assuming implementation of the low end of the proposed range of weed treatment acres), from predictable factors in ten years. Of these acres, approximately 10 acres/year are associated with open and limited roads, 323 acres/year with grassland and shrubland (combined) vegetation treatments, 116 acres/year with forest treatments, 9 acres/year with riparian treatments, and the remainder with natural expansion of established weed infestations in the Planning Area.

Wildfires could increase these total expansion acres less under Alternative D than with any other alternative because that alternative proposed the most reduction in fire potential from vegetation treatments.

Up to 61,000 acres per decade would be treated to reduce noxious weeds with 85 to 90 percent of these acres being repeat treatments. Therefore, up to 9,200 acres (45 percent of current populations) per decade of weed infestations would be successfully controlled or eradicated using Integrated Weed Management methods under this alternative.

Vegetation restoration of up to 25,850 acres of grasslands and shrublands (combined) would eventually produce up to 19,000 acres of healthy desired vegetation resistant to weed infestations.

Restrictions of a 100 foot aerial herbicide application buffer for riparian areas would result in the lowest riparian weed control costs of all the alternatives.

WILDLIFE

Effects Common to All Alternatives

Because of the programmatic nature of the proposed alternatives, qualitative effects from management activities on wildlife are addressed under “Effects Common to All Alternatives.” Some effects may vary due to the degree of an activity such as the acres of vegetative treatments or road closures. These “quantitative” effects are addressed under each alternative. More specific analysis would be required to determine the extent of potential impacts from site specific management actions. This analysis would be completed when a management action is clearly defined.

Proposed management of the following resource programs would have no anticipated impacts to wildlife; Air Quality, Paleontology, Cultural Resources, Visual Resources, Economics, and Environmental Justice.

Habitat improvement projects would be implemented to restore or improve wildlife habitat for a wide variety of species.

The restorative treatments of uneven-age management in dry forest types using prescribed fire and mechanical treatments including thinning commercial and non-commercial trees, chipping, and grinding would mimic pre-fire suppression processes (Graham et al. 2004). This would improve the quantity and quality of habitat for wildlife dependent on a variety of size classes and densities but especially those that depend on mature open stands of ponderosa pine and Douglas-fir forests. Management towards large diameter trees would improve snag habitat for primary and secondary cavity users. Restoration and management of dry forests would increase habitat for a wide variety of resident and migratory birds as well as breeding, foraging, and hiding habitat for large and small mammals, amphibians, and reptiles.

Uneven-aged management within cool, moist forests would focus on reduction of stem density and creating small openings that would be beneficial to many of the wildlife species that occur in this vegetation community. Creation of small openings would increase vegetation diversity and available forage, especially for species such as the Canada lynx. Cool forests would also be thinned, when necessary, to promote old forest characteristics, provide habitat diversity, and reduce the risk for epidemic levels of insects and disease.

Reduction in tree densities and restoration of forest habitats would move vegetation towards the natural range of variation, especially in dry forest types, and increase the quality and quantity of big game winter range as well as breeding, denning, foraging, and hiding habitat for a variety of wildlife species. Moving vegetation towards the range of natural variability would increase vegetation diversity and habitat for large and small mammals, migratory and resident birds, and rep-

tiles. Short-term disturbance and displacement of wildlife could occur during project implementation and treated areas could be temporarily avoided. However, it is expected that the long-term benefits to a wide variety of species from restoring vegetative communities would outweigh the short-term negative effects.

A change in vegetation density could reduce the amount of habitat available for certain species while increasing habitat for others. For example, reducing dense forest to increase security habitat for bighorn sheep would decrease the amount of hiding and, possibly, thermal cover for elk. During project planning, the effects of treatments at the landscape scale would be addressed to determine the change in habitats, species affected, short and long-term effects to species and their habitats, the percent of habitat change across the landscape and which wildlife species would benefit or be negatively impacted by project implementation. The importance of big game security habitat and hiding and thermal cover would be considered during project planning.

Thinning forest stands that are subject to severe, uncharacteristic wildfire events, as well as those threatened by epidemic outbreaks of insects or disease would reduce the loss of large areas of habitat. Epidemics of insects and disease can have long-term negative impacts to some wildlife species while those species dependent on snag habitat and down woody material may benefit from increased foraging and nesting habitat.

Timber salvage would result in the loss of wildlife habitat for those species that depend on dead and dying forests. Maintaining patches of dead and dying forest would help to retain habitat features for these species but the affects to snag dependant species would vary greatly depending on the size of patches remaining after salvage. Timber salvage could have minor to major effects to those species that depend on dead and dying forest.

Treatment of grasslands and shrublands using prescribed fire and appropriate mechanical methods to reduce conifer encroachment would reduce the density of conifers and restore habitat for species dependent upon these vegetation communities. Maintenance and restoration of grassland and shrubland communities would ensure long-term quality habitat for big game winter range, calving habitat, and forage and nesting habitat for a variety of resident and migratory grassland and sagebrush bird species. Treatments could cause individuals to leave an area during project implementation but this is expected to be short-term. Since removing conifers from grasslands and shrublands would alter the amount and type of available habitat, wildlife species would be affected in different ways. For example, the removal of conifers may reduce hiding and thermal cover for big game but would increase the amount of forage available for these species. Reducing the density of conifers could also reduce nesting and foraging habitat for forest bird species but would increase nesting and foraging habitat for grassland and shrubland bird species. Overall, the

benefits of restoring grassland and shrubland habitat would outweigh the negative effects to those species currently using encroached grasslands and shrublands.

Riparian areas support a higher diversity of plants and animals than non-riparian land. This is a result of the wider range of habitats and available food as well as the proximity to water, microclimate, and refuge. Many native plants are found only, or primarily, in riparian areas, and these areas are essential to many animals for all or part of their lifecycle. Riparian areas also provide refuge for native plants and animals in times of stress, such as drought or fire, and provide critical corridors for wildlife movement.

Riparian and wetland restoration, including implementing Land Health Standards, and conducting all activities in a manner that would strive to maintain or restore riparian structure and function would improve habitat for resident and migratory birds, bats, reptiles and amphibians, and wildlife that use riparian areas for breeding, foraging, overwintering, or migration. Modifying grazing practices in riparian areas that retard or prevent attainment of riparian goals would benefit a multitude of species over the long-term. Riparian habitats would also be protected by not allowing incident bases, camps, helibases, or staging areas inside riparian areas during fire suppression activities.

Reducing conifer encroachment from riparian vegetation would increase the amount, health, and vigor of riparian vegetation preferred by resident and migratory birds as well as for a wide diversity of other species for breeding, brood rearing and foraging. The health and vigor of aspen, willows, cottonwoods, and riparian shrub species would improve with the removal of competing conifers. Within forest-dominated riparian areas, thinning dense conifer stands would allow for an increase in the size and diameter of remaining conifers to provide breeding and foraging habitat for many species of reptiles, amphibians, small and large mammals and numerous bird species.

The Streamside Management Zone Law provides the minimum regulatory standards for forest practices in Streamside Management Zones (SMZs) (**Appendix E**). The SMZs provide protection to water quality, stream-bank stability, down woody material and shade by restricting certain forest activities such as clearcutting, operation of wheeled or tracked vehicles except on established roads, construction of roads, deposition of slash, and broadcast burning. Streamside Management Zones, however, provide limited protection to overall riparian function and habitat diversity to terrestrial species. By focusing dead and live tree retention within the first 50 feet of stream and by allowing smaller diameter trees to be retained (down to 8 inches DBH), SMZs could limit wood recruitment to streams, reduce habitat for foraging and breeding (less vegetation and smaller diameter snags retained), reduce hiding and brood rear-

ing habitat as well as limit effective wildlife movement corridors.

Mechanical treatments could potentially cause disturbance and short-term displacement of wildlife species depending on the type of equipment used as well as the size and location of treatment areas. Hand cutting and the use of horses for logging could have minimal disturbance and allow wildlife to remain in or near the area. Mechanical ground equipment, the use of chainsaws and helicopters would have a greater degree of disturbance and result in more displacement of wildlife. It is expected that use of the area would resume after project implementation but some species could permanently leave the area. The timing of treatments would be considered during project planning and project implementation during critical seasons of use (such as within big game winter range during winter) would be minimized or prohibited.

Both prescribed fire and mechanical treatments would remove vegetation and could disturb and displace wildlife with the effects ranging from minor to major and short-term to long-term based on timing, extent, and duration of a project. Often, mechanical treatments must be done to pre-treat a site for prescribed burning. Effects could be either beneficial or detrimental depending on the wildlife species impacted, goals of the project, size of project and timing of implementation.

Prescribed fire would restore, create, and improve habitat for wildlife dependant on post-fire forest habitats and would rejuvenate and enhance understory vegetation. Down woody material and snag habitat would also be increased from the use of prescribed fire. Grassland and shrubland species would benefit from the use of prescribed fire by reducing conifer encroachment and restoring forage and breeding habitats for a wide range of wildlife species.

Although grasses and certain forbs are rejuvenated and often quickly reestablished after prescribed fire, it could take two growing seasons or longer before shrubs, desired tree species and other forb species re-colonize a burn area. Mechanical treatments retain more desired vegetation for short-term recovery of a site but can cause a longer duration of disturbance than prescribed fire.

Naturally ignited wildland fires in the Elkhorn Mountains could be allowed to burn without aggressive fire suppression activities to improve vegetative conditions. Allowing wildland fires in the Elkhorn Mountains would restore larger areas in more remote locations than would be practicable or feasible with prescribed fire. Wildland fires could create more diversity of habitats due to the variability in their intensity. Wildfire often retains a mosaic of habitats as well as diversity of vegetation that may or may not be possible using prescribed fire.

Fire suppression activities would include the clearing of firelines, the maintenance of roads and the use of retardants. These activities would remove vegetation and

habitat and would disturb and displace wildlife within these areas either temporarily or long-term depending on the type and extent of disturbance.

Permanent and temporary roads associated with management could increase public access and decrease the quantity and quality of wildlife habitat. Permanent and temporary roads could negatively impact wildlife habitat, particularly if roads are open during critical periods including winter and breeding seasons or during the hunting season in big game habitat. Roads can encourage the public to recreate in areas that had formerly been secluded. Roads can cause direct mortality through road kill, prevent wildlife movement, create disturbance, cause the spread of noxious weeds, and cause habitat fragmentation across the landscape.

Livestock grazing could reduce forage and cover available to wildlife. Managing grazing through the implementation of Standards for Rangeland Health and Guidelines would ensure that residual vegetation is maintained for foraging, breeding and cover habitat and reduce the risk of rangelands becoming degraded.

All alternatives would work to improve vegetation conditions and reduce the negative effects of livestock grazing on wildlife habitat for a variety of species. Maintaining sufficient forage and cover for wildlife on seasonal habitat would protect and benefit important wildlife habitat. Limiting water developments in areas where substantial conflicts for forage occurs between wildlife and livestock would ensure that the needs of wildlife are met.

Range improvement projects would improve range conditions over the long-term. Installing wildlife escape ramps in water tanks would prevent birds and small mammals from drowning in water tanks.

All new fences would be built to allow wildlife passage unless site-specific analysis identifies other objectives for a particular fence. Specifications for new or rebuilt fences would allow wildlife passage, especially for big game species.

Noxious weed management would have minimal negative impacts on wildlife but could provide substantial beneficial effects. Control of noxious weeds would improve wildlife habitat by protecting the diversity of native vegetation. Noxious weed infestations can reduce available forage to wildlife, degrade big game winter range, decrease the quality of riparian habitats, and reduce nesting, brood rearing, and hiding habitat for a variety of birds. Many noxious weeds are unpalatable to herbivores. While noxious weed control could temporarily disturb wildlife within treatment areas, the effects would be short-term. The long-term benefit of increasing the quality and quantity of wildlife habitat by reducing noxious weed infestations would outweigh any short-term disturbance.

Recreational activities could cause disturbance and displacement of wildlife species. However, the level of impacts would vary depending on the extent of activities and the wildlife species disturbed. Those recreational activities that occur during critical periods (i.e. nesting and brood rearing) and/or for long durations of time would have the greatest negative impacts on wildlife.

The management of Wilderness Study Areas (WSAs) would provide large blocks of undisturbed habitat, particularly for species that are sensitive to disturbance and have large home ranges. WSAs would also provide large blocks of habitat for connectivity and movement corridors for a wide range of species.

The Sleeping Giant ACEC provides important habitat for bighorn sheep, mountain goat, elk, bear, mule deer, mountain lion, as well as numerous migratory and resident bird species. One of the primary objectives of this ACEC is to preserve, protect and promote wildlife and habitat for “key” species including; elk, bighorn sheep, mountain goat, osprey, bald eagle, peregrine falcon, waterfowl, and cold water fish. Continued management of the Sleeping Giant ACEC would ensure that critical wildlife habitat for the above mentioned species would be maintained for the long-term.

Placing new communication sites at existing facilities would prevent loss of wildlife habitat as well as prevent additional disturbance to wildlife. In addition, the implementation of *Suggested Practices for Raptor Protection on Power Lines* (APLIC 1996) would ensure that impacts to birds and bats are being avoided. Implementation of wind energy guidelines as defined in the Wind Energy Development Programmatic EIS would minimize bird and bat mortality from turbines and associated infrastructure.

Under all alternatives, locatable minerals would be allowed to be explored and extracted. Exploration and extraction of minerals would result in disturbance and displacement of wildlife within the area of impact. During periods of active mining until restoration/reclamation is completed, the area being mined would be unavailable as habitat for wildlife. Mining creates disturbance that would cause individuals to remain away from an area. Mining also causes a loss of habitat and reclamation activities may not be able to restore habitat to its original condition. The impacts to wildlife could include loss or fragmentation of habitat, loss of movement corridors and displacement of wildlife from critical winter or breeding ranges. Where there are priority species or their habitats, there may be special measures to prevent undue degradation during mineral and geophysical exploration. The degree of disturbance and habitat alteration from mining activities would vary depending on the size and extent of mineral extraction and could have minimal to major effects to wildlife and wildlife habitat with effects ranging from short to long-term.

After placer mining operations, reclamation activities would be required to restore stream channels and riparian habitat to functioning condition as close to pre-mine conditions as possible. Mining activities, placer operations in particular, could lead to a loss of riparian-wetland vegetation. All vegetation within the active mining area could be removed before and during mine development and operation. Vegetation immediately adjacent may be affected by roads, water diversions or other development. Riparian-wetland vegetation has a significant influence on certain stream types. Changes in the composition, vigor, and density of riparian vegetation can result in a loss of foraging, breeding, and hiding habitat for a wide variety of species as well as a loss in movement and travel corridors. The effects to wildlife from placer mining and mining in riparian areas could be substantial with long-term negative effects.

The reclamation and restoration of abandoned mine sites would provide cover and forage for wildlife and would improve water quality. Reclaimed areas often use non-native vegetation that is easily and quickly established. Often this non-native vegetation provides forage and cover for wildlife but does not provide the diversity of vegetation or the species that may have originally been located on the site.

Oil and gas exploration and development of surface and subsurface lands would comply with appropriate stipulations and term and conditions at the time of leasing. This would ensure that impacts to wildlife and wildlife habitat are considered and avoided, when possible. Habitat would be lost from drilling activity, wells, ponds, access roads, and pipelines. Wildlife species would be disturbed and displaced. The effects to wildlife could be minimal to major and short to long-term depending on the wildlife species found in an area and the extent of drilling activities.

There are approximately 652,194 acres of federal mineral estate lands potentially available for oil and gas exploration and development in the Decision Area. Actual acreages available vary based on proposed stipulations by alternative. In the Decision Area, five areas have been identified with the most potential for oil and gas exploration and development (low to moderate potential overall) where there would most likely be reasonably foreseeable development and drilling activity (**Appendix M**). The five areas are located near the southern Deerlodge Valley, Sleeping Giant, Canyon Ferry, Bozeman, and Livingston. The total area within these five areas is roughly 116,295 acres. Each of the five areas ranges in size from 1,400 to 50,600 acres.

It is estimated that a total of 31 conventional oil and gas wells could be drilled, most likely within the five areas with the most potential over 15-20 years. Nineteen of these wells would be exploratory, with six of them being producers. The RFD assumes that there would be two additional step-out wells developed for each of the six producers, resulting in a total of 18 producing wells

overall. The RFD also assumes that seven of these producing wells would be on federal mineral estate with the remainder being non-federal. As many as 40 wells might be drilled for coal bed natural gas, most likely near Bozeman Pass. None of this activity is forecast to take place on federal mineral estate.

Under all alternatives, there would be five stipulations to lessen the effects of oil and gas development on wildlife (stipulations that effect special status species are described under “Special Status Species”). A No Surface Occupancy or No Lease stipulation would prevent the loss of breeding, foraging, security and migration habitats as well as prevent any type of disturbance associated with oil and gas development. The more acres within a NSO or NL stipulation, the more overall protection a wildlife species (as well as other species) would have from oil and gas development. When comparing alternatives, those with more acres in NSO or NL provide the least negative effects to wildlife.

Timing restrictions protect species during the crucial breeding season (such as bald eagles and sage grouse) and/or during the sensitive overwinter season (such as with sage grouse). As with NSO and NL stipulations, when comparing alternatives, the more acres within a timing restriction, the more a species would be protected from disturbance during crucial seasons of use. This should allow a species to reproduce and fledge young and/or increase the chance of surviving the winter season. This stipulation would only be applied during oil and gas exploration and habitat loss could still occur for those species with timing stipulations. Timing restrictions and surface use stipulations would vary by alternative.

Effects of Alternative A

Vegetation types within the Decision Area are represented by grassland, shrubland, dry forest, cool, wet forest and riparian. Dry forest is the most dominant forest type and represents 38 percent (115,000 acres) of the total available habitat. Currently, there are approximately 101,200 acres of high density, mature dry forest in the Decision Area. The SIMPPLLE model (**Appendix D**) suggests that historic dry forests were maintained in a more open condition due to frequent fires and would be represented by approximately 30,400 acres (low density stands). Historically, these forests would have open canopies with an understory of grasses, shrubs, and forbs and would be surrounded by large blocks of areas dominated by grasslands and shrublands.

Under Alternative A, approximately three percent (3,600 acres) of the mature, high density, dry ponderosa pine and Douglas-fir habitat and up to four percent (5,100 acres) of all densities and size classes of dry forest habitats could be restored within the Decision Area per decade. Restoration would thin dense forests to create open stands with an understory of grasses, forbs, and shrubs. While this would benefit those wildlife species depen-

dent on mature dry forest, Alternative A would have the least impact on restoring this habitat type in comparison to Alternative B (14,750 acres per decade) and D (18,200 acres per decade) but would restore more acres than Alternative C (4,800 acres per decade).

Cool, moist forest comprises only about 7 percent (20,200 acres) of the total amount of available habitat in the Decision Area. This vegetation type is found primarily in the Big Hole and Upper Missouri watersheds. The SIMPPLLE model found this habitat type to be closer to the range of historic conditions than other habitat types in the Decision Area. This is most likely due to a longer interval between fire events in cool, moist forest types. Although the SIMPPLLE model suggested that this vegetation type was close to the historic range of natural variation, fewer acres of smaller diameter trees (seedling, sapling and pole size) were found during the modeling exercise than expected.

There are approximately 14,000 acres of mature, high density cool, moist forest compared to the estimated 8,000 acres suggested by the SIMPPLLE model as the historic average. Under Alternative A, approximately 2,400 acres of high density, cool, moist forest could be treated per decade (12 percent of total cool, moist forest). Treatments in cool, moist forests would create small openings and thin dense stands to increase the diversity of vegetation and habitat and increase available forage for small and large mammals (including big game) and migratory and resident birds. Alternative A would move cool, moist forest towards the range of natural variability but would treat fewer acres of this forest type in comparison to Alternatives B (3,750 acres per decade) and D (5,050 acres per decade) resulting in less diversity of habitat. However, there would be less short-term displacement of wildlife under this alternative compared to Alternatives B and D. Alternative A could treat up to 1,850 more acres per decade than Alternative C.

Alternative A provides no retention guidelines or recommendations for restoration of snag and down woody habitat. Alternative A allows dead or down trees of any size (with no restrictions within riparian habitats) to be gathered for firewood and would not have any restrictions on the size of timber salvage projects. Under Alternative A, snag habitat and down wood would decline more rapidly than under the action alternatives. Alternative A would reduce available nesting and foraging habitat for woodpeckers, raptors, owls and other migratory and resident birds, flying squirrels as well as reduce denning sites for bears and martens. Down wood is a crucial habitat component for amphibians and reptiles and would decline more under this alternative than under the action alternatives. This alternative could result in a decline of habitat for those species dependent upon dead and dying trees and could have major and long-term negative effects.

Grassland vegetation represents approximately 45 percent of the total habitat in the Decision Area. These areas provide critical big game winter range as well as important habitat for large and small mammals and a wide variety of migratory and resident birds. The loss of grassland habitat due to conifer encroachment is a serious concern in the Decision Area and approximately 37 percent of grasslands (50,000 acres) are experiencing a decline in quality and quantity due to encroachment. Using the SIMPPLLE model (**Appendix D**), it was estimated that the number of acres with conifer encroachment in both grasslands and shrublands would have historically been closer to 6,000 acres.

Under Alternative A, almost four percent (5,250 acres) of grasslands could be treated per decade to reduce conifer encroachment and improve winter range for big game and nesting habitat for resident and migratory birds. Alternative A could treat approximately 62 percent more grassland habitat than Alternative C, but would treat less habitat than Alternatives B or D (56 percent and 72 percent less, respectively).

Sagebrush shrublands represent roughly 7 percent of the total habitat within the Decision Area and provide crucial habitat for wintering and calving big game as well as habitat for sagebrush obligates. Alternative A would not provide management direction for treatment and restoration of shrublands, which would result in a decline in healthy sagebrush habitat and negatively impact sagebrush dependant species.

Under Alternative A, noxious weed infestations would continue to degrade range conditions and reduce available forage for big game and other large and small mammals. Within riparian areas, grasslands, and shrublands, weeds would continue to reduce the quality of nesting and brood rearing habitat for a variety of migratory and non-migratory birds. Assuming implementation of the high end of proposed weed treatment acreages by alternative, Alternative A would treat 30,000 fewer acres (per decade) than Alternative B, 18,000 fewer acres (per decade) than Alternative C and 41,000 fewer acres than Alternative D (per decade).

The implementation of the Streamside Management Zones would result in smaller areas of riparian habitat being protected for the benefit of riparian habitats than under Alternatives B and C but the same as under Alternative D. Smaller riparian management areas proposed under Alternatives A and D, along with the types and extent to management activities allowed in SMZs, could reduce forage, hiding cover, and breeding habitat for a wide range of species and reduce the size and quality of riparian movement corridors. The effects would be the same as described under “Effects Common to All Alternatives.”

Under Alternative A, approximately 3,500 acres would be protected with SMZs. Of the 3,500 acres, 1,700 acres would be forested and 1,800 acres would be non-

forested (same as Alternatives B and D). The Upper Missouri and Big Hole watersheds would have the most acreage in SMZs (1,700 and 900 acres, respectively).

Alternatives A and D would not utilize timing restrictions to protect breeding migratory and resident birds during prescribed burning or other vegetation treatments. Alternative B would prevent prescribed burns during the breeding season unless those projects have low potential to impact breeding birds. Alternative C would restrict prescribed burning and mechanical treatments during the breeding season unless those projects have low potential to impact breeding birds. Alternatives A and D could have more mortality to birds from project implementation compared to Alternatives B and C.

Timing restrictions on activities that may disrupt big game during critical periods, such as the breeding or winter seasons, would reduce displacement and disturbance of these species. These seasonal restrictions would generally protect and benefit: elk, mule deer, moose and bighorn sheep winter and spring range; elk, mule deer, and bighorn sheep calving range; and mountain goat winter and spring range. The timing restriction in big game winter and spring ranges would be one month less under Alternative A than under the action alternatives (see “Effects Common to Action Alternatives”). This would allow disturbance during critical times of year when animals have been weakened from the winter. Additional stress to these weakened animals could cause mortality.

Alternative A would actively target less than one percent (30 acres) per decade of riparian habitat for mechanical treatments of vegetation, the least amount of riparian habitat restoration in comparison to the action alternatives. Unlike the action alternatives, aspen would not be identified for restoration or protection under Alternative A. Although riparian restoration could occur through other projects or as a result of implementing Land Health Standards, only 30 additional acres of riparian restoration per decade would be expected under this alternative. This is 670 fewer acres than Alternative B, 170 fewer acres than Alternative C and 1,670 fewer acres than Alternative D. Although short-term impacts from disturbance would be lowest with Alternative A, the long-term benefits from restored habitat and vegetation diversity and composition would be less than under any of the action alternatives.

No routine maintenance or review of exclosures would be required under Alternative A which could lead to breach of exclosures by cattle and degradation of riparian habitat.

Approximately 5.5 miles of permanent roads per year could be constructed in association with forest management under Alternative A. This could substantially reduce habitat and increase the level of disturbance and displacement for many wildlife species. This would have the most negative impacts on species sensitive to distur-

bance. Although Alternatives B and D do not specify an upper limit on permanent roads that could be built, both alternatives would minimize permanent road construction and build fewer roads than Alternative A. Alternative C would not allow permanent road construction and would protect the greatest amount of habitat and the most species from the negative effects of roads.

Alternative A would have the greatest negative impacts to wildlife from permanent and temporary road construction and the effects would be the same as those described under “Effects Common to All Alternatives.”

Livestock grazing would continue to occur on 273,000 acres with approximately 25,680 AUMs. This would be 8,000 acres more than Alternative B and 11,000 acres more than Alternative C, but the same acreage as Alternative D. Livestock grazing under Alternatives A and D could have more negative effects due to competition between livestock and big game for forage, spread of noxious weeds, decrease in quality and quantity of grassland/shrubland habitat and loss of riparian habitat than Alternatives B and C.

The newly acquired Indian Creek, McMaster, and Spokane allotments would be grazed under the same grazing regulations as other BLM allotments. These areas are predominantly grassland and the lack of management flexibility under Alternative A could cause an increase in competition for resources between big game species, especially elk, and livestock.

Alternatives A and D would protect bighorn sheep and bighorn sheep habitat by reducing risks associated with the commingling of domestic and bighorn sheep. The implementation of buffers between domestic sheep and goat allotments and bighorn sheep habitat up to 9 miles in width would reduce the potential for disease epidemics within bighorn sheep populations. Although Alternatives A and D would allow for a buffer of up to 9 miles, these alternatives would not have a minimum buffer width. These alternatives would not guarantee adequate separation between wild and domestic sheep to prevent disease transmission. Alternatives B and C would provide minimum buffer widths between wild and domestic sheep. Unlike the action alternatives, Alternative A would not provide specific guidance when using domestic sheep for weed control in occupied bighorn sheep habitat. This could allow for disease transmission to wild sheep during weed control activities.

Roads can impact big game species, especially during critical phases of their life cycle. Disturbance and displacement of big game species can increase stress and energy demands on animals during critical periods such as the winter, breeding or calving seasons and reduce survival, especially during the winter and spring months. Motorized use of roads can produce disturbance that prevents full utilization of available habitat. The loss in potential use of habitat can exceed 50 percent when open road densities exceed 2 mi/mi² (Christensen et. al. 1993).

During the hunting season, the probability of bull elk survival in proximity to open roads is much lower than in areas away from roads. Road kill causes direct mortality of elk and major interstate freeways may act as movement barriers in some cases.

The implementation of the Montana Cooperative Elk Logging Study (Lyons et al. 1985) would assist in maintaining security habitat and limiting disturbance under Alternative A. However, the action alternatives would ensure specific direction for maintaining large blocks of security habitat.

Alternative A would continue management of the Sleeping Giant ACEC but would not propose any new ACECs. The effects from this ACEC would be the same as described under “Effects Common to All Alternatives.”

Unlike the action alternatives, Alternative A would not designate Humbug Spires as an ACEC. Although Humbug Spires is currently a WSA, if Congress does not designate this area as a Wilderness, there would be no management direction for this unique and important area. The proposed ACEC designation under the action alternatives would ensure this area is would be protected for numerous wildlife species.

With the action alternatives, the proposed ACEC that could have the most substantial beneficial effects to a wide variety of species is the Elkhorn ACEC. Currently, this area is managed under a Memorandum of Understanding (MOU) between the State and Forest Service for wildlife and recreation. If, at some time in the future, the MOU is withdrawn, an ACEC designation would ensure that BLM lands within the Elkhorn Mountain Range would be managed for wildlife goals and objectives. Alternative A would not guarantee that the emphasis of management in the Elkhorn Mountains would be for wildlife.

The negative effects to wildlife from mineral operations would be minimized by implementation of BMP's, which mostly relate to water quality and soils. The effects from mineral operations and development would be the same as described under “Effects Common to All Alternatives.” All alternatives would have five stipulations to lessen the effects of oil and gas development on wildlife (stipulations that affect special status species are described under “Special Status Species”). Under Alternative A, these stipulations would include No Lease (NL) and No Surface Occupancy (NSO) of state wildlife management units and timing restrictions in big game habitat.

The five areas with the most potential for oil and gas exploration and development are located near the southern Deerlodge Valley, Sleeping Giant, Canyon Ferry, Bozeman, and Livingston. The total acreage within these five areas is roughly 116,295 acres. Each of the five areas range in size from 1,400 to 50,600 acres. The southern Deerlodge Valley area located north of Ana-

conda is approximately 8,700 acres of subsurface ownership with no BLM lands. There are no wildlife management areas within the subsurface ownership in this area. The majority of subsurface ownership is within big game winter and spring range that would be subject to a 12/1 to 5/15 timing restriction. There are no currently identified critical big game calving areas in this area. Approximately 2,000 acres in this area are identified as year-round habitat for bighorn sheep and would be protected by the same timing restriction as big game winter and spring range (12/1 to 5/15).

The Sleeping Giant area is located north of Helena and is approximately 47,000 total acres of subsurface and surface ownership with roughly 22,000 acres of BLM ownership. There are wildlife management areas on the subsurface ownership of this area and approximately 3,400 acres would be protected with a NSO restriction. The majority of subsurface ownership is within big game winter and spring range and would be protected with a 12/1 to 5/15 timing restriction. There are no currently identified critical big game calving areas in this area. Approximately 11,800 acres in this area are identified as year-round and core habitat for bighorn sheep and would be protected by the same timing restriction as big game winter and spring range (12/1 to 5/15).

The Canyon Ferry area is located in and around the town of Townsend and is the largest area of potential oil and gas development with approximately 51,000 acres of subsurface and surface ownership. Roughly, 35,000 acres of BLM lands (surface) have the potential for oil and gas development with the majority of the acres located in the National Guard Firing Range. There are wildlife management areas within this location and approximately 700 acres would be protected with a NSO restriction. The majority of subsurface ownership is within big game winter and spring range and would be protected with a 12/1 to 5/15 timing restriction. There are no currently identified critical big game calving areas in this area. Approximately 20,900 acres in the area are identified as year-round and core habitat for bighorn sheep and would be protected by the same timing restriction as big game winter and spring range (12/1 to 5/15).

The Bozeman area is located approximately 10 miles east of Bozeman and is approximately 1,400 acres of subsurface ownership. There are no BLM lands in this

area. There are no wildlife management areas within the subsurface ownership of this area. The majority of subsurface ownership is within big game winter and spring range and would be protected with a 12/1 to 5/15 timing restriction. There are no currently identified critical big game calving areas in this area. The area does not provide habitat for bighorn sheep.

The Livingston area is located immediately east of the town of Livingston and is approximately 8,450 acres of subsurface and surface ownership. There are approximately 1,600 acres of BLM lands in this area. There are no wildlife management areas located in this area. The majority of subsurface ownership is within big game winter and spring range and would be protected with a 12/1 to 5/15 timing restriction. Approximately 300 acres are identified as critical big game calving range in this area that would be protected with a 5/1 to 6/30 timing restriction. The area does not provide habitat for bighorn sheep.

In the Decision Area, there would be 66,000 acres of wildlife management areas that would be protected with a NSO stipulation under Alternative A (Table 4-8). However, only two of the five areas with the most potential for oil and gas development have wildlife management areas (4,100 acres) that would be protected with the NSO stipulation.

Decision Area-wide, there would be 498,973 acres of big game winter and spring range that would have a 12/1 to 5/15 timing restriction under Alternative A. Of these acres, approximately 236,443 acres would be even more protected with overlapping NSO stipulations or No Lease areas, leaving about 262,530 acres being protected by the Timing Limitation stipulation. Roughly 20,000 acres would have a 5/1-6/30 timing restriction in big game calving habitat. All of the five areas with the most potential for oil and gas development (total of 106,447 acres) overlap with big game winter and spring range and a total of 99,550 acres would be protected with the 12/1 to 5/15 timing restriction. Of these 99,550 acres, approximately 47,390 acres would be overlapped with more protective NSO stipulations or No Lease areas, leaving about 52,160 acres with just the Timing Limitation stipulation. Critical calving habitat is currently only found in one area (Livingston) and approximately 300 acres would be protected by a 5/1 to 6/30 timing restriction.

Resource Stipulation	Decision Area (Acres)	Five High Potential Oil and Gas Areas (Acres)
Wildlife Management Areas	66,000	4,100
Big Game Spring/Winter Range	500,000	99,550
Big Game Calving Habitat	20,000	300
Bighorn Sheep Year-round Range	131,000	37,000
Bighorn Sheep Core Habitat	71,000	28,000

Decision Area-wide, there would be 131,279 acres of bighorn sheep year-round habitat (including core habitat) that would have a 12/1 to 5/15 timing restriction under Alternative A. Of these acres, approximately 67,341 acres would be even more protected with overlapping NSO stipulations or No Lease areas, leaving about 63,938 acres being protected by the Timing Limitation stipulation. Three of the five areas with the most potential for oil and gas development are within occupied bighorn sheep habitat and a total of about 37,000 acres would be protected with a 12/1 to 5/15 timing restriction. Of these 37,000 acres, approximately 18,243 acres would be overlapped with more protective NSO stipulations or No Lease areas, leaving about 18,757 acres with just the Timing Limitation stipulation. Almost all of the acres in bighorn sheep habitat are also within big game winter and spring range so the timing restriction of 12/1 to 5/15 would benefit both bighorn sheep as well as all other big game species.

Timing restrictions for big game winter and spring range would be the same under Alternatives A, B and D. Although timing restrictions would protect big game during oil and gas exploration, there would be no guarantee that these species would be protected during development and production. Also, timing restrictions would not prevent the loss of habitat. Alternative C is the only alternative that would prevent loss of habitat as well as prevent disturbances to big game species. In big game calving habitat and bighorn sheep year-round range, timing restrictions would be less restrictive under Alternative A than Alternative B. Alternative A, however, would provide more protection to big game species compared to Alternative D.

Effects Common to Action Alternatives

All federally listed and BLM sensitive species and their habitats would be considered “priority” species and “priority” habitats. Other priority species would include; big game, migratory birds and habitats such as caves, cliffs, snags and down wood, sagebrush, bitterbrush, and mountain mahogany. By designating these species and habitats as “priority”, they would be given additional protection and consideration during project planning and implementation. Protection and maintenance of habitat would ensure wildlife species maintain viable and diverse populations and ensure short-term and long-term protection of wildlife species within the Decision Area. Protection of special habitat components such as caves and cliffs would maintain habitat for species such as bats and peregrine falcons.

Seasonal closures during the winter and breeding seasons in occupied special status bat habitat would limit disturbance and allow these species to conserve energy during critical times of their lifecycle. Disturbance of bat hibernacula could cause bats to flee and expend valuable energy during the winter and, possibly, lead to mortality. Disturbance of maternity colonies could cause young bats to fall and be at risk of predation. Installation of bat

gates would protect bats from disturbance, displacement, and direct mortality.

Protection of wildlife linkage corridors would reduce isolation and improve gene flow and viability of many wildlife populations.

Disturbance associated with projects in big game habitat would be seasonally restricted under all action alternatives. Restrictions would protect big game winter and spring range from disturbance and conserve the animals’ energy during this critical time period. Restrictions within big game calving range would reduce disturbance and displacement and increase calving success.

All programs would be designed and implemented to meet or move towards meeting Land Health Standards. This would allow the restoration or protection of wildlife habitat from activities associated with all resource management programs including but not limited to; vegetation management, livestock grazing, forestry, rights-of-way, and energy development.

Vegetation treatments would move towards mimicking natural disturbances. Mimicking natural disturbance regimes would ensure that the structure, processes, and composition of these communities are healthy, functioning, and capable of renewal. This would maintain, protect, and restore habitat components necessary for forage, cover, and breeding habitat for wildlife. In addition, the emphasis on old forest structure, snag management, and large diameter trees would protect, enhance, and restore habitat for those wildlife species dependent on old forest structure and cavities for nesting and denning.

Existing old structure forests would be retained and protected from land use actions, stand-replacing wildland fire, and epidemic levels of insects and disease. Management actions would allow the development and maintenance of stand structures that are relatively complex with highly variable tree densities, healthy and diverse understory composition, and abundant snags and down logs that are well distributed across the landscape. Habitat for species that are dependent on and utilize late and old structure forests would benefit from the maintenance, protection, and development of this community.

Restoration to achieve desired ecological conditions in grasslands and shrublands would be conducted with all action alternatives through prescribed burning, mechanical treatments, and other appropriate treatments. This would enhance and rejuvenate wildlife habitat for many species. Regeneration of decadent vegetation, reduction of conifers and improving vegetation diversity and composition would improve winter range for big game, nesting, and brood rearing habitat for migratory and resident birds, as well as forage and cover for small and large mammals. During treatments in grasslands and shrublands, all trees with old forest structure would be left standing to provide nesting and perch sites for raptors and other migratory and resident birds.

Alternatives B, C, and D would emphasize restoration and protection of sagebrush habitat and would maintain, to the extent possible, large patches of high quality sagebrush. These alternatives would also emphasize maintaining connections between sagebrush communities and enlarging the size of sagebrush patches in occupied or historic sage grouse habitat. This would protect sagebrush obligate species and increase habitat for these species.

Riparian areas would be managed to maintain or improve the distribution of large woody material and to provide habitat for a variety of small and large mammals, birds, bats, reptiles, and amphibians. Protection and restoration of riparian and wetland habitats would ensure that breeding, foraging and overwintering habitat as well as snags and down wood would be available for the wide variety of wildlife species dependent on this important habitat within the Decision Area. Protection, enhancement, and restoration of these areas would also ensure habitat is available for migratory or transient animals.

During project planning, the effects of roads (permanent and temporary) on wildlife and habitats would be considered. This would ensure that impacts to wildlife and wildlife habitat are minimized, when possible. These evaluations may determine that some pre-existing routes be closed or decommissioned. Closure and rehabilitation of roads within the Decision Area would reduce disturbance to wildlife and increase functional habitat.

Implementation of grazing utilization levels (not to exceed 55 percent non-native grasses and 45 percent native herbaceous plants) in grazing allotments that lack specific management objectives would maintain forage for wildlife, especially big game species. This would also help to prevent competition for forage between livestock and big game. Maintaining quality range conditions would ensure that adequate forage, cover and nesting and brood rearing habitat would be available for wildlife.

Prohibiting the use of domestic sheep and/or goats for weed control within occupied bighorn sheep habitat would reduce the transmission of diseases to bighorn populations.

Closing rock climbing in areas with active raptor nests would prevent these species from abandoning nest sites.

When MFWP determines that big game hunting season extensions are necessary to efficiently and effectively manage for big game populations, BLM may modify seasonal use restrictions on roads to allow access.

Where minimum-size blocks of security habitat (250 acres) are located, they would be retained in a suitable condition during project implementation. Larger blocks of security habitat would be addressed and analyzed during project or watershed level planning to address the protection of security habitat. Where security habitat is

limited or fragmented across the landscape, the BLM would emphasize improving habitat through vegetation treatments and road closures (including seasonal closures) to increase security habitat for big game species.

High priority lands for retention and future acquisitions would include areas important to wildlife such as ACECs, Wild and Scenic River corridors, Wilderness, and habitat for priority and special status species. This would ensure long-term protection for numerous wildlife species.

All practical measures to maintain, protect, or minimize disturbances to natural resources would be taken during mining exploration. The effects on wildlife and wildlife habitats due to mining could be minor to substantial with long-term negative effects.

Effects of Alternative B

Dry forest of Douglas fir and ponderosa pine represent the most common forested habitat in the Decision Area. Management of dry forest (including prescribed fire and commercial and non-commercial treatments) would focus on moving this habitat type towards the range of historic conditions. The SIMPPLLE model suggested that this habitat has been severely altered from historic conditions due to fire suppression. The historic fire frequency in these habitat types would have maintained more acres with open canopies and a diversity of understory plants.

Under Alternative B, treatments in dry forests would improve habitat for those wildlife species dependent on mature, open stands by increasing breeding and foraging habitat and by increasing the diversity of vegetation structure and species. Projects would mimic natural fire events to create large mature trees with an open understory of grasses, shrubs, and forbs. Over the long-term, habitat for resident and migratory birds, raptors, and large and small mammals would be increased. Large diameter snag habitat would be allowed to become established, creating crucial habitat for snag dependent species.

Treatments in dry forest would encourage increased diameters of trees with a diversity of overstory and understory age classes. However, the density of trees would be reduced, sometimes substantially, to promote the growth of grasses, shrubs, and forbs. Under Alternative B, up to 14,750 acres (13 percent) of dry forest habitat (all size classes and densities) could be treated per decade to improve forest structure, density, and composition.

Treatments within dry forest habitat would be emphasized within the Upper Missouri, Jefferson, and Big Hole watersheds. The majority (47 percent) of the treated areas would occur within the Upper Missouri River watershed. Currently, there are approximately 34,000 acres of medium and large tree size, high density, dry Douglas-fir and ponderosa pine habitat within the

Upper Missouri River watershed compared to 7,000 acres estimated to be historically present. Proposed treatments could reduce the acreage of high density trees to approximately 29,000 acres in the first decade. After two decades approximately 24,000 acres would remain in a high density condition.

Treatment of up to 2,750 acres per decade of medium and large tree, high density dry forest in the Jefferson watershed could reduce current acreages from 19,200 acres to 16,450 acres in the first decade as compared to 4,900 acres historically present (based on the SIMPLLE Model). After two decades, approximately 13,700 acres would remain in a high density condition. Proposed treatments of up to 1,850 acres per decade in the Big Hole watershed could reduce current acreages from 14,000 acres to 12,150 acres in the first decade compared to 7,000 acres historically present. After two decades, approximately 10,300 acres would remain in a high density condition.

The dry forest types are often used by big game species during winter months and reduction in tree densities would result in an increase of forage. However, reducing tree densities and creating open stands could increase the vulnerability of big game to hunting.

Management for mature, open, dry forests would increase habitat for a variety of resident and migratory birds, raptors, and owls. Although there would be long-term benefits to species that depend on open, dry forest stands such as flammulated owls, there could be a decline in the amount of habitat available for those species that prefer more dense forest types.

Additional impacts would occur from temporary road construction for forest treatments. Roads would reduce habitat and could potentially increase the level of disturbance and displacement of wildlife species in these areas. To reduce disturbance to wildlife, temporary roads would be closed within one year of project completion.

Over the long-term, management towards pre-fire suppression conditions would benefit the majority of species that utilize these vegetation communities.

Overall, Alternative B would move more acres towards the historic average and restore more habitats for wildlife dependant on dry forest types than Alternatives A and C, but less than Alternative D.

Cool, moist forest is the least available habitat type in the Decision Area and is predominately located in the Big Hole and Upper Missouri Watersheds. Under Alternative B, up to 3,350 acres of medium to large tree, high density, cool, moist forest could be treated per decade within the Decision Area. Up to 1,600 acres per decade could be treated in both the Big Hole and Upper Missouri watersheds in this habitat type. In the Upper Missouri, this could reduce mature, dense, cool forest stands from 6,000 acres to 4,400 acres in the first decade which would be close to the historic average (4,300 acres). In

the Big Hole, the reduction could be from 5,500 acres to 3,900 acres in the first decade and to 2,300 acres within two decades, taking the number of acres near the historic average of 2,400.

The Jefferson, Blackfoot, Gallatin, and Yellowstone watersheds could have a small number of acres of mature, high tree density cool forest treated per decade; 50 acres in the Gallatin, 100 acres in the Yellowstone and Blackfoot and 300 acres in the Jefferson. The effects to wildlife from treatments in these watersheds would be minimal.

There would also be a small number of acres (200 acres per decade) treated in the Upper Missouri and Big Hole watersheds to thin seedlings and pole size cool forest habitats. This would have minor effects to wildlife.

Reduction of stem density and creating additional small openings would be beneficial to wildlife that occur in this vegetation community. The creation of small openings would increase vegetation and habitat diversity and available forage for big game and other species. Increased vegetation diversity and understory development would improve habitat for many small and large mammals and migratory and resident birds. Improvement of habitat for prey species would benefit large predators within cool, moist forests.

Alternative B would treat up to 3,750 acres per decade of cool, moist forest over all size classes, which would be less than Alternative D, but more than Alternatives A and C. Treatments would result in temporary displacement of wildlife within project areas to adjacent forest areas. However, displacement would be short-term and habitat would ultimately be improved by creating a diversity of vegetation species, size classes, and age classes. Additional impacts would occur from temporary road construction for forest treatments. Roads would reduce habitat and could potentially increase the level of disturbance and displacement of wildlife species in these areas.

The BLM would use an existing protocol developed by the USFS to determine the range of natural conditions for snag habitat until additional studies are completed. This would provide criteria for determining how much snag habitat should be retained (or created) in different habitat types and would aid in assessing impacts associated with management actions during project planning. Throughout the Decision Area, there are snag deficient areas due to historic mining, firewood cutting, and timber harvest. In these areas, snags would be targeted for creation. Within other forested stands of the Decision Area, snags have been created naturally through forest insects, disease, and fire.

Improvement in snag habitat management would benefit those species dependent on snags for breeding, foraging, and denning. The proactive creation of snags would increase snag habitat for snag dependant species over the long-term and improve species viability. In snag defi-

cient areas, Alternative B would proactively create more snag habitat than all other alternatives.

When timber salvage is proposed in dead and dying forests, Alternative B would provide direction to maintain contiguous acres of undisturbed standing and down woody material in adequate amounts for those wildlife species that depend on this habitat type. This would protect snag habitat for a variety of snag dependent species including migratory and resident birds, raptors, bats, and mammals.

Where salvage is allowed to occur, forest openings would be appropriate to the site and would also include retention patches. Selective thinning could occur between openings. Alternative B would ensure more habitat for those species that depend on dead and dying forests is maintained compared to Alternatives A and D but less than Alternative C.

Under Alternative B, only dead and dying trees would be allowed to be removed for firewood and no trees over 24 inches in diameter could be cut. However, BLM would have the flexibility to designate specific areas of live trees for firewood cutting in order to meet specific resource goals such as removing conifer encroachment in grasslands and shrublands. Retention of larger, dead trees would ensure that the largest, higher quality snags would be retained for those species dependent on snags for breeding, foraging, and cover. Larger diameter snags typically remain standing longer than smaller diameter snags so retention of larger snags would increase the number snags and improve the quality of snag habitat over the long-term.

Most firewood cutting occurs within 300 feet of roads but can have a substantial effect on the number of snags in an area. By allowing firewood cutting of snags up to 24 inches in diameter, many smaller snags that would still provide nest sites, cover, and forage for birds and mammals would be lost. Alternative B would protect more snags and down wood from firewood cutting than Alternative A but substantially less than Alternative C (firewood cutting would only be allowed in designated areas). Because most firewood cutting takes place near roads and Alternative B would have more miles of closed and seasonally restricted roads than Alternatives A and D, this alternative would have fewer areas of the forest affected from firewood cutting than Alternatives A and D but more than Alternative C.

Grasslands make up the majority of habitat in the Decision Area (45 percent) and conifer encroachment is causing a substantial decline in the quality and quantity of this habitat type. Although sagebrush shrubland is only found on 7 percent of the Decision Area, this habitat type provides essential habitat for sagebrush obligate species.

Treatments in grasslands and shrublands would move towards pre-fire suppression conditions and away from the effects of historic grazing to improve habitat for

species that are dependent upon these vegetation communities. Conifer encroachment has reduced the amount and quality of breeding, brood rearing, foraging, and cover habitat for a wide range of wildlife species. Roughly 50,000 acres of grassland and 14,000 acres of shrublands are currently experiencing some level of conifer encroachment. The SIMPLLE model predicted that an average of 6,000 acres of grasslands and shrublands within the Decision Area would be encroached historically. Alternative B would treat up to 11,800 acres (9 percent) of grasslands and 3,650 acres (18 percent) of shrublands per decade in the Decision Area with prescribed fire, mechanical treatments, and other appropriate methods to reduce conifer encroachment and improve the health and resiliency of these communities. Alternative B would restore more acres of grasslands and shrublands than Alternatives A and C but fewer than Alternative D. Although Alternative B would have short-term adverse effects from disturbance to wildlife, the long-term benefits from increased breeding, brood rearing, foraging and cover habitat would outweigh the short-term impacts. The loss of conifers could have negative effects to nesting migratory and resident birds but habitat for these species is not considered to be limited across the Decision Area.

Alternative B would treat grasslands and shrublands within all major watersheds but the watersheds with the largest number of acres treated would be the Big Hole, Jefferson, and Upper Missouri.

Overall, Alternative B would treat more acres to reduce noxious weeds than Alternatives A and C, but approximately 11,000 acres less than Alternative D. The effects would be the same as described under "Effects Common to All Alternatives."

Alternatives B and D would be the most proactive alternatives regarding restoration and protection of bitterbrush and mountain mahogany habitat. These communities are often important within big game winter range and restoration and protection of these communities would ensure long-term availability of high quality habitat for big game. A variety of other wildlife species, such as resident and migratory birds, would also benefit from the protection and restoration of this habitat type.

Under Alternative B, prescribed burns would be planned to protect 20 percent of above ground vegetation within treatment areas, providing desirable vegetation for colonization into the burn. Alternative C would retain more (40 percent) unburned vegetation during prescribed fire and Alternative D would retain less (10 percent).

Alternative B would reduce mortality to nesting birds, including migratory and resident birds, in areas treated with prescribed fire by excluding the use of fire during the breeding season in areas that have substantial use by breeding birds. However, because other methods of treatments would not have timing restrictions, there could be impacts to breeding birds from mechanical

treatments during the breeding season. Alternative B would protect breeding birds and prevent more mortality than Alternatives A and D but less than Alternative C.

Riparian areas support a higher diversity of plants and animals than non-riparian land. This is a result of the wider range of habitats and foods available as well as the proximity to water, microclimate, and refuge. Many native plants are found only, or primarily found, in riparian areas and these areas are essential to many animals for all or part of their lifecycle. Riparian areas also provide refuge for native plants and animals in times of stress, such as drought or fire, and play a large role in providing corridors for wildlife movement.

The limited amount of riparian habitat in the Decision Area and the substantial use these areas receive by wildlife, makes this habitat type the most crucial to restore or protect.

Riparian Management Zones (RMZs) would be established for this alternative that are wider than SMZs under Alternatives A and D, but narrower than RMZs under Alternative C. Whereas SMZs under Alternatives A and D only protect streams and riparian habitats from timber harvest, RMZs would provide overall riparian management objectives. These zones would differ in width by forested and non-forested habitat, stream type (fish-bearing, perennial or intermittent) and range from 50 feet (intermittent streams) to approximately 160 feet for fish-bearing streams (based on the height of two site potential trees) on either side of the stream. A site potential tree in the Decision Area is considered to have an average height of 80 feet. Riparian Management Zones would provide more protection for terrestrial wildlife than SMZs alone by restricting all management activities in larger areas adjacent to streams and by requiring management activities to restore or maintain riparian and stream function. These wider RMZs would ensure that riparian habitat is maintained along streams not only for water quality and aquatic habitat but also for the numerous terrestrial wildlife species that use riparian areas for breeding, foraging and hiding habitat as well as for movement corridors.

Under Alternative B, approximately 5,300 acres would be managed with the emphasis on protecting, restoring, or maintaining riparian areas in RMZs. Of the 5,300 acres, 3,507 acres would be forested and 1,800 acres would be non-forested. The Upper Missouri and Big Hole watersheds would have the most acreage in Riparian Management Zones (2,330 and 1,440 acres, respectively).

Alternative B would allow management in RMZs to restore, enhance, or protect aquatic and riparian communities. There would be fewer negative effects from a loss of large woody material, desired vegetation or movement corridors under Alternative B than with Alternatives A and D. Since Alternative C extends RMZs further from streams, riparian habitat and movement

corridors would be the widest and most protected under this alternative.

Under Alternative B, up to 700 acres of riparian vegetation could be mechanically treated per decade with 200 acres in the Upper Missouri watershed, 200 acres in the Jefferson watershed, 200 acres in the Big Hole watershed, 50 acres in the Yellowstone watershed, 40 acres in the Blackfoot watershed and 10 acres in the Gallatin watershed. The 700 acres proposed with Alternative B would be treated as “stand alone” projects. Additional riparian areas could be improved through other vegetation treatment projects. The objectives, however, would be the same whenever projects occur in riparian areas. Unless a project is necessary for human safety or has unavoidable adverse affects as with mineral extraction, projects would be done to restore or protect riparian habitats.

Protection and active restoration of riparian areas would maintain and/or enhance breeding, brood rearing, foraging, travel, and hiding cover for migratory and resident birds (including raptors and owls) and small and large mammals as well as habitat for amphibians and reptiles. Restoration and protection of riparian areas would improve habitat for beavers that would in turn increase the width of riparian areas (by damming streams) and provide high quality foraging and breeding habitat for a variety of species. Habitat connectivity would be improved, fragmentation would be reduced, and travel corridors would be ensured for a multitude of species.

Unlike Alternative A, Alternatives B and D would actively restore aspen stands to improve and expand habitat for wildlife. Nesting habitat for birds, including migratory birds, would be increased and so would an important winter food source for elk, deer, and moose.

Timber harvest and removal of products would be allowed during riparian restoration under Alternative B but only if riparian objectives are met. When necessary, some temporary roads may be allowed to access riparian areas but would only be allowed if they do not damage riparian vegetation, soils, or streams or negatively impact riparian or aquatic functions. Restoration of riparian habitats would rejuvenate riparian vegetation, encourage multiple age classes, and expand the diversity of native vegetation.

Alternative B would actively restore more acres of riparian habitat than Alternatives A and C but less than Alternative D. Active restoration activities could have minor and short-term effects from disturbance and minor soil erosion but would have long-term beneficial effects from an increase in diversity and vigor of riparian vegetation as well as an increase in habitat structure. Since many riparian areas have existing open roads, some restoration activities could decrease the amount of hiding or security cover for big game. When possible, the loss of hiding and security cover would be minimized during project development.

Although RMZs would be identified to protect and improve riparian function, firewood cutting would still be allowed within some RMZs. Down wood and snags would be protected from firewood cutting within 100 feet for perennial and 50 feet for intermittent streams. This would ensure that a certain amount of riparian habitat is protected from firewood cutting. However, disturbance and removal of habitat from firewood cutting within the outer 60 feet of the RMZ boundaries (perennial streams) would be allowed. This would reduce the quantity of available snag and down wood habitat in these areas.

Alternatives B and D would provide more protection of snag habitat in riparian areas from firewood cutting compared to Alternative A but would provide less protection than Alternative C.

Under Alternative B, there would be a schedule for exclosure maintenance but there would be no guarantee that exclosures would be in a functioning condition before livestock turn-out. This could result in damage and degradation of riparian areas, springs, and unique habitats. There would be no substantial differences in acres grazed by livestock between all alternatives. Alternative B would decrease the acres of livestock grazing proposed under Alternatives A and D by 8,000 acres but would increase the number proposed under Alternative C by 3,000 acres. Designation of McMasters Hills, Indian Creek, and Spokane Hills as forage reserve areas would assist in improving range condition and meeting Land Health Standards by allowing other allotments to be rested during and after restoration activities (prescribed fire, etc.). The McMasters Hills and Spokane Hills allotments are primarily bluebunch wheatgrass (approximately 70 percent) and provide big game winter range. The Indian Creek allotment provides a diversity of habitats but also provides important big game winter range as well as crucial habitat for bighorn sheep.

Unlike Alternatives A and D, Alternative B would require a minimum buffer width of 5 miles between wild and domestic sheep populations to reduce the potential for diseases, such as pasteurella, scabies and parasites from being passed from domestic to bighorn sheep. New sheep or goat allotments would not be allowed in occupied bighorn sheep habitat to protect wild sheep from disease transmission.

Alternative B would ensure that interactions between bighorn sheep and domestic sheep being used for weed control are kept to a minimum. Seasonal restrictions and buffers would ensure that domestic sheep and wild sheep do not use the same areas within the same time period. Alternative B would protect bighorn sheep more than Alternatives A and D through the use of a mandatory minimum buffer width but less than Alternative C (mandatory buffer width would be larger under Alternative C).

Although Alternative B would keep new permanent road construction to a minimum, new roads could result in disturbance and loss of habitats for numerous wildlife species including a loss of big game security habitat. Alternative B would have more negative effects from new road construction than Alternative C (which doesn't allow any new road construction) but less than Alternatives A and D.

To minimize disturbance to wildlife and loss of habitat, temporary roads would be kept to a minimum and closed within 1 year of project implementation. This would be similar to the other action alternatives although temporary roads could remain open longer under Alternative D.

Alternative B would also provide protection to big game by allowing no net increase in permanent roads in areas where open road densities are 1 mi/mi² or less in big game winter and calving ranges. Christensen et al. (1993) found that open road densities greater than 1 mi/mi² substantially lowered the use of habitat by elk. Alternative B would ensure that high quality winter and calving areas remain available to big game. Under Alternative B, BLM would also focus on reducing open road densities in big game winter and calving ranges where they exceed 1 mi/mi². Alternative B would ensure more functional habitat is available to elk and other big game species compared to Alternative A and D which would allow higher road densities in elk habitat. This alternative, however, would provide less function habitat for elk than Alternative C.

There would be two proposed ACECs common to all the action alternatives, Sleeping Giant and Humbug Spires. Alternative B would propose two additional ACECs (Elkhorn Mountains and Ringing Rocks). The Ringing Rocks ACEC would be small (160 acres) and would have minimal beneficial effects to wildlife. Humbug Spires is currently a Wilderness Study Area. If Congress does not designate the Humbug Spires WSA as Wilderness, the proposed ACEC designation would ensure a certain measure of continued protection of this area for those species that depend on dry forest, rocky outcrops, and riparian habitats.

The proposed ACEC that would have the most substantial beneficial effects to a wide variety of species is the Elkhorns ACEC. Currently, this area is managed under a Memorandum of Understanding (MOU) between MFWP, USFS, and BLM for wildlife and recreation. If, at some time in the future, the MOU is withdrawn, the ACEC designation would ensure that BLM lands within the Elkhorn Mountain Range would be managed to support populations of wildlife species associated with endemic vegetative communities and that management would focus on wildlife goals and objectives. The ACEC would also ensure that long-term management goals and objectives in the Elkhorn Mountains would be for wildlife and wildlife habitat.

The potential Elkhorns ACEC would consist of approximately 50,431 acres in and around the Elkhorn Mountains but would exclude the Limestone Hills National Guard Training Area, Radersburg motorized play area and several small isolated parcels along the western boundary. Management activities under the proposed ACEC would have long-term benefits to wildlife by focusing management specifically for wildlife. Substantially more acres would be proposed under this alternative than Alternative D which would only encompass the existing Tack-on WSA boundary (3,575 acres).

Unlike Alternatives A and D, Alternative B would guarantee long-term protection of wildlife habitat in the Elkhorn Mountain Range if the MOU is withdrawn. Under Alternative C, the Elkhorn ACEC would include all BLM lands in the Elkhorn Mountains (67,665 acres).

Alternatives B and C would implement food storage regulations at all recreation sites with high potential or known encounters between bears and people. This would protect bears from being destroyed or moved. Alternatives A and D would not provide for any food storage restrictions to protect bears.

During mining activity, road construction would be kept to a minimum and roads and facilities would be closed and rehabilitated after mining is finalized. Alternative B could protect wildlife habitat from the effects of mining to a greater degree than Alternatives A and D but less than Alternative C. However, the effects from mineral extraction could have minor to major and long-term effects to wildlife as described under “Effects Common to All Alternatives.”

All alternatives would have five stipulations to lessen the effects of oil and gas development on wildlife (stipulations that effect special status species are described under “Special Status Species”). Under Alternative B, these stipulations would include No Surface Occupancy (NSO) in state wildlife management units and bighorn sheep core areas and timing restrictions in big game habitat, including bighorn sheep year-round range.

The acres of available habitat would be the same for each alternative (**Table 4-8**) but the type of stipulations would vary between alternatives.

The stipulation for wildlife management areas would be similar under Alternatives A, B and D but under Alternative A, there would be “core” areas surrounding the wildlife management unit that would have the most restrictive stipulation of No Lease (NL). With a proposed NSO stipulation under Alternatives B and D and a NL stipulation under Alternative C, there would be minimal differences in effects between the action alternatives. All alternatives would protect habitat within wildlife management areas from oil and gas exploration and development.

Alternative B would have the same timing restriction on oil and gas exploration as Alternatives A and D for big

game winter and spring range (12/1-5/15). Under Alternative B, of the 498,973 acres of big game winter and spring range, approximately 248,213 of these acres would be even more protected with overlapping NSO stipulations or No Lease areas; approximately 11,770 more acres than under Alternative A. Of the 99,550 acres of big game winter/spring range within the five areas most likely to have oil and gas development, about 42,217 acres (5,173 fewer than under Alternative A) would be even more protected by overlapping NSO stipulations or No Lease areas under Alternative B. Although Alternatives A, B and D would protect overwintering big game from disturbance, Alternative C would provide the greatest amount of protection to big game from both disturbance and loss of habitat.

Alternative B would increase the timing restriction in big game calving habitat by one month in the spring over Alternatives A and D to 4/1-6/30. This would provide areas free of disturbance to individuals that may give birth early and would provide refuge to big game before they give birth. Alternative B would provide less protection than Alternative C which would prevent disturbance to big game as well as prevent loss of habitat from oil and gas development.

Alternatives B and D would increase the timing restriction for oil and gas exploration in year-round bighorn sheep habitat by two months to 11/1-6/30 compared to Alternative A. This would provide more refuge for sheep during lambing (most lambing occurs between April and June with some lambing occurring in early July) and going into the difficult winter season. Of the 131,279 acres of bighorn sheep year-round habitat, approximately 91,126 acres (23,695 more than under Alternative A) would be even more protected with overlapping NSO stipulations or No Lease areas, leaving about 40,153 acres being protected by the Timing Limitation stipulation. Of the approximately 37,000 acres of bighorn sheep habitat within the five areas most likely to have oil and gas exploration and development, 30,025 acres (11,782 more than under Alternative A) would be overlapped with more protective NSO stipulations or No Lease areas, leaving about 6,975 acres protected by the Timing Limitation stipulation. Alternative B would provide less protection than Alternative C which would prevent disturbance to bighorn sheep as well as prevent loss of habitat from oil and gas development.

Alternative B would restrict use in bighorn sheep core habitat over Alternatives A and D during oil and gas exploration and development by implementing a NSO. This would protect crucial habitat for bighorn sheep from disturbance as well as from loss of habitat. Alternative B would have similar beneficial effects as Alternative C (NL) on bighorn sheep in their core habitats.

Under Alternative B, the riparian habitat along Muskrat Creek would not be protected from mineral development. This could result in the fragmentation and loss of

crucial riparian habitat along Muskrat and Nursery Creeks.

Effects of Alternative C

Alternative C would focus more on “passive” restoration of habitats and would treat the least amount of dry forest habitat in comparison to the other alternatives (up to 4,800 acres per decade of all size classes and densities).

Treatments would only be proposed in the three major watersheds, Big Hole, Jefferson, and Missouri but the majority of treatments would occur in the Missouri River watershed.

Currently, there are approximately 34,000 acres of medium and large tree size, high density, dry Douglas-fir and ponderosa pine habitat within the Missouri River watershed compared to 7,000 acres estimated to be historically present. Proposed treatments under this alternative could reduce the acreage of high density trees to approximately 32,000 acres in the first decade. After two decades approximately 29,000 acres would remain in a high density condition. This would be substantially fewer acres restored to historic conditions than with all other alternatives. Under Alternative C, mature, high density ponderosa pine would only be treated in the Missouri River watershed.

Approximately 1,250 acres of mature, high tree density dry forest in the Jefferson watershed would be treated per decade. Treatments would reduce the current acreages from 19,000 acres to 17,750 acres in the first decade and down to as low as 16,500 over two decades. This would be well above the historic average of 4,900 acres. Proposed treatments of 500 acres per decade in the Big Hole watershed would reduce current acreages from 14,000 acres to 13,500 acres over a decade and down to as low as 13,000 after two decades, which would also be well above the historic average of 7,000 acres.

Alternative C would restore the fewest acres of habitat for those wildlife species dependent on mature, open stands of Douglas fir and ponderosa pine of all alternatives. Alternative C would treat substantially fewer acres compared to Alternatives B and D with up to approximately 10,000 acres per decade less than Alternative B, and up to approximately 13,000 fewer acres per decade than Alternative D. Alternatives A and C would treat a similar amount of acres. Dry forest makes up roughly 38 percent of all vegetative communities in the Decision Area. This community was found to be severely altered and degraded due to fire suppression and Alternative C would move the fewest acres towards the natural range of conditions. Under Alternative C, more acres of dry forest types would be in an undesirable condition for the wildlife species dependant on this habitat type. However, Alternative C would have the fewest negative effects from disturbance to wildlife from treatments in dry forest habitat.

Alternative C would restore a relatively small amount of mature cool, moist forest and would treat the least amount of this habitat type compared to the other alternatives (approximately 550 acres per decade in four watersheds, Big Hole, Upper Missouri, Jefferson, and Yellowstone). Since cool, moist forest was not found to be substantially out of the range of historic conditions with the SIMPPLLE model and may not be out of the historic range due to longer periods between fires in this habitat type, restoration of cool, moist forest is less crucial. Treatments would increase habitat diversity but Alternative C would have a minor effect, either beneficial or detrimental, to this habitat type and the species dependant on cool, moist forest.

Determining the range of natural conditions for snag habitat would be the same as Alternative B. However, the creation of snags would only be done opportunistically through other projects, when possible. Snags would be protected but not necessarily created in areas where they are lacking like under Alternative B. Due to a lack of vegetation treatments and active snag management, Alternative C could create less snag habitat in snag deficient areas over the long-term than Alternative B, but would be similar in effects to snag deficient areas as Alternatives A and D. Alternative C, however, would protect more acres of existing snag habitat created by insect, disease or fire than all other alternatives.

Since Alternative C would not allow dead and down wood to be taken as firewood and live trees could only be removed for firewood in authorized areas to meet resource objectives (such as the removal of conifer encroachment), this alternative would protect more snag and down wood habitat compared to all other alternatives. This approach would benefit species dependent on snags for foraging and nesting and would protect down wood for microsites, amphibians, reptiles, birds and small mammals.

Whereas Alternative B would not specifically identify the acres of dead and dying forest that would be retained during timber salvage, Alternative C would require 50 percent of dead and dying forest be retained in stands that exceed 1,000 acres (unless human safety is an issue). Although both Alternatives B and C would protect dead and dying forests, Alternative C would better guarantee the protection of moderate to large blocks of dead and dying forests. Connectivity and diversity of habitat as well as species productivity could be greatest for those species dependent on snag habitat under Alternative C than with Alternative B. Alternative D would also require a minimum patch size be retained for dead and dying forest but would only require 30 percent of an area be retained when dead forest stands exceed 1,000 acres. Alternative C would provide substantially larger blocks of snag habitat compared to Alternatives A or D.

Grasslands make up the majority of the vegetative communities in the Decision Area (45 percent) and are experiencing a serious decline in quantity and quality due to

conifer encroachment. Although sagebrush shrublands are only found in 7 percent of the Decision Area, this habitat type provides essential habitat for sagebrush obligate species.

Alternative C would treat and restore 2,000 acres of grassland (1 percent of total) per decade and 750 (4 percent of total) acres of shrubland per decade within three watersheds, Missouri, Jefferson, and the Big Hole. There are approximately 50,000 acres of grassland and 14,000 acres of sagebrush currently experiencing some level of conifer encroachment compared to the historic average of 6,000 acres in both grassland and shrubland communities.

Alternative C would treat fewer acres of grasslands and shrublands of all alternatives. Alternative C would have a minor effect on restoring grasslands and shrublands in the Decision Area and would only reduce the amount of conifer encroachment to 48,000 acres in grasslands and up to approximately 13,500 acres in sagebrush in the first decade. Most of the conifer encroachment in grassland occurs in the Missouri watershed while most of the encroachment in sagebrush occurs in the Big Hole watershed. Alternative C would treat the least amount of grassland and sagebrush than any of the action alternatives and would have the most detrimental effects to wildlife by allowing a continued decline in nesting, breeding and foraging habitat for a wide variety of species. The short-term adverse effects from project implementation would be less under Alternative C compared to all other alternatives.

Alternative C would have the least aggressive weed management of the action alternatives. Because this alternative would treat fewer acres of weeds than the other action alternatives, there would be more loss of wildlife habitat, especial foraging, nesting, and breeding habitat due to weed infestations. However, habitat conditions would improve with this alternative over Alternative A.

Aerial spraying for herbicides would not occur under Alternative C and this would prevent the potential inadvertent loss of important habitat such as sagebrush and mountain mahogany as well as the loss of important forbs. The lack of aerial spraying could decrease the ability of the BLM to control large weed infestations or infestations in remote areas or in rough terrain that could be difficult to reach by vehicle or on foot. The restriction on aerial spraying could cause an increase in the size and extent of weed infestations in the Decision Area and, ultimately, cause a decline or loss of wildlife habitat.

Unlike Alternatives B and D, bitterbrush and mountain mahogany habitat would not be proactively restored under Alternative C. These habitat types could be treated opportunistically with other projects but it is expected that fewer acres of these vegetative communities would be restored or maintained with Alternative C than under the other action alternatives.

Alternative C would retain the greatest amount of unburned above ground vegetation during prescribed fire treatments (40 percent). This would allow recovery of foraging, nesting, and hiding cover more quickly than the other alternatives. However, Alternative C would restore fewer acres because each treatment area would be required to retain a higher percent of above ground vegetation than under the other action alternatives. This could include undesirable species such as conifers in grasslands and shrublands.

Compared to the other alternatives, Alternative C would provide the greatest amount of protection to nesting birds, including migratory birds, by restricting both mechanical methods and prescribed burning during the breeding season. This would prevent mortality to migratory and resident birds during the breeding season.

Riparian Management Zones established for this alternative would be wider than under all other alternatives. A 300-foot RMZ for fish bearing streams and a 150-foot zone for non-fish bearing streams would be implemented under Alternative C. As with the other alternatives, the RMZs could have management activities.

Unlike Alternatives A and D, Alternatives C and B would only allow management within riparian areas that protect, enhance or restore the riparian area and meet riparian objectives. Unlike Alternative B, under Alternative C trees could not be removed from the RMZ during restoration unless they would be used for other restoration activities (i.e. instream restoration or erosion control). This would ensure that not only would riparian goals and objectives be met with all projects (unless for human safety) but that any excess material generated from projects would be used for other restoration activities.

Alternative C would establish the most acres of all alternatives where the emphasis would be to restore, protect or enhance riparian habitat for aquatic species and terrestrial species that use the riparian zones adjacent to streams, wetlands and lakes for part or all of their lifecycle. Under Alternative C, approximately 11,393 acres would be managed for riparian objectives of which 6,657 acres would be forested and 4,736 acres would be non-forested. Alternative C would have approximately 8,000 more acres proposed for riparian management than Alternatives A and D and approximately 6,000 acres more than Alternative B.

Alternative C would provide the best protection to all species which use riparian zones and the increased RMZ width would ensure that critical movement corridors are maintained for numerous wildlife species. Whereas the other alternatives focus more on the direct effects of riparian management to streams, Alternative C best considers the overall need of riparian areas to wildlife and as travel corridors for a wide range of species.

Although riparian treatments could occur with other projects, Alternative C would only actively target up to

200 acres of riparian vegetation per decade with 100 acres in the Missouri watershed, 50 acres in the Jefferson watershed, and 50 acres in the Big Hole watershed. Alternative C would take a more “passive” approach to riparian restoration and would actively restore the fewest acres of any action alternative. However, this alternative would treat more riparian acres than Alternative A. Alternative C would also have less active restoration of aspen stands than Alternative B or D leading to a decline of this unique and valuable vegetative community.

Although RMZs would be identified to protect riparian areas, firewood cutting could be authorized within some RMZs under Alternative C if it meets other resource objectives. Because firewood cutting would only be allowed in authorized areas to meet resource objectives, habitat would be improved or maintained with this alternative and there would only be minimal negative effects to wildlife.

Unlike all other alternatives, Alternative C would ensure existing exclosures are maintained annually and maintained before livestock turn-out. This is the only alternative that provides adequate protection to aquatic and riparian habitats, springs, and other unique and fragile habitats from livestock use. Although a maintenance schedule would be provided under the other action alternatives, livestock turn-out could still occur before functional exclosures are in place. Unlike the other action alternatives, Alternative C would ensure that fragile and high value natural resources are protected. There would be no substantial differences in acres grazed by livestock between alternatives. However, with Alternative C, livestock grazing would be allowed on the fewest acres of all alternatives (3,000 acres less than Alternative B and 11,000 less than Alternatives A and D). This alternative would have the least detrimental effects on wildlife from livestock grazing, such as competition for forage, of all alternatives. Unlike Alternatives A and D, the Indian Creek allotment would be unavailable to grazing and unlike Alternative B, this allotment would be unavailable as a forage reserve.

Alternative C would require the largest mandatory buffer, 9 miles, between occupied bighorn sheep habitat and domestic sheep and goats. Alternative C would also provide the greatest protection to bighorn sheep when goats and sheep are used during weed control. This alternative would reduce the risk of disease transmission from domestic to wild sheep more than any other alternative.

Since forest treatments would only be allowed in areas that are already accessible by the current road system, Alternative C would have the fewest negative effects to wildlife from permanent road construction of all alternatives. As with Alternative B, temporary roads would be kept to a minimum and closed within 1 year of project implementation. With fewer proposed acres of treatment, Alternative C would require the fewest miles of temporary road for projects and would have the fewest

road-related impacts on wildlife from roads of all alternatives.

Alternative C would provide the greatest protection to big game winter/calving range from the effects of open roads (described under “Common to All Alternatives” and “Effects of Alternative A”) by allowing no net increase in permanent roads where open road densities are 1.5 mi/mi² or less in big game winter range. Alternative C would also improve the quality and quantity of big game winter range more than any other alternative by managing to reduce open road densities where they exceed 0.5 mi/mi². Christensen et al. (1993) found that reducing open road miles to less than 0.5 mi/mi² increases the amount of functional elk habitat by over 70 percent.

There would be two proposed ACECs common to all the action alternatives, Sleeping Giant and Humbug Spires.

Alternative C would propose three additional ACECs (Elkhorns, Spokane Creek, and Ringing Rocks). Both Spokane Creek and Ringing Rocks would be small (14 and 160 acres, respectively) and would have minimal beneficial effects to wildlife. Humbug Spires is currently a Wilderness Study Area. If Congress does not designate the Humbug Spires WSA as Wilderness, the proposed ACEC designation would ensure a certain measure of continued protection of this area for those species that depend on dry forest, rocky outcrops, and riparian habitats.

The proposed ACEC that would have the most substantial beneficial effect to a wide variety of species is the Elkhorns ACEC. Currently, this area is managed under a Memorandum of Understanding (MOU) between MFWP, USFS, and BLM for wildlife and recreation. If, at some time in the future, the MOU is withdrawn, the ACEC designation would ensure that the management emphasis of BLM lands within the Elkhorn Mountain Range would be to support populations of wildlife species associated with endemic vegetative communities and that management would focus on wildlife goals and objectives.

The potential Elkhorns ACEC would consist of all BLM lands in and around the Elkhorn Mountains (approximately 67,665 acres). The ACEC would provide long-term benefits to wildlife by focusing management specifically for wildlife. Substantially more acres would be proposed under this alternative than Alternative D which would only encompass the existing Tack-on WSA boundary (3,575 acres). Alternative C would have approximately 17,200 more acres in the Elkhorn ACEC than Alternative B.

Alternatives C and B would implement food storage regulations at all recreation sites with high potential or known encounters between bears and people. This would protect bears from being destroyed or moved. Alternatives A and D would not provide for any food storage restrictions.

Under Alternative C, no new structures or roads would be allowed in riparian management zones during new or existing mineral operations. This would provide more protection from mining activities of all other alternatives.

All alternatives would have five stipulations to lessen the effects of oil and gas development on wildlife (stipulations that affect special status species are described under “Special Status Species”). Alternative C would have a NL stipulation for state wildlife management units, big game winter and spring range, and bighorn sheep habitat.

Unlike the other alternatives, Alternative C would prevent any type of disturbance or loss of habitat from oil and gas exploration and development in big game habitat. This alternative would be the most protective to big game species.

Unlike all other alternatives, Alternative C would have a 180-acre mineral withdrawal along Muskrat and Nursery Creeks. This would ensure crucial riparian habitat along Muskrat and Nursery Creeks is provided long-term protection for resident and migratory species.

Effects of Alternative D

Alternative D would benefit a variety of wildlife species by actively restoring habitat that is vital to many species. Vegetation treatments would encourage growth and diversity of habitats and result in multi-age class communities.

Alternative D would take the most aggressive approach in actively restoring all habitat types in the Decision Area.

Dry forest of Douglas fir and ponderosa pine represent the most common forested habitat in the Decision Area. Management of dry forest would focus on moving this habitat type towards the range of historic conditions. The SIMPPLLE model suggested that this habitat type has been severely altered from historic conditions due to fire suppression.

Under Alternative D, projects would mimic natural fire events to create large, mature trees with open canopies and a diverse understory of grasses, shrubs, and forbs. Over the long-term, habitat for resident and migratory birds and large and small mammals would be increased. Large diameter snag habitat would be allowed to become established, creating crucial habitat for snag dependent species. Creation of open stands would ultimately result in increased breeding, foraging and hiding habitat for a wide range of species.

Treatments in dry forest would encourage increased diameters of trees with a diversity of understory age classes. However, the density of trees would be reduced, sometimes substantially, to promote the growth of grasses, shrubs, and forbs. This could have a negative effect on some species. For example, thinning dense

stands of dry forest could result in a loss of hiding habitat for big game, making them more vulnerable to hunting or predation. However, thinning would also result in an increase in forage for these species. Site specific analysis would identify the effects to wildlife impacted by forest treatments.

Under Alternative D, up to 18,200 acres of habitat could be treated per decade within dry forest types of all sizes and densities which would alter forest structure, density, and composition more than under any other alternative.

Dry forest treatments could occur in the six watersheds of the Decision Area but there would be an emphasis on restoration in the Upper Missouri, Jefferson, and Big Hole watersheds. The majority of the treated areas (5,500 acres per decade) would occur within the Upper Missouri River watershed. Treatments would focus on medium and large tree size, high density, dry Douglas-fir and ponderosa pine stands.

Currently, there are approximately 34,000 acres of medium and large tree size, high density, dry Douglas-fir and ponderosa pine habitat within the Upper Missouri River watershed compared to 7,000 acres estimated to be historically present. Proposed treatments could reduce the acreage of high density trees to approximately 28,500 acres in the first decade. After two decades approximately 23,000 acres would remain in a high density condition.

Treatment of 3,000 acres per decade of medium and large tree, high density dry forest in the Jefferson watershed would reduce current acreages from 19,000 acres to 16,000 acres per decade and down to as low as 13,000 acres after two decades compared to an average of 4,900 acres historically found in the watershed.

Treatments of 2,300 acres of medium and large tree, high density dry forest in the Big Hole watershed would reduce current acreages from 14,000 acres to 11,700 acres in the first decade and down to as low as 9,400 acres after two decades which would move the Big Hole close to the historic average of 7,000 acres.

The dry forest types are often used by big game species during winter months and a reduction in tree densities would result in an increase of forage for big game. However, reducing tree densities would create open stands that could increase the vulnerability of big game to hunting and predation.

Management for mature, open dry forests would increase or improve habitat for a variety of resident and migratory birds, large and small mammals, amphibians, and reptiles. Although there would be long-term benefits to species that depend on open, dry forest stands, such as flammulated owls, there could be a decline in the amount of habitat available for those species that prefer more dense forest types.

Additional impacts would occur from temporary road construction for forest treatments. Roads would reduce

habitat and could potentially increase the level of disturbance and displacement of wildlife species from project areas. To reduce disturbance to wildlife, temporary roads would be closed within one year of project completion. Because Alternative D would entail building more temporary roads for treatments (more acres treated) and would allow temporary roads to remain open longer, this alternative would have more negative effects to wildlife from temporary roads than Alternatives B and C.

Overall, Alternative D would move more acres towards the historic range and restore more habitats for wildlife dependant on dry forest than all other alternatives. This alternative, however, would also have the most short-term effects from disturbance of all alternatives. Over the long-term, management towards pre-fire suppression conditions would benefit the majority of species that utilize these vegetation communities.

Cool, moist forest is the least available habitat type in the Decision Area and is predominately located in the Big Hole and Upper Missouri Watersheds. Under Alternative D, up to 5,050 acres of medium to large size, high density, cool, moist forest could be treated per decade within the Decision Area. Treatments would occur in the same watersheds as Alternatives B and C. Three watersheds would have the majority of treatments, Upper Missouri, Jefferson, and Big Hole.

Up to 2,050 acres per decade could be treated in the Upper Missouri watershed in this habitat type. In the Upper Missouri, this could reduce mature, dense, cool forest stands from 6,000 acres to 3,950 acres in the first decade which would be close to the historic average of 4,300 acres.

In the Big Hole watershed, up to 1,500 acres could be treated per decade to reduce the current amount of mature, dense cool and moist forest from 5,500 acres to 4,000 acres in the first decade and down to as low as 2,500 acres within two decades, taking the number of acres to near the historic average of 2,400 acres.

Although there is very little known cool, moist forest in the Jefferson watershed (approximately 1,500 acres), Alternative D would propose to treat up to 500 acres per decade. This is more than under all other alternatives.

The Blackfoot, Gallatin, and Yellowstone watersheds could have a small number of acres of mature, high tree density cool forest treated (175 acres in the Yellowstone and Blackfoot and 75 acres in the Gallatin). The effects on wildlife, either beneficial or detrimental, from treatments in these watersheds would be minimal.

There could also be a small number of acres treated in the Missouri, Big Hole, Yellowstone, and Gallatin watersheds to thin seedlings and pole-sized trees in cool forest habitats. Up to 250 acres per decade could be thinned in the Missouri, 300 acres per decade in the Big Hole and only 25 acres per decade in the Gallatin and

Yellowstone watersheds. This would have minor effects to wildlife.

Reduction of stem density and creating small openings would be beneficial to wildlife that occurs in this vegetation community. Creation of small openings would increase vegetation and habitat diversity as well as increase available forage for big game and other species. Increased vegetation diversity and understory development would improve habitat for many small and large mammals and migratory and resident birds. Improvement of habitat for prey species would benefit large predators within cool, wet forests.

Alternative D would treat a total of 5,050 acres per decade of cool, moist forest, which would be more than under all other alternatives. Treatments would result in temporary displacement of wildlife within project areas to adjacent forest areas. However, displacement would be expected to be temporary and habitat would ultimately be improved by creating a diversity of habitats. Additional impacts would occur from temporary road construction for forest treatments. Roads would reduce habitat and could potentially increase the level of disturbance and displacement of wildlife species in these areas.

Like Alternative A, Alternative D would not have retention guidelines or recommendations for restoration of snag and down woody habitat. Snag improvement projects could occur in conjunction with timber management projects but snags would not be actively recruited in snag deficient areas. Alternatives D, A and C would create fewer snags in snag deficient areas than Alternative B.

Unlike Alternative A, snags that have been created naturally through insects, disease and fire would be retained, to some degree, under Alternative D. This would retain habitat for snag dependant species while allowing commodity removal.

For timber salvage, Alternative D differs from Alternatives B and C when contiguous areas of dead and dying forest exceed 1,000 acres. Under Alternative D, 30 percent of the affected area would be retained unless necessary for human safety. Alternative D would require fewer acres of dead and dying forest to be retained compared to Alternatives B and C. Although Alternatives B and D would protect dead and dying forests, Alternative C would guarantee the protection of moderate to large blocks of dead and dying forests. Connectivity and diversity of habitats as well as species productivity could be less for those species dependent on snag habitat under Alternative D than with Alternatives B and C but more than under Alternative A.

The effects of firewood cutting would be the same as Alternative B.

Grasslands make up the majority of habitat in the Decision Area (45 percent) and conifer encroachment is

currently causing a severe decline in the quality and quantity of this habitat type. Although sagebrush shrubland is only found on 7 percent of the Decision Area, this habitat type provides essential habitat for sagebrush obligate species.

Treatments in grasslands and shrublands would move towards pre-fire suppression and away from the effects of historic grazing. This would improve and protect habitat for species that are dependent upon this vegetation community. Conifer encroachment has reduced the amount and quality of breeding, brood rearing, foraging, and cover habitat for a wide range of wildlife species.

Alternative D would treat up to 19,100 acres (14 percent) of grasslands and 6,800 acres (35 percent) of shrublands per decade in the Decision Area to reduce conifer encroachment and improve the health and resiliency of these communities. Alternative D would restore more acres of grasslands and shrublands than all other alternatives. Although Alternative D would have more short-term adverse effects to wildlife from disturbance, the long-term benefits from increased habitat for breeding, forage and cover would outweigh the short-term impacts. The loss of conifers could have negative effects to nesting migratory and resident birds but habitat for these species has not been found to be limiting.

Under Alternative D, the quality and quantity of grassland and shrubland habitat would be restored on more acres than under all other alternatives. The majority of treatments would occur in the Upper Missouri, Jefferson, and Big Hole watersheds.

Alternative D would treat the most acres of noxious weeds of all alternatives (up to 61,000 acres). Assuming implementation of the high end of proposed treatment acreages, Alternative D would treat 41,000 acres more than Alternative A, 11,000 more acres than Alternative B and 23,000 more acres than Alternative C. This alternative would restore more acres of wildlife habitat by reducing noxious weeds than all other alternatives.

Alternative D would restore and protect bitterbrush and mountain mahogany habitat. Effects would be the same as Alternative B.

Alternative D would allow the greatest amount of over ground vegetation to be consumed during prescribed fire (90 percent). This would allow more removal of target vegetation such as conifers in grasslands or shrublands but could result in a greater time for re-colonization of target grasses, forbs, and shrubs.

Like Alternative A, there would be no timing restrictions for prescribed burning or mechanical treatments. This could result in more mortality of migratory and resident birds than under Alternatives B and C.

Fifty-foot Streamside Management Zones would be implemented under Alternative D, the same as Alternative A. The effects from SMZs would be the same as described under "Effects Common to All Alternatives"

and as described for Alternative A. Smaller riparian management areas proposed under Alternatives D and A, along with the types and extent to management activities allowed in SMZs, could reduce breeding, foraging, and hiding habitat and reduce the quality and quantity of movement corridors for a wide range of species.

Alternative D could actively restore (through mechanical treatments) up to 1,700 acres of riparian vegetation per decade, more than under any other alternative. Although the most riparian acres could be targeted for active restoration under Alternative D, Alternatives D and A would provide the least amount of direction for riparian management. Like Alternative A, Alternative D would allow management of the riparian areas strictly for commodity removal. Alternatives A and D could cause a reduction in breeding, brood rearing, foraging, denning, overwintering and travel habitat for a wide range of species.

Like Alternative B, Alternative D could actively restore aspen stands to improve and expand habitat for wildlife. Nesting habitat for birds, including migratory birds, could be increased and so could an important winter food source for elk, deer, and moose.

The effects of firewood cutting in riparian areas would be the same as under Alternative B.

Livestock exclosures would be checked and maintained every five years. Alternative D would protect more riparian areas from livestock grazing and trampling compared to Alternative A which does not require maintenance of exclosures. However, damaged and non-functional exclosures could allow access to riparian areas and streams between 5 year maintenance intervals. Due to this, Alternative D would provide less protection to riparian areas than Alternative C but, possibly, more protection compared to Alternative B (depending on the maintenance schedule developed under Alternative B.) The type of grazing, acres available for livestock grazing and effects to wildlife would be the same as under Alternative A.

Alternative D would have the same buffer prescriptions associated with bighorn sheep and domestic sheep as Alternative A. The implementation of buffers between domestic sheep and goat allotments and bighorn sheep habitat up to 9 miles in width could reduce the potential for disease epidemics within bighorn sheep populations. Although Alternatives D and A allow for a voluntary buffer of up to 9 miles, these alternatives would not have a minimum buffer width. These alternatives would not guarantee adequate separation between wild and domestic sheep to prevent disease transmission. Alternatives B and C would provide minimum buffer widths between wild and domestic sheep. Unlike Alternative A, Alternative D would provide specific guidance when using domestic sheep for weed control in occupied bighorn sheep habitat (same as Alternative B). This would help in preventing disease transmission to wild sheep during weed control activities.

Unlike the other action alternatives, Alternative D would allow some new, permanent roads to remain open to the public if travel plan objectives are met. Since Alternative D would treat the most vegetation acres of all alternatives, there would be more need for permanent road construction to facilitate multiple entries to meet objectives. Because Alternative D would allow more new, permanent roads and fewer roads would be closed during travel planning, this alternative could have substantially more negative effects to wildlife associated with roads than Alternatives B and C. Under Alternative D, there would be more loss of habitat due to road construction, an increase in disturbance and harassment to wildlife, an increase in the spread of noxious weeds and a greater change of direct mortality through road kill.

Like the other action alternatives, temporary roads would be kept to a minimum under Alternative D. However, temporary roads would not be required to be closed within a certain time after project implementation. Open temporary roads could be used by the public and would cause more displacement of wildlife than under Alternatives B and C.

Alternative D would protect and maintain fewer acres of functional big game winter/calving range by allowing new permanent road construction in areas where the road density exceeds 0.5 mi/mi². Alternative D would allow new roads to be built in areas of low road density. This alternative could substantially reduce the quality of habitat for big game and other wildlife species as well as the amount of functional habitat by allowing new permanent roads in areas that currently provide high quality habitat. Christensen et al. (1993) found that open road miles less than 0.5 mi/mi² provide elk habitat that is roughly 70 percent functional. A sharp decline in habitat effectiveness was found when road densities reached 1 mi/mi² and above (Christensen et al. 1993).

There would be two proposed ACECs common to all the action alternatives, Sleeping Giant and Humbug Spires. Alternative D would propose one additional ACEC, Humbug Spires. The effects of the Sleeping Giant ACEC are described under “Effects Common to All Alternatives.”

Effects of the proposed Humbug Spires ACEC would be the same as under Alternatives B and C.

Under Alternative D, the Elkhorns ACEC would only include the existing Tack-on Wilderness Study Area boundary (3,575 acres). This is substantially different from Alternatives B and C where the size of the Elkhorns ACEC boundary would be 50,431 and 67,665 acres, respectively. Under Alternative D, the proposed Elkhorns ACEC would be managed for semi-primitive, non-motorized recreation which would benefit wildlife species by reducing the level of disturbance and maintaining habitat (same management direction as existing WSA).

Currently, the entire Elkhorn Mountain Range is managed under a Memorandum of Understanding (MOU) between the MFWP, USFS, and BLM for wildlife and recreation. If, at some time in the future, the MOU is withdrawn, BLM lands in the Elkhorn Mountains would revert back to multiple use management and wildlife and their associated habitat might not be adequately protected. Unlike Alternatives B and C, Alternative D would not ensure BLM lands within the Elkhorn Mountain Range are managed for wildlife objectives and goals. The Elkhorn Mountains would not necessarily be managed to support populations of wildlife species associated with endemic vegetative communities if the MOU is withdrawn.

Alternative D would not implement food storage regulations at recreation sites to prevent conflicts between bears and people. This would pose more risk of bears being moved or killed due to interactions with humans than under Alternatives B and C.

During new and existing mineral operations, Alternative D would allow facilities and roads to be constructed in riparian areas. This would cause more loss of wildlife habitat and disturbance than under Alternatives B and C. The loss of habitat could be long-term and major depending on the type and extent of activity.

All alternatives would have five stipulations to lessen the effects of oil and gas development on wildlife (stipulations that affect special status species are described under “Special Status Species”). Under Alternative D, these stipulations would include NSO in state wildlife management units and timing restrictions in big game habitat.

The acres of available habitat would be the same for each alternative (Table 4-8) but the stipulations would vary between alternatives.

Stipulations for wildlife management areas would be similar for Alternatives D, A, and B but under Alternative A, there would be “core” areas surrounding the wildlife management unit that would have the most restrictive stipulation of NL.

Alternative D would have the same timing restriction as Alternatives A and B for big game winter and spring range (12/1-5/15). Of the 498,973 acres of big game winter/spring range in the oil and gas leasing Decision Area, 97,454 acres would be overlapped with more protective NSO stipulations or No Lease areas, leaving about 401,519 acres protected with the Timing Limitation stipulation. Within the five areas with the most potential for oil and gas exploration and development, 15,589 acres (least of all alternatives) of the 99,550 acres of big game winter/spring range would be overlapped with more protective NSO stipulations or No Lease areas. Considering the overlap of more protective stipulations, Alternative D would provide the least protection to big game winter/spring range of all alternatives. Although Alternatives D, A, and B would provide varying protec-

tion to overwintering big game from disturbance, Alternative C would provide the greatest amount of protection to big game by preventing both disturbance and loss of habitat with a NL stipulation.

Alternative D would have the same timing restriction in big game calving habitat as Alternative A, 5/1-6/30. This would be less time available free of disturbance to individuals that may give birth early or as a refuge to big game before they give birth than under Alternatives B and C.

Alternatives D and B would also increase the timing restriction in year-round bighorn sheep habitat by two months (11/1-6/30) over Alternative A. Of the 131,279 acres of bighorn sheep year-round habitat, approximately 31,711 acres (least of all alternatives) would be even more protected with overlapping NSO stipulations or No Lease areas, leaving about 99,568 acres being protected by the Timing Limitation stipulation. Of the approximately 37,000 acres of bighorn sheep habitat within the five areas most likely to have oil and gas exploration and development, 6,880 acres (11,363 fewer acres than under Alternative A, 23,145 fewer acres than under Alternative B) would be overlapped with more protective NSO stipulations or No Lease areas, leaving about 30,120 acres protected by the Timing Limitation stipulation. This would provide more refuge for sheep during lambing (most lambing occurs between April and June with some lambing occurring in early July) and going into the difficult winter season. Alternatives D and B would provide less protection than Alternative C which would prevent disturbance to bighorn sheep as well as prevent loss of habitat from oil and gas exploration and development with a NL stipulation.

Alternative D would have the same timing limitation in bighorn sheep core habitat (12/1-5/15) as Alternative A. Alternatives D and A would be less protective of bighorn sheep and core habitat than Alternatives B and C which would protect crucial habitat for bighorn sheep from disturbance as well as from loss of habitat.

Alternative D would not withdraw 180 acres of riparian habitat in the Muskrat Creek watershed. There could be a loss of habitat for a variety of species in the Muskrat Creek watershed under Alternatives D and A.

FISH

Effects Common to All Alternatives

Because of the programmatic nature of the proposed alternatives, qualitative effects from management activities on fish and aquatic ecosystems are addressed under "Effects Common to All Alternatives." Some effects may vary due to the degree of an activity such as the amount of vegetative treatments or road closures. These "quantitative" effects are addressed under each alternative. More specific analysis would be required to determine the extent of potential impacts from site specific

management actions. This analysis would be completed when a management action is clearly defined.

Proposed management of the following resource programs would have no anticipated impacts to fisheries; Air Quality, Paleontology, Cultural Resources, Visual Resources, Economics, and Environmental Justice.

Water Quality

In their natural environment, the survival of fish and other aquatic species depends upon many factors including; finding food, predator avoidance, immune system health and reproduction. Although sediment is a natural part of the aquatic ecosystem, an increase in fine sediment has the potential to affect all of these factors as well as cause stressful conditions that could increase aquatic species' susceptibility to disease.

An increase of sediment to aquatic systems can happen through ground disturbing activities such as vegetation treatments using mechanical methods and/or prescribed fire, livestock grazing, mining, energy development, road construction and use, recreational activities such as trail construction and use (especially motorized use) and campground development in riparian areas (Meehan 1991).

An increase above the natural sediment load in streams can prevent the successful capture of prey and limit the ability of fish to obtain food. Sediment in streams may also be deposited in spawning gravels where it can smother eggs and reduce the amount of interstitial spaces available for eggs, juvenile fish, and other organisms. This is especially critical in the winter months when interstitial spaces are used as refugia and allow fish and other aquatic species to survive under severe flows and temperature conditions.

Developing fish eggs and larvae need a constant supply of cold, oxygen rich water which flows through the interstitial spaces in stream gravels. Embedded sediments fill these interstitial spaces and also limit essential winter habitat used by juvenile fish for cover from predators, ice scour and high-velocity stream flows. The filling of pools with sediment further limits overwintering sites for juvenile and adult fish (Meehan 1991).

Significant increase in sediment deposition can also lead to alterations of stream morphology causing a widening of the stream, an increase in subsurface flow and stream channel instability.

Direct effects of sediment on aquatic invertebrates includes; loss of habitat due to scouring of streambeds, dislodgment of individuals, smothering of benthic communities, loss of interstitial spaces between substrate, abrasion of respiratory surfaces and interference of food uptake for filter feeders (Beschta et al. 1995). Many of the macroinvertebrates that are favored as food (e.g. mayflies, caddisflies and stoneflies) by stream dwelling fish prefer coarse streambed substrates and are harmed

by an increase of fine sediments, while others (e.g. midges) are considered to be more tolerant.

Accelerated runoff can trigger downcutting of the streambed, which lowers the streambed, alters the water table, dries out the riparian area, destabilizes streambanks, increases erosion, and further accelerates runoff. Unless stopped by some form of intervention or a hard geologic formation, downcutting may migrate upstream and further disrupt the hydrologic function of the stream system (Rosgen 1996).

Water quality can be affected not only from an increase in sediment but also from an increase in nutrients, pollutants, or heavy metals. Metals are naturally present in varying concentrations in all surface waters. Mining, however, may cause concentrations of dissolved metals to exceed background levels, particularly in situations involving acid mine discharge. The chief metals associated with mining released to streams include; arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, and zinc. These substances may produce toxic effects alone, in combination or synergistically that include direct mortality, behavioral changes or reproductive failure in aquatic organisms (Meehan 1991).

Nutrients can be elevated in streams from management activities such as timber harvest and associated road construction, prescribed fire and livestock grazing which can increase algal production. An increase in algal blooms can reduce interstitial spaces and dissolved oxygen in the stream (Meehan 1991).

Riparian Vegetation

Riparian vegetation directly influences the condition, quality, and maintenance of aquatic habitats. Riparian plants filter sediments and nutrients, provide shade, stabilize streambanks, provide cover in the form of large and small woody debris, produce leaf litter energy inputs, and promote infiltration and recharge of groundwater (Forest Ecosystem Management Assessment Team 1993 and Takahi et al. 2002). As a result of these functions, spawning beds for fish and microhabitats for macroinvertebrates remain relatively free of damaging fine sediment deposits. Riparian vegetation reduces sedimentation of pools, thereby maintaining water depths and structural diversity of the channel. Base flow levels are augmented throughout the year by the slow release of groundwater. Complex off-channel habitats, such as side channels, and undercut banks are often formed by the interaction of stream flow and riparian features such as vegetation and large woody material. These areas of slower water provide critical refuge during floods and high flows for a variety of aquatic species and serve as rearing areas for juvenile fish (Brown et al. 1988).

The bank stabilizing function of streamside vegetation not only helps reduce erosion and influence channel morphology but also acts to supplement instream cover by the development of undercut streambanks and by

providing overhanging vegetation. Well-vegetated stream channels and stable streambanks help reduce turbidity and channel scouring resulting from high flows and can enhance primary production (Beschta et al. 1995).

Riparian trees provide streams with critical instream habitat components such as woody material that creates pools, slows high flows, provides refuge during the summer and winter for aquatic species, and provides shade, cover and a prey base for many species. Woody material also protects streambanks from erosion and provides microsites for riparian vegetation to be established.

Effects of Management Actions

All programs would be managed and implemented to improve or maintain riparian conditions that are essential for quality fish and aquatic habitat. When this is not possible (as could occur with activities such as placer mining), measures would be taken to reduce risks to aquatic resources and to restore stream systems. However, those projects that remove habitat features or degrade aquatic habitats would have a negative impact to fish and other aquatic organisms.

By using mechanical methods and prescribed fire, sagebrush, grasslands and forests would be restored to improve species composition, distribution, and vigor. This could create short-term pulses of sediment, nutrients, and runoff to streams due to soil disturbance and compaction and vegetation removal (Meehan 1991). In the long-term, however, restoring vegetation structure, density, species composition, and pattern would reduce the risk of unnaturally large wildland fire events and reduce the risk of excessive runoff and sedimentation. By restoring these habitats to a more "healthy" state, the risk of excessive sedimentation and erosion would be reduced and, in forested riparian areas, large trees would be promoted to provide a source of large woody material along floodplains and within instream habitats. Water flows would be restored to more natural conditions, allowing for more water storage and slow release to streams. Understory vegetation would be promoted in currently dense stands of dry forest and there would be a reduction of noxious weeds.

Some vegetative projects would involve multiple treatments of the same area. This could involve using mechanical treatments to prepare an area for a prescribed burn. Prescribed fires conducted in the spring (when drainage-bottoms are still snow covered) help to protect riparian vegetation and soils whereas burns in the fall could potentially cause more loss of riparian vegetation as well as an increase of runoff, sediment, and nutrients to streams. The primary goal of these projects would be to restore vegetation and move towards the historic range of conditions that would allow aquatic species to withstand the effects of natural disturbances.

Mid-term (10 year) projections indicate noxious weed populations would increase even with implementation of weed management plans, statutes, and regulations due to expansion of existing populations and new infestations associated with roads and areas of disturbance. Weed management activities such as selective grazing, herbicide application, biological control agents or mechanical treatments could produce some short term minor effects on fisheries and aquatic resources that could include, but are not limited to, increases in sedimentation, changes in water chemistry due to the delivery of chemicals, reduction in shade or thermal cover or an increase in bank instability from the loss of vegetative cover. These short-term negative effects should be overshadowed by the long-term benefits on the aquatic resources as native or desirable species become re-established.

Restoring riparian vegetation would benefit streams and riparian areas by improving a large tree component as well as down woody material in the stream channels and along floodplains. Restoration treatments may have short-term adverse effects due to disturbance and may cause a short-term pulse of sediment to stream channels but would have long-term beneficial effects such as stabilizing streambanks, increasing shade, reducing fine sediment, reducing runoff, improving ground water storage and providing habitat features (down wood, undercut banks) to the stream and riparian habitat.

Aquatic habitat would be restored, when necessary, to improve unsatisfactory or declining habitat. This would include restoration of riparian vegetation to improve shade, increase down woody material, improve storage of ground water, and protect streambanks. Restoration of aquatic habitat would also include providing habitat features such as instream woody material for cover, overwinter habitat, refugia, shade, and forage. In pool deficient streams, pools could be created to provide both winter and summer habitat. In some cases where a stream has been severely altered or degraded, such as with placer mining, the stream may need to be reconstructed. Roads and road crossings could be removed to reduce fine sediment and runoff to streams, restore riparian vegetation, and remove migration barriers to fish.

All alternatives would be subject to management under Montana Streamside Management Zones (SMZs) which allow activities such as logging, prescribed fire, and road building in riparian areas (generally 50 feet on either side of a stream) but restricts how many trees can be removed and where road construction can occur. Restricting management activities associated with logging and road construction in riparian areas would maintain some of the functional capacity of wetlands and riparian areas and help to reduce and trap sediment generated from management activities. However, only 50 percent of trees >8 inches DBH on each side of stream or 10 trees per 100-foot stream segment would be required to be retained within SMZs. Although this would provide some protection to streams, the loss of riparian vegeta-

tion and soil disturbance may cause negative impacts to streams from increased runoff, loss of large woody material and sedimentation.

BMPs (Appendix E) would be used to avoid or minimize adverse effects to water quality from sedimentation and pollution and help to protect the quality of instream habitat.

The risk of pollutants entering streams would be reduced by requiring storage of chemicals outside of riparian areas, having a spill prevention and control plan and not allowing refueling within riparian areas (with the exception of mining activities, fire suppression and reclamation and chainsaw re-fueling).

Livestock grazing may have harmful effects on riparian habitat as well as on fish and aquatic resources depending on the intensity of grazing within riparian areas. Grazing that is too intensive, or occurs for too long duration within a riparian area, can cause increases in sedimentation and introduce nutrients to the aquatic environment. Grazing can cause bank trampling that can destabilize stream banks and cause the loss of undercut banks and channel erosion. Grazing can also lead to a loss of vegetation density, diversity, and vigor (Meehan 1991).

Implementation of Allotment Management Plans, Coordinated Resource Management Plans and Land Health Standards and Guidelines would move towards developing stable, deep-rooted vegetation which would stabilize streambanks, reduce soil erosion, and improve riparian condition. Implementation of Land Health Standards and Guidelines would prevent the degradation of riparian habitats and would also improve the health of all vegetative communities where grazing has caused degradation to riparian communities and stream systems.

The health and integrity of riparian vegetation would be protected and improved by fencing, development of upland water sources, timing livestock use to avoid sensitive periods in spring, and reductions in grazing intensity and trampling. These types of activities would protect and restore riparian vegetation, protect and restore streambeds and banks and reduce sedimentation and nutrient additions to streams. Suspension of grazing in riparian areas where livestock use has caused site degradation would help meet riparian goals and proper functioning condition.

Fuels projects would be designed and implemented in a manner that minimizes impacts to aquatic resources. Mechanical treatments and prescribed burning used to reduce fuel loading or for restoration of vegetation communities could cause short-term pulses of nutrients (especially in the case of prescribed fire) and fine sediment as well as increased runoff.

Although wildland fires could still occur in areas where hazardous fuel loads have been reduced, fires would be expected to be predominately understory burns exhibit-

ing less intensity and less severe burning conditions than crown fires. These understory burns are easier to control with lower-impact suppression methods (such as hand-built firelines) and would be less likely to adversely affect aquatic resources. In contrast, the crown fires associated with heavier fuel loads often require suppression techniques likely to have greater adverse impacts to aquatic habitats and species.

Wildland fire suppression may involve activities typically not desired within riparian areas to protect human safety or prevent major losses within riparian and up-slope habitats. These activities might include, but are not limited to, tree felling/fireline placement, operation of heavy equipment, crossing of streams, road construction, use of chemical retardants and removal of water. Incident bases, helibases, and staging areas would be located outside of riparian areas, if at all possible. These activities could increase fine sediment and runoff and decrease riparian vegetation and down woody material along streambanks and riparian areas. These activities could also decrease shade, degrade streambeds and banks, and allow contaminants to enter streams. Wildland fire suppression, particularly in riparian areas, could have varying degrees of effects (negligible to major, short term to long-term) depending on the size, location, and intensity of suppression activities.

Travel management could improve and benefit aquatic habitat by closing roads in riparian areas and removing road crossings.

Recreation activities, such as camping, OHV use, boat use and fishing and can have negative effects on fish and aquatic resources. Effects include displacement of species from their typical habitats due to human presence or recreation related facilities, species mortality (fishing), and habitat degradation (loss of riparian vegetation, increase in fine sediment and bank trampling).

Special designations, such as Wilderness Study Areas, Wild and Scenic Rivers and ACECs would have beneficial effects to fisheries and aquatic resources. These areas are typically designed to protect, restore, or enhance habitat (both aquatic and terrestrial). Additionally, these areas minimize or limit disturbance, allowing habitat conditions to exist in near natural conditions.

Mining activities, placer operations in particular, may lead to a loss of riparian and/or wetland vegetation. All vegetation within the active mining area is removed before and during mine development and operations. Vegetation immediately adjacent to mining activities could be lost or degraded by roads, water diversions and other related developments. Riparian and/or wetland vegetation has a significant influence on certain stream types. Changes in composition, vigor, and density of riparian vegetation can result in changes in sediment input, stream shade, instream erosional processes, terrestrial insect habitat, and the contribution of detritus and structural components to the stream channel. Water

quality is also related to the quality and quantity of riparian and wetland vegetation.

Much of the Decision Area is subject to mineral and energy exploration and development. The effects to fish and other aquatic species from minerals and energy exploration and development would range from minor to major and could have both short-term and long-term effects. Surface mining operations can disrupt surface and groundwater flow patterns. Mining operations also have the potential to release pollutants to surface and groundwater, contaminate soils and cause the eventual incorporation of pollutants into plant tissue. Both water and soil contamination may be harmful to riparian and wetland vegetation. Mineral exploration and extraction could cause increased sedimentation or loss of aquatic habitats from road construction, mining activities and the relocation or diversion of streams.

There are approximately 652,194 acres of federal mineral estate lands potentially available for oil and gas exploration and development in the Decision Area. Actual acreages available vary based on proposed stipulations by alternative. In the Decision Area, five areas have been identified with the most potential for oil and gas exploration and development (low to moderate potential overall) where there would most likely be reasonably foreseeable development and drilling activity (Appendix M). The five areas are located near the southern Deerlodge Valley, Sleeping Giant, Canyon Ferry, Bozeman, and Livingston. The total area within these five areas is roughly 116,295 acres. Each of the five areas range in size from 1,400 to 50,600 acres.

It is estimated that a total of 31 conventional oil and gas wells could be drilled, most likely within the five areas with the most potential over 15-20 years. Nineteen of these wells would be exploratory, with six of them being producers. The RFD assumes that there would be two additional step-out wells developed for each of the six producers, resulting in a total of 18 producing wells overall. The RFD also assumes that seven of these producing wells would be on federal mineral estate with the remainder being non-federal. As many as 40 wells might be drilled for coal bed natural gas, most likely near Bozeman Pass. None of this activity is forecast to take place on federal mineral estate.

Under all alternatives, there would be one stipulation to lessen the effects of oil and gas development on fish (stipulations that affect special status fish species are described under "Special Status Species"). This stipulation would protect Class 1 fisheries to different degrees based in the type of stipulation under each alternative. A No Surface Occupancy (NSO) or No Lease (NL) stipulation would have the greatest benefit to Class 1 fisheries by preventing loss of habitat. Controlled Surface Use (CSU) would allow exploration

and development in the areas adjacent to streams but would provide some degree of protection by limiting the amount and type of use.

The effects from reclamation activities associated with abandoned mines lands on fish and other aquatic species should be minimized with BMPs (**Appendix E**) and would be expected to be beneficial. Mining features that discharge water with elevated levels of contaminants to surface waters, or directly to streams could have negative effects on fish and other aquatic organisms, depending on volume and constituent concentrations. The effects from mine drainage could result in direct mortality, behavioral changes, or reproductive failure.

The effects from renewable energy programs (i.e., hydroelectric, solar, and wind power generation) in the Decision Area would generally be expected to be minor. Effects to aquatic organisms from renewable energy projects could include increased runoff from access roads and other structures.

Rights-of-way grants and easements may promote the construction of paved or unpaved access roads, gravel pads, and utility corridors which could adversely affect aquatic habitats through increased runoff and fine sediment and contaminants.

Effects of Alternative A

Under Alternatives A and D, riparian areas would only be protected with Streamside Management Zones (SMZ) of generally 50 feet for fish bearing and non-fish bearing streams. The SMZ would provide some protection for fish and aquatic resources by restricting certain forest activities. Forest management would not be required to benefit riparian areas and management could be conducted strictly for product removal. Since management could occur in up to 50 percent of the SMZ, down woody material in riparian areas and large woody recruitment to streams could be negatively affected. There could also be a risk of sedimentation to streams from the use of SMZs.

Table 4-9 and **Table 4-10** show acreages of SMZs and Riparian Management Zones (RMZs) of forested and non-forested land for each alternative by watershed in the Decision Area.

Alternatives A and D would provide the least amount of riparian habitat protected, approximately 3,528 acres (**Table 4-10**). Under Alternatives A and D, the Upper Missouri and Big Hole watersheds would have the most acres of riparian area covered by SMZs across all water body types (1,670 and 928 acres, respectively). Management of SMZs under Alternatives A and D would allow a large amount of the 3,528 acres to be accessed for commodity removal and would not necessarily provide for overall protection of riparian function.

Alternatives B and C would have larger areas identified for riparian management that would maintain, restore or preserve riparian functions and values including providing functional wildlife movement corridors (especially under Alternative C). Alternatives B and C would still allow RMZs to be actively “managed” to restore habitat and maintain the health and function of riparian areas and streams. The type and extent of projects that would be allowed in riparian areas under Alternatives A and D could cause more negative effects from increased sedimentation, runoff and reduction of riparian and instream habitat quality than Alternatives B and C. The effects to riparian and aquatic habitats from Alternatives A and D could be minor to major and could be short to long-term.

The limited amount of riparian habitat in the Decision Area makes this habitat type important to restore or protect.

Firewood cutting with no diameter size limit could occur within riparian areas and both down wood in riparian areas and large woody material recruitment to streams could be negatively affected by this alternative.

Unlike the action alternatives, aspen would not be identified for restoration or protection under Alternative A.

	Fish Bearing			Perennial Non-fish			Intermittent	Total Forest		
	A & D	B	C	A & D	B	C	A, B, C, D	A & D	B	C
Riparian Management Width	50 feet	160 feet	300 feet	50 feet	80 feet	150 feet	50 feet			
Big Hole	174	597	1,216	131	220	426	214	519	1,031	1,856
Blackfoot	9	30	58	2	4	8	0	11	34	66
Boulder	81	266	579	79	134	263	75	235	475	917
Jefferson	95	317	639	46	78	154	58	199	453	851
Madison	5	18	40	0	0	0	0	5	18	40
Upper Clark Fork	5	18	38	0	0	0	4	9	22	42
Upper Missouri	187	684	1,585	241	404	785	281	709	1,369	2,651
Upper Yellowstone	18	73	169	18	32	65	0	36	105	234
Total	574	2,003	4,324	517	872	1,701	632	1,723	3,507	6,657

	Perennial (including fish bearing)		Intermittent	Total Non-Forest		Total Riparian Management Acres (Forest and Non-Forest)		
	A, B, & D	C		A, B, C, D	A, B, & D	C	A & D	B
Riparian Management Width	50 feet	150 feet	50 feet					
Big Hole	291	930	118	409	1,048	928	1,440	2,904
Blackfoot	20	66	0	20	66	31	54	132
Boulder	71	197	22	93	219	328	568	1,136
Jefferson	77	258	112	189	370	388	642	1,221
Madison	9	36	0	9	36	14	27	76
Upper Clark Fork	2	10	0	2	10	11	24	52
Upper Missouri	826	2,458	135	961	2,593	1,670	2,330	5,244
Upper Yellowstone	121	393	1	122	394	158	227	628
Decision Area Total	1,417	4,348	388	1,805	4,736	3,528	5,312	11,393

Although riparian restoration could occur through other projects or as a result of Land Health Standards, only 30 additional acres of riparian restoration per decade would be expected under this alternative. This is up to 670 fewer acres than under Alternative B, up to 170 fewer acres than under Alternative C and up to 1,670 fewer acres than under Alternative D. Although short-term impacts from disturbance would be lowest with Alternative A, the long-term benefits from restored habitat and vegetation diversity and composition would be much less than under any of the action alternatives.

Alternative A would restore fewer acres of shrubland, grassland, and forest habitats than Alternatives B and D but more than Alternative C. Alternative A would be less effective at restoring overall watershed function and riparian and stream functions compared to Alternatives B and D but, potentially, more effective than Alternative C.

Assuming that the high end of the range of proposed weed treatments is implemented under any alternative, Alternative A would treat the fewest acres of noxious weeds and would have the greatest negative effects from loss of native riparian vegetation. Monotypic stands of annual weeds with poor soil retention/stabilization properties or invasion of streambanks or wetlands by unde-

sirable non-native species would continue at a greater level than under the action alternatives.

Since Alternative A would allow up to 5.5 miles of new permanent roads per year to access vegetation treatments and would close the fewest miles of roads through travel planning, the detrimental effects to riparian and aquatic habitats as described under “Effects Common to All Alternatives” would be greatest under this alternative and could be major and long-term.

Alternative A would allow the most acres of livestock grazing and would have the most potential for major and, possibly, long-term detrimental effects to riparian and stream habitats from bank trampling and loss of riparian vegetation as well as from other effects discussed under “Effects Common to All Alternatives.”

Riparian enclosures would not be routinely maintained under this alternative and damaged enclosures could allow access to riparian zones and streams by livestock. This would negatively affect aquatic habitats by causing increased inputs of nutrients and sediment to streams, and a reduction of riparian vegetation.

As **Table 4-11** indicates, there would be only one ACEC, Sleeping Giant, proposed under Alternative A that would provide habitat for fish. Approximately 11.4

ACEC	Stream Miles with Special Status Fish				Miles of Other Fish Bearing Streams				Total Miles of Fish Bearing Streams			
	A	B	C	D	A	B	C	D	A	B	C	D
Elkhorns	0	5	5	2.7	0	6.8	8.7	0	0	11.8	13.7	2.7
Humbug Spires	0	0	0	0	0	7.4	7.4	7.4	0	7.4	7.4	7.4
Ringing Rocks	0	0	0	0	0	0	0	0	0	0	0	0
Sleeping Giant	0	0	0	0	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4
Spokane Creek	0	0	0	0	0	0	0.4	0	0	0	0.4	0
Total	0	5	5	2.7	11.4	25.6	27.9	18.8	11.4	30.6	32.9	21.5

miles of fish bearing streams would be included in the Sleeping Giant ACEC under this alternative. Alternative A would provide the fewest miles of aquatic habitat protected under ACEC designations of all alternatives. Alternative A would follow the existing Sleeping Giant ACEC Management Plan. This plan would not allow active restoration of riparian areas or streams. The action alternatives, however, would modify the Sleeping Giant Management Plan to allow for aquatic habitat restoration, when necessary.

Four river segments, Upper Big Hole, Missouri River, Moose Creek, and Muskrat Creek were found to be eligible for Wild and Scenic Rivers but would not have a final determination under Alternative A. These rivers/streams would be managed to maintain Outstandingly Remarkable Values indefinitely under Alternative A.

All alternatives would have one stipulation to lessen the effects of oil and gas development on fish (stipulations that affect special status fish species are described under “Special Status Species”). Under Alternative A, this stipulation would be NSO within 1,000 feet on either side of streams with Class 1 fisheries.

With a NSO of 1,000 feet, approximately 10,000 acres adjacent to Class 1 fisheries streams would have some level of protection from loss of riparian habitat, sedimentation, and chemical spills in the Decision Area.

Class 1 fish streams are found in three of the five areas with the most potential for oil and gas exploration and development (Sleeping Giant, Canyon Ferry, and Livingston).

The Sleeping Giant area is located north of Helena and is approximately 47,000 total acres of subsurface and surface ownership with roughly 22,000 acres of BLM ownership. Approximately 330 acres in the Sleeping Giant area along the Missouri River would be protected with the 1,000 foot NSO for Class 1 fisheries.

The Canyon Ferry area is located in and around the town of Townsend and is the largest area with potential for oil and gas development. This area has approximately 51,000 acres of subsurface and surface ownership. Approximately 35,000 acres of BLM lands (surface) have some potential for oil and gas exploration and development with the majority of the acres located within the National Guard Firing Range. Approximately 113 acres in the Canyon Ferry area along the Missouri River would be protected with the 1,000 foot NSO for Class 1 fisheries.

The Livingston area is located immediately east of the town of Livingston and is approximately 8,450 acres of subsurface and surface ownership. There are approximately 1,600 acres of BLM lands (surface) in this area. Approximately 370 acres in the Livingston area along the Yellowstone River would be protected with the 1,000 foot NSO for Class 1 fisheries.

In the five areas with the most potential for oil and gas development, approximately 813 acres of Class 1 fisheries stream and riparian habitat would have some level of protection from loss of riparian habitat, sedimentation and chemical spills in the Decision Area. However, Alternative A would potentially provide less protection than Alternatives B and C (wider areas in NSO) but would be more protective than Alternative D (CSU).

Effects Common to Action Alternatives

Under all action alternatives, there would be an emphasis on protecting and restoring riparian areas and wetlands. All action alternatives would emphasize maintaining diverse, healthy, productive, well-distributed aquatic habitats and communities to increase populations of native fish and other aquatic species.

All programs would move towards meeting Land Health Standards. Implementation of Land Health Standards would maintain or move towards well rooted vegetation to stabilize streambanks, reduce soil erosion, and provide shade and structure.

Vegetation restoration treatments would mimic natural disturbance regimes and create vegetative communities that would be resilient to unnatural occurrences of insects, disease, and fire. This would protect riparian and aquatic habitats from the effects of uncharacteristically large disturbances, restore habitat features, and create a diversity of habitat conditions.

Management of riparian areas would provide the amount and distribution of large woody material characteristic of natural aquatic and riparian habitats. Riparian and wetland areas would be assessed and monitored for proper functioning condition. When streams are not “properly functioning”, management activities would be changed or restoration conducted (when possible) to improve the long-term functioning condition of the stream and/or riparian habitat.

BLM would coordinate with FWP to reintroduce locally or regionally absent species, such as beaver. The reintroduction of beaver would provide a beneficial effect to fish and aquatic resources by creating deep pools, creating larger riparian areas behind dams, adding more water storage potential and providing greater flood protection (through an increase in the width of the riparian zone capable of storing water).

Maintaining existing water rights, monitoring water quality, and participating in the development of TMDL plans would protect and restore water quality for a wide variety of aquatic species.

Although exploration and mineral activities would take all practical measures to maintain, protect, or minimize disturbances to resources, aquatic habitat could be slightly to severely impacted by these types of activities. Effects would be the same as discussed under “Effects Common to All Alternatives.”

Effects of Alternative B

Riparian Management Zones (RMZs) would be established for this alternative that would be wider than SMZs under Alternatives A and D, but narrower than RMZs under Alternative C (**Table 4-9**). These zones would differ in width by forested and non-forested habitat, stream type (fish-bearing, perennial or intermittent) and range from 50 feet (intermittent streams) to approximately 160 feet for fish-bearing streams (based on the height of two site potential trees) on either side of the stream. A site potential tree in the Butte Field Office is considered to have an average height of 80 feet. Riparian Management Zones would provide more protection to fish and aquatic resources than SMZs alone by restricting more management activities in larger areas adjacent to streams and by requiring management activities to restore or maintain riparian and stream function.

As **Table 4-10** indicates, Alternative B would have approximately 5,312 acres where the emphasis would be on riparian goals and objectives. The RMZs under this alternative would benefit riparian and stream communities more than SMZs under Alternatives A and D. Alternative B would have approximately 6,000 fewer acres in RMZs than Alternative C. The Upper Missouri and Big Hole watersheds would have the most acreage in RMZs under Alternative B (2,330 and 1,440 acres, respectively)(**Table 4-10**).

Riparian Management Zones under Alternative B would provide more riparian protection than under Alternatives A or D, but less than half the protection provided under Alternative C (**Table 4-9** and **Table 4-10**). Alternative B would allow management in RMZs to restore or enhance riparian communities and stream systems. There would be fewer negative effects from an increase in fine sediment and nutrients and a loss of large woody material with Alternative B than with Alternatives A and D. RMZs under Alternatives B and C would have similar effects in protecting streambank stability, shade, input of organic matter and woody material to streams for fish bearing streams. Since Alternative B has a narrow RMZ compared to Alternative C for perennial non-fish bearing streams (80 vs. 150 feet) there would be more potential for increases in fine sediment and loss of large woody material in these systems under Alternative B compared to Alternative C. Since Alternative C extends RMZs further from streams, more habitats for species that depend on both the aquatic and terrestrial ecosystems, such as amphibians, would be protected, enhanced, or restored.

Under Alternatives B and D, firewood cutting (of dead and down material less than 24 inches DBH) would be restricted adjacent to perennial and intermittent streams. This would maintain all snags and down trees within 100 feet of perennial and 50 feet of intermittent streams to protect large woody material. Alternatives B and D would provide more retention of woody material from

firewood cutting in riparian areas compared to Alternative A, but less than under Alternative C.

Under Alternative B, up to 700 acres per decade of riparian vegetation could be actively restored or enhanced using a variety of treatment methods to reduce conifer encroachment, reduce noxious weeds, and promote vegetation diversity and vigor. Unlike Alternatives A and C, Alternative B would emphasize restoration or maintenance of aspen and cottonwood stands. Improvements to riparian vegetation would benefit fish and other aquatic organisms by stabilizing stream banks, reducing sediment delivery, increasing woody material, and providing desired water temperatures. Short term, minor effects, such as an increase of fine sediment, could occur during or immediately following riparian restoration activities. However, the long-term benefits to riparian and stream communities should outweigh the short-term effects. Alternative B would restore more riparian vegetation, including aspen stands, than Alternatives A and C but less than Alternative D.

Under Alternative B, there would be a schedule for enclosure maintenance but there would be no guarantee that enclosures would be in a functioning condition before annual livestock turn-out. This could result in damage and degradation of instream habitats, riparian areas, springs, as well as unique habitat types from cattle or other livestock use. Damage to instream and riparian habitats could be expected when enclosures are not maintained. The effects to riparian and stream habitats from livestock grazing would be the same as described under "Effects Common to All Alternatives." Alternative B would restore more acres of grasslands, shrublands, and forests and would have greater beneficial effects on overall watershed function than Alternatives C and A. Alternative B would restore fewer acres of vegetation than Alternative D. Although the long-term beneficial effects on watershed function could be less with Alternative B compared to Alternative D, there could be a greater amount of short-term adverse effects with the implementation of Alternative D.

Alternative B would allow timber salvage to occur outside of riparian areas. This alternative would maintain contiguous acres of undisturbed standing and down woody material. The management of dead and dying forests under Alternative B would provide protection to watershed function by maintaining blocks of undisturbed areas with down woody material and by restricting road construction. This would minimize sediment delivery and run-off to streams.

Assuming that the high end of the range of proposed weed treatments is implemented under any alternative, this alternative would restore the vigor, diversity, and distribution of riparian vegetation by reducing more acres of noxious weeds than Alternatives A and C but less than Alternative D. Although some new permanent roads would be allowed to be built for long-term forest management and mineral entry, both permanent and

temporary road construction would be kept to a minimum. Temporary roads would be decommissioned within one year of use. Alternatives B and C would protect streams and aquatic organisms from the detrimental effects of roads by; minimizing road locations in riparian areas, minimizing sediment delivery from road surfaces, outcropping road surfaces and minimizing disruption of natural hydrologic flow paths.

Managing for low road densities (less than 1 mi/mi²) in big game winter range and grizzly bear distribution and managing for blocks of unroaded areas for elk security habitat would also improve overall watershed function as well as riparian and stream functions.

Since Alternative B would allow less livestock grazing than Alternatives A and D, this alternative could protect more riparian acres from the negative effects of livestock grazing (as described under “Effects Common to All Alternatives”) than with Alternatives A and D. Because livestock grazing would be allowed on more acres than Alternative C, there would be more risk of impacts to riparian areas under Alternative B compared to Alternative C.

Unlike Alternative A, delivery of chemical retardants to perennial or fish bearing streams would be avoided during wildland fire suppression under Alternative B. Fire retardants can be lethal to aquatic organisms or result in decreases in species richness and diversity. Fish screens would be required under Alternatives B and C when using hoses to remove water in fish bearing streams during fire suppression activities. This would prevent direct mortality to fish.

As **Table 4-11** indicates, ACEC designations under Alternative B would have 30.6 miles of fish bearing streams. Alternative B would have a similar number of miles as Alternative C but would provide 19.2 more miles of fish bearing stream than Alternative A and 9.1 miles more than Alternative D. The ACEC designations under Alternative B would guarantee continued or additional protection to fish and other aquatic species by maintaining or restoring riparian and instream habitats and by protecting or restoring habitat at the landscape scale (reducing road density or restoring upland vegetation).

Two river segments would be recommended for inclusion in the National Wild and Scenic Rivers System; Muskrat Creek and the Missouri River below Hauser Dam. The goal of the Wild and Scenic River System is to preserve the character of rivers, ensure that rivers remain free flowing, and protect outstandingly remarkable values (ORVs). The ORV identified for Muskrat Creek was its restored population of westslope cutthroat trout while the ORVs for the Missouri River were identified as recreation (including recreational fisheries), scenic, and wildlife values. Unlike Alternative A, Alternative B would not protect ORVs for Moose Creek and the Upper Big Hole River because these two segments

would not be recommended as suitable under this alternative.

All alternatives would have one stipulation to lessen the effects of oil and gas development on fish (stipulations that effect special status fish species are described under “Special Status Species”). Under Alternative B, this stipulation would be NSO within 0.5 mile of streams with Class 1 fisheries. With a NSO of 0.5 mile, approximately 30,500 acres adjacent to Class 1 streams would be protected from loss of riparian and stream habitat and chemical spills in the Decision Area.

Class 1 fish streams are found in three of the five areas with the most potential for oil and gas exploration and development (Sleeping Giant, Canyon Ferry, and Livingston).

Approximately 1,300 acres in the Sleeping Giant area along the Missouri River would be protected with the 0.5 mile NSO for Class 1 fisheries. This would be approximately 1,000 acres more than under Alternative A.

Approximately 750 acres in the Canyon Ferry area along the Missouri River would be protected with the 0.5 mile NSO for Class 1 fisheries. This would be approximately 600 acres more than under Alternative A.

Approximately 700 acres in the Livingston area along the Yellowstone River would be protected with the 0.5 mile NSO for Class 1 fisheries. This would be approximately 300 acres more than under Alternative A.

In the five areas with the most potential for oil and gas development, approximately 2,750 acres of Class 1 fisheries stream and riparian habitat would have some level of protection from loss of riparian and stream habitat and chemical spills. Since Alternative B would have more acres protected under a NSO, this alternative would provide more protection than Alternatives A and D, but less than Alternative C.

Effects of Alternative C

Like Alternative B, Alternative C would also establish additional protection to streams through Riparian Management Zones (RMZs). However, these RMZs would be wider under Alternative C than under Alternative B. These zones would differ in width by forested and non-forested habitat, stream type (fish-bearing, perennial or intermittent) and range from 50 feet for intermittent streams to 300 feet for fish bearing streams on either side of the stream (**Table 4-9** and **Table 4-10**). Riparian Management Zones under Alternative C would provide the most acreage where the management goals and objectives would be maintenance, restoration, and/or protection of riparian and stream habitats and functions of all alternatives (11,393 acres) (**Table 4-10**). This would be 53 percent more acres than under Alternative B and 70 percent more acres than under Alternatives A and D. The Upper Missouri and Big Hole watersheds would have the most acreage in RMZs (5,244 and 2,904 acres, respectively) under Alternative C.

This alternative would provide the most protection of all alternatives for fish and other aquatic organisms by only allowing activities in riparian areas that would restore or maintain riparian and stream habitats and functions. The width of these RMZs would ensure that the introduction of fine sediment would be negligible and the delivery of large woody material and organic matter would be maximized.

Under this alternative, certain management activities would be limited and only allowed when maintaining or restoring riparian and stream functions. No commercial product removal would be allowed but material could be used for restoration of other riparian or upslope habitats. Unlike the other action alternatives, Alternative C would emphasize “passive” restoration of riparian habitat, including aspen clones. Up to 200 acres of riparian vegetation could actively be restored per decade with this alternative (more could be done through other projects). Because restoration activities could occur in riparian areas and in streams, there could be short-term adverse effects to aquatic organisms from fine sediment or runoff but these effects would be anticipated to be negligible to minor. Alternative C would not actively restore as many acres of riparian habitats or miles of stream compared to Alternatives B and D.

Under Alternative C, firewood cutting would only be allowed in designated areas and no trees >20 inches DBH would be removed. Alternative C would designate the removal of firewood in areas to meet other resource objectives, such as the removal of conifer encroachment in aspen stands. This alternative would ensure that the most down woody material would be available to streams and riparian areas of all alternatives.

Alternative C would also emphasize “passive” restoration in upland vegetation. Due to this, Alternative C would actively restore the fewest acres of grasslands, shrublands, and forest habitats of all alternatives. Although short-term adverse effects would be the lowest under this alternative, this alternative could be the least effective at restoring overall watershed and stream functions.

Fewer acres of riparian vegetation would be treated to remove noxious weeds under Alternative C than under Alternatives B and D, but more than under Alternative A. Unlike all other alternatives, this alternative would not allow aerial application of herbicides. This would protect untargeted riparian vegetation more than the other alternatives but could also impede minimizing noxious weeds in riparian and upslope habitats that could ultimately lead to a decline of riparian and stream health and function.

As with Alternative B, the extent of timber removal with timber salvage projects would be restricted, but Alternative C would require the largest blocks (acres) of dead and dying forest be retained of all alternatives. Alternative C would provide the greatest protection to overall

watershed function of all alternatives by maintaining the most down woody material and existing regenerating vegetation and by preventing soil disturbance and loss of microsites.

Under Alternative C, no new permanent roads would be constructed and temporary roads would be kept to a minimum and decommissioned after use. Road design criteria (same as Alternative B) would minimize disturbance in riparian areas, minimize sedimentation, and maintain natural flow regimes. Unlike all other alternatives, this alternative would require stream crossings to be able to withstand 100-year storm events, thus providing more protection to fish habitat in this context than the other alternatives.

Alternative C would reduce road densities in big game winter range and grizzly bear distribution more than all other alternatives. Managing for low road densities for wildlife would also contribute to Alternative C having the lowest overall road densities and greatest benefits to watershed function.

During wildland fire suppression, chemical retardants would only be used if there is a risk to human life and safety. This would protect aquatic organisms from direct mortality due to fire retardants and maintain species richness and diversity during wildland fires more than under the other alternatives.

As with Alternative B, fish screens would be used when removing water from streams during fire suppression to prevent direct mortality of fish.

Alternative C would potentially protect the most acres of riparian and stream habitats by allowing the fewest acres of livestock grazing. The effects to fish and aquatic resources from livestock grazing as described in “Effects Common to All Alternatives” would be less under Alternative C than all other alternatives.

Unlike Alternatives B and D, Alternative C would guarantee enclosures are maintained annually and before livestock turn-out. Although the other action alternatives would provide a maintenance schedule for enclosures, there would be no guarantee under Alternatives B and D that enclosures would be in a functioning condition before annual livestock use. Alternative C is the only alternative that would ensure protection of streams, riparian vegetation, and springs from livestock use. Damage to instream and riparian habitats could be expected when enclosures are not maintained. As **Table 4-11** indicates, ACECs under Alternative C would contain 32.9 miles of fish bearing stream. Although very similar to Alternative B, this alternative would protect the most mileage of fish bearing streams of all alternatives. Like Alternative B, the ACEC designations would guarantee continued or additional (in the case of the Elkhorn ACEC) protection to fish and other aquatic organisms by maintaining or restoring riparian and instream habitats and by protecting or restoring habitat at

the landscape scale (reducing road density or restoring upland vegetation).

Alternative C would have the most river segments recommended for inclusion under the National Wild and Scenic River System: Muskrat Creek, Moose Creek, Upper Big Hole, and Missouri River. Unlike the other alternatives, Moose Creek and the Upper Big Hole would also be protected from management activities that could change the outstanding and remarkable value of these river segments. Alternative C would provide protection to cutthroat trout in Moose Creek and Arctic grayling in the Upper Big Hole.

Alternative C would have the least negative impacts of all alternatives to fish and aquatic resources from mineral activities by not allowing new structures or roads within RMZs.

All alternatives would have one stipulation to lessen the effects of oil and gas exploration and development on fish (stipulations that effect special status species are described under “Special Status Fish Species”). Under Alternative C, this stipulation would be a NSO within 1 mile of streams with Class 1 fisheries. With a NSO of 1 mile, approximately 62,000 acres adjacent to Class 1 streams in the Decision Area would have a high level of protection from loss of riparian habitat, sedimentation to streams and from chemical spills.

Class 1 fish streams are found in three of the five areas with the most potential for oil and gas development (Sleeping Giant, Canyon Ferry, and Livingston).

Approximately 3,300 acres in the Sleeping Giant area along the Missouri River would be protected with the 1 mile NSO for Class 1 fisheries. This would be approximately 3,000 acres more than under Alternative A and 2,000 more acres than Alternative B.

Approximately 3,200 acres in the Canyon Ferry area along the Missouri River would be protected with the 1 mile NSO for Class 1 fisheries. This would be approximately 3,100 acres more than under Alternative A and 2,450 more acres than Alternative B.

Approximately 1,400 acres in the Livingston area along the Yellowstone River would be protected with the 1 mile NSO for Class 1 fisheries. This would be approximately 1,000 acres more than under Alternative A and 700 acres more than Alternative B.

In the five areas with the most potential for oil and gas development, there would be roughly 7,900 acres of Class 1 fisheries stream and riparian habitat with a high level of protection. Since Alternative C would have the most acres under a NSO (1 mile), this alternative would provide the most protection to riparian and stream habitat as well as to overall watershed function of all the alternatives.

Effects of Alternative D

As with Alternative A, riparian areas would only be protected by Streamside Management Zones under Alternative D. The SMZ would be 50 feet on both sides of the centerline of the stream (**Table 4-9**). The SMZ would provide some protection to fish and aquatic organisms and would have the same effects as described under “Effects Common to All Alternatives” and “Effects of Alternative A.”

Alternative D would provide the fewest acres of riparian protection of the action alternatives but the same acreage (3,528 acres) as Alternative A (**Table 4-9** and **Table 4-10**). Since Alternatives D and A would have fewer acres adjacent to streams and wetlands with restrictions on the type and extent of management activities, there would be more negative effects to streams and aquatic species from fine sediment, increased runoff and nutrients, and loss of large woody material compared to Alternatives B and C.

Under Alternative D, up to 1,200 acres per decade of riparian vegetation could be actively restored through mechanical treatments. Alternative D could potentially restore the most acres of riparian habitat of all alternatives. However, since Alternative D would focus on a more narrow area adjacent to streams compared to Alternatives B and C, restoration of riparian areas would not be as effective under Alternative D compared to Alternatives B and C. The treatment of more riparian acres under Alternative D would result in more short-term effects from increased sedimentation and runoff than with the other alternatives.

The effects from firewood cutting in riparian areas would be the same as Alternative B.

Alternative D would restore the most acres of grasslands, shrublands, and forests. Although this would re-establish more historic vegetation conditions and move towards restoring overall watershed health and function, the number of roads and disturbance necessary to conduct vegetation treatments would have more short-term effects than under Alternatives B and C but less than under Alternative A.

Alternative D would maintain blocks of dead and dying forest from timber salvage operations but fewer acres would be maintained than under Alternatives B and C. Of the action alternatives, Alternative D could have the most detrimental effect on watershed, stream and riparian functions due activities associated with salvage harvest such as the loss of regeneration, loss of large woody recruitment and increased sedimentation and runoff to streams.

Alternative D would treat and reduce the most acres of noxious weeds of all the alternatives. This would restore the health and vigor of riparian vegetation on more acres than under all other alternatives. Of the action alternatives, the negative effects due to road construction and

use (as described under “Effects Common to All Alternatives”) would be greatest and the beneficial effects less under Alternative D due to larger acres of vegetation treatments, smaller SMZs, fewer acres with low road density to protect big game winter range and security habitat and fewer roads closed or decommissioned through travel planning. Alternative D, however, would have fewer negative effects and greater beneficial effects than Alternative A. This alternative would also provide road design criteria to minimize impacts in SMZs and to minimize sediment delivery to streams. The road design criteria under Alternative D would be less restrictive and allow more detrimental effects to fish and aquatic habitats than those proposed under Alternatives B and C.

As with Alternative B, wildland fire suppression activities would avoid delivery of retardant to streams but unlike Alternatives B and C, Alternative D would not require fish screens be used when removing water from fish bearing streams (same as Alternative A). This could cause direct mortality of fish, including special status species.

Alternative D would allow the same amount of livestock grazing as under Alternative A and the effects would be the same as those described under “Effects of Alternative A.” Enclosures would not be maintained annually and the potential of livestock damaging riparian and aquatic habitats from non-functioning enclosures would be greater under Alternatives D, B, and A than under Alternative C.

ACEC designations under Alternative D would contain 21.5 miles of fish bearing stream (**Table 4-11**). Alternative D would protect almost 10 miles of additional habitat compared to Alternative A, 9.1 fewer miles than Alternative B, and 11.4 fewer miles than Alternative C.

Unlike Alternatives B and C, this alternative would only protect 2.7 miles of fish bearing stream in the Elkhorn Mountains (11.8 miles under Alternative B and 13.7 miles under Alternative C). The ACEC designations under Alternative D would guarantee continued or additional protection to fish and other aquatic species over Alternative A by maintaining or restoring riparian and instream habitats and by protecting or restoring habitat at the landscape scale (reducing road density or restoring upland vegetation).

Under Alternative D no river segments would be recommended for inclusion in the National Wild and Scenic River System. There would be no benefits to fish and aquatic resources from this designation under Alternative D.

Like Alternative A, this alternative would allow new and existing mineral operations to have support facilities, including roads, in SMZs. Unlike Alternative A, this alternative would require facilities to be removed when no longer necessary. Alternative D would have similar detrimental effects due to mineral exploration and de-

velopment as Alternative A and greater impacts than Alternatives B and C.

All alternatives would have one stipulation to lessen the effects of oil and gas exploration and development on fish (stipulations that effect special status fish species are described under “Special Status Species”). Under Alternative D, this stipulation would be CSU within 0.5 mile of streams with Class 1 fisheries. With a CSU of 0.5 mile, approximately 30,500 acres adjacent to Class 1 streams would have some level of protection from loss of riparian habitat, sedimentation, and chemical spills in the Decision Area.

Class 1 fish streams are found in three of the five areas with the most potential for oil and gas development (Sleeping Giant, Canyon Ferry, and Livingston).

Approximately 1,300 acres in the Sleeping Giant area along the Missouri River would be protected with the 0.5 mile CSU for Class 1 fisheries. Alternative D would have the least amount of guaranteed protection to streams and riparian habitats from oil and gas exploration and development of all the alternatives. Under this alternative, some use and occupancy would be allowed but the type and extent of use would be limited.

Approximately 750 acres in the Canyon Ferry area along the Missouri River would be protected with the 0.5 mile CSU for Class 1 fisheries.

Approximately 700 acres in the Livingston area along the Yellowstone River would be protected with the 0.5 mile CSU for Class 1 fisheries.

In the five areas with the highest potential for oil and gas exploration and development, there would be roughly 2,750 acres adjacent to streams that would have some level of protection. The level of protection under Alternative D would be less than under the other action alternatives because under a CSU, oil and gas exploration and development could occur. Although the type and extent of exploration and development could be modified to protect Class 1 fisheries, under this alternative there could be detrimental effects to streams and riparian habitats from loss of habitat due to exploration, drilling, roads and other activities related to oil and gas development.

SPECIAL STATUS SPECIES

Because of the programmatic nature of the proposed alternatives, qualitative effects from management activities on special status ecosystems are addressed under “Effects Common to All Alternatives.” Some effects may vary due to the degree of an activity such as the amount of vegetative treatments or road closures. These “quantitative” effects are addressed under each alternative. More specific analysis would be required to determine the extent of potential impacts from site specific management actions. This analysis would be completed when a management action is clearly defined.

Proposed management of the following resource programs would have no anticipated impacts to special status species; Air Quality, Paleontology, Cultural Resources, Visual Resources, Economics, and Environmental Justice.

Nearly all the effects identified in the Wildlife and Fish sections would be the same for special status species. For more analyses and discussion on how the proposed treatments would impact wildlife, fish, (including special status species) or plant species within the Decision Area, see their respective sections.

There are approximately 652,194 acres of federal mineral estate lands potentially available for oil and gas exploration and development in the Decision Area. Actual acreages available vary based on proposed stipulations by alternative. In the Decision Area, five areas have been identified with the most potential for oil and gas exploration and development (low to moderate potential overall) where there would most likely be reasonably foreseeable development and drilling activity (**Appendix M**). The five areas are located near the southern Deerlodge Valley, Sleeping Giant, Canyon Ferry, Bozeman, and Livingston. The total area within these five areas is roughly 116,295 acres. Each of the five areas ranges in size from 1,550 to 53,370 acres.

Planning Area-wide, it is estimated that a total of 19 oil and gas wells (not including “step-out” wells) could be drilled, most likely within the five areas with the most potential over 15-20 years, but that only six of the 19 wells would produce oil or gas. A total of seven producing wells (including step-out wells) are forecast to be located on BLM mineral estate lands.

Effects Common to All Alternatives

Wildlife

The effects described under the general “Wildlife” section would apply to special status wildlife in the Decision Area.

All management actions would promote conservation of special status and priority wildlife species and their habitats and emphasize maintaining and supporting healthy, productive, and diverse populations and communities of native wildlife.

The implementation of habitat improvement projects would address declining habitat conditions and aim to stabilize and improve sensitive species’ breeding, foraging and security habitats.

The Management Plan and Conservation Strategies for Sage Grouse in Montana (MSGWG 2005) states that human activities, including flushing birds during nesting and brood rearing by vehicles, could lead to mortality from predation, accidents, or other proximal causes. Disturbance near leks may disrupt breeding and cause birds to abandon traditional breeding sites, or reduce breeding success for that year. Disturbance within nest-

ing areas may cause destruction or abandonment of nests; resulting in no hatch. Management activities in sage grouse habitats would be designed and implemented to be consistent with the National and Montana conservation strategies and guidelines, when appropriate, which would ensure all management activities protect sage grouse as well as habitat for other sagebrush obligate species. Following the National and Montana conservation strategies and guidelines would ensure that all projects would retain sufficient sagebrush densities for sagebrush obligate species, including sage grouse. This, along with the use of timing restrictions, would protect sage grouse breeding, foraging and security habitats. Implementation of the National and Montana conservation strategies and guidelines would have a beneficial effect to sage grouse and other sagebrush dependant species.

Implementation of current and future recovery plans for listed threatened and endangered species would ensure that the BLM is managing these special status species in a manner that is consistent with the Endangered Species Act. The BLM would conserve special status species and the ecosystems that they depend upon and would provide habitat for healthy, productive populations of special status species.

The restorative treatments in dry forest types would mimic natural fire and improve habitat for those special status species dependent on mature, open stands of ponderosa pine and Douglas-fir forests (refer to “Effects Common to All Alternatives” in the general Wildlife section). Over the long-term, treatments would result in greater acres of large, mature trees with open canopies and a diversity of understory grasses, shrubs, forbs and trees. The management of mature dry forests would increase habitat for special status species such as the flammulated owl, northern goshawk, great gray owl, migratory birds, long-eared myotis, long-legged myotis, and fringed myotis by increasing tree size, reducing the density of trees and by providing a snag and down wood component.

Uneven-aged management within cool, moist forests would focus on reduction of stem density and creating small openings that would be beneficial to many of the special status species that occur in this vegetation community. Creation of small openings would increase vegetation diversity and available forage, especially for species such as the Canada lynx. Cool forests would also be thinned, when necessary, to promote old forest characteristics and provide habitat diversity. This would improve forage and breeding habitat for special status species such as the northern goshawk, lynx, grizzly bear, and wolverine.

Reduction in tree densities and restoration of forest habitats would move vegetation towards historic conditions and increase the quality and quantity of breeding, foraging and hiding cover for a variety of special status species. Short-term disturbance and displacement of

special status species could occur during project implementation and treated areas may be temporarily avoided. However, it is expected that the long-term benefits to a wide variety of species from restoring vegetative communities would outweigh the short-term negative effects.

A change in vegetation density could reduce the amount of habitat available for certain species while increasing habitat for others. During project planning, the effects of treatments at the landscape scale would be addressed to determine the change in habitats, special status species affected, short and long-term effects to species and their habitats, the percent of habitat change across the landscape and which special status wildlife species would benefit or be negatively impacted from treatments.

The use of commercial and non-commercial timber harvest to meet vegetation restoration goals and objectives would benefit special status species dependent on forest habitats by improving habitat and restoring diversity.

Reducing the amount of forest subject to severe, uncharacteristic wildfire events as well as epidemic outbreaks of insects and disease would reduce the loss of large areas of habitat. Epidemics of insects and disease can have long-term negative impacts to some species while those species dependent on dead and dying forests, such as black-backed and three-toed woodpeckers, would benefit from increased foraging and breeding habitat.

Timber salvage would result in the loss of habitat for special status species that depend on dead and dying forests. Maintaining patches of dead and dying forest would help to retain habitat features for these species but the effects to snag dependant species would vary greatly depending on the size of patches remaining after salvage. The negative effects to breeding and foraging habitats used by special status wildlife species from timber salvage could be minor to major and long-term.

Treatment of grasslands and shrublands to create pre-fire suppression conditions, with an emphasis on reducing conifer encroachment, would restore and maintain habitat for the golden eagle, Brewer's sparrow, Swainson's hawk, ferruginous hawk, sage grouse, pygmy rabbit, sage thrasher, sage sparrow, mountain plover, long-billed curlew and black-tailed prairie dog (see "Wildlife Effects Common to All Alternatives"). Short-term disturbance and displacement could occur during project implementation and treated areas may be temporarily avoided. However, it is expected that the long-term benefits to a wide variety of special status species from restoring grasslands and shrublands would outweigh the short-term negative effects.

The effects of riparian treatments and management would be the same as described in "Effects Common to All Alternatives" in the general Wildlife section. Because of the unique nature of riparian areas and the crucial habitat they provide, almost all special status wildlife species could be impacted by management of these

areas. By reestablishing native vegetation, reducing conifer encroachment (in non-forested areas) and reducing the effects of livestock grazing in riparian areas, breeding, foraging and hiding habitat along with movement corridors for all special status species would be improved.

Permanent and temporary roads associated with management could increase public access and decrease the quantity and quality of habitat for special status species. Permanent and temporary roads could negatively impact special status species, particularly if roads are open during critical periods such as during the winter in lynx habitat and during the summer within occupied grizzly bear habitat. Roads can encourage the public to recreate in areas that had formerly been secluded. Roads can cause direct mortality through road kill, prevent wildlife movement, create disturbance, cause the spread of noxious weeds, and cause habitat fragmentation across the landscape.

The effects of livestock grazing and noxious weed management on special status wildlife species would be the same as described under "Effects Common to All Alternatives" in the general Wildlife section.

Wilderness Study Areas (WSAs) provide undisturbed habitat that is important for special status species, particularly, species that are sensitive to disturbance and have large home ranges (i.e. grizzly bears, lynx, bald eagle, northern goshawk, and migratory birds). Wilderness Study Areas also provide large blocks of habitat for connectivity and movement corridors for many species.

The Sleeping Giant ACEC provides important habitat for numerous wildlife species. One of the primary objectives of this ACEC is to preserve, protect, and promote wildlife and habitats for "key" species including elk, bighorn sheep, mountain goat, osprey, bald eagle, peregrine falcon, waterfowl, and cold water fish. Continued management of the Sleeping Giant ACEC would ensure that crucial wildlife habitat for the above mentioned species, as well as for other special status species, would be maintained for the long-term.

The implementation of Suggested Practices for Raptor Protection on Power Lines (APLIC 1996) would ensure that impacts, including direct mortality to migratory and resident birds and bats would be avoided. Implementation of wind energy guidelines as defined in the Wind Energy Development Programmatic EIS would also help to protect special status species by minimizing the impacts (such as bird and bat strikes of turbines and associated infrastructure) of wind energy development.

The way bald eagles respond to human activities varies depending on the site, pair, and type of activity. The type, intensity, and proximity of disturbance to occupied habitat all determine how eagles respond.

Where there are priority species or their habitats, special measures may need to be applied to prevent impacts

associated with mineral and geophysical exploration. The effects to special status wildlife species from mineral exploration and development would be the same as described under “Effects Common to All Alternatives” in the general Wildlife section.

Breeding, foraging, security and migration habitats for special status species could be directly lost from oil, gas, and mineral extraction activities due to the construction of wells, well pads, roads, pipelines, powerlines, buildings, and mine sites. Construction and implementation activities could also cause special status species to be displaced, preventing use of previously occupied habitats. Access roads could disturb and displace special status species, especially during critical seasons such as breeding or overwintering. The effects from oil, gas, and mineral development to special status wildlife species could be long-term and major at the site specific scale. However, due to the projected number of wells at the Planning Area scale (31) along with the use of stipulations, the effects from oil and gas development is expected to be minor to moderate in the Planning Area. Effects from hard rock mineral extraction, however, could be long-term and major at the Planning Level Scale depending on the location, the size of development and the extent of time mining occurs.

Oil and gas exploration and development would comply with appropriate stipulations and terms and conditions at the time of leasing. This would help to ensure that impacts to special status species are considered and avoided when possible.

Under all alternatives, there would be 12 stipulations to lessen the effects of oil and gas development on special status species (stipulations that affect wildlife and fish are described under those sections) (Table 4-12). The stipulations would protect special status species to different degrees based on the type of stipulation. A No Surface Occupancy or No Lease stipulation would prevent the loss of breeding, foraging, security and migration habitats as well as prevent any type of disturbance associated with oil and gas development. The more acres within a NSO or NL stipulation, the more overall protection a wildlife species (as well as other species) would have from oil and gas development. When comparing alternatives, those with more acres in NSO or NL would provide the least negative effects to wildlife.

Timing restrictions protect species during the crucial breeding season (such as bald eagles and sage grouse) and/or during the sensitive overwinter season (such as with sage grouse). As with NSO and NL stipulations, when comparing alternatives, the more acres within a timing restriction, the more a species would be protected from disturbance during crucial seasons of use. This should allow a species to reproduce and fledge young and/or increase the chance of surviving the winter season. This stipulation would only be applied during oil and gas exploration and habitat loss could still occur for those species with timing stipulations.

Controlled Surface Use (CSU) could provide the least protection to special status species because facilities associated with oil and gas exploration and development could replace habitat. Timing restrictions and surface use would vary by alternative.

Fish

The effects described under the Fish section would apply to special status fish in the Decision Area.

All alternatives would emphasize maintaining diverse, healthy, productive, and well distributed aquatic habitats and communities to increase populations of special status fish species.

The BLM would implement recovery and conservation plans for special status fish species. This would ensure that habitat for these species is protected, maintained, or restored. Management or conservation plans are currently in place for westslope cutthroat trout, Arctic grayling, and bull trout.

Plants

Native species are variable in their sensitivity to herbicides based on the type of herbicide applied, stage of growth of the plants, and timing of application. Often noxious weeds are treated early in the year before many native plants are actively growing and most sensitive to herbicide application or in late fall when many native plants are dormant and relatively insensitive to herbicide effects. Treatments of noxious weeds with biological control agents could also affect some native species, usually those most closely related to the species targeted for biological control. There have been incidents where biological control agents have attacked non-target species reducing their vigor and viability. Effects on non-target plants may reduce the densities on treated sites; however, no non-target species would be eliminated from treated sites.

Generally, treatments would promote desirable native species because noxious weeds compete with and displace many native species in infested areas.

Use of prescribed fire, timber harvest, and mechanical methods to create a mosaic of multiple successional stages would open forest canopies thus increasing habitat diversity for special status species.

Field inspections and population monitoring of special-status plants would protect populations by refining grazing management, weed control and other activities that are potentially damaging to special-status species.

Development of habitat management plans and conservation strategies for special-status plants would help maintain population viability and reduce the probability that management actions would reduce the distribution of desirable populations.

**Table 4-12
Oil and Gas Stipulations and Acres Protected for Special Status Wildlife Species Decision Area-wide and in the
Five Areas of Most Potential for Oil and Gas Development**

Resource	Alternative A	Alternative B	Alternative C	Alternative D
Bald Eagle Nest Site (DA Acres) (5 Area Acres)	NSO ½ Mile 2,600 acres 1,110 acres	NSO ½ Mile 2,600 acres 1,110 acres	NL 1 Mile 9,540 acres 4,330 acres	NSO ½ Mile 2,600 acres 1,110 acres
Bald Eagle Breeding Habitat (DA Acres) (5 Area Acres)	TL 2/1-8/31 (1 Mile) 9,500 acres 3,150 acres	TL2/1-8/31 (1 Mile) 9,500 acres 3,150 acres	NL 1 Mile Same Area covered as Bald Eagle Nest Sites	TL 2/1-8/31 (1 Mile) 9,500 acres 3,150 acres
Ferruginous Hawk Breeding Territories (DA Acres) (5 Area Acres)	NSO ¼ Mile 0 0	NSO ½ Mile 0 0	NSO ½ Mile TL 3/1-8/31 (1 Mile) 0 0	TL 3/1-7/31 (1 Mile) 0 0
Peregrine Falcon Nest Sites (DA Acres) (5 Area Acres)	NSO ¼ Mile 240 acre 11 acres	NSO 1 Mile 3,820 acres 90 acres	NL 1 Mile 3,820 acres 90 acres	NSO 1 Mile 3,820 acres 90 acres
Other Raptor Nest Sites (DA Acres) (5 Area Acres)	NSO ¼ Mile 2,200 acres 460 acres	TL 3/1-7/31(1/2 Mi.) 7,400 acres 1,830 acres	NL ½ Mile 7,400 acres 1,830 acres	SLT
Prairie Dog Towns (DA Acres) (5 Area Acres)	NSO ¼ Mile 0 acres 0 acres	NSO 0 acres 0 acres	NSO 0 acres 0 acres	NSO 0 acres 0 acres
Sage Grouse Leks (DA Acres) (5 Area Acres)	NSO 500' 0 0	NSO ¼ Mile 0 0	NL ½ Mile 0 0	NSO ¼ Mile 0 0
Sage Grouse Breeding Habitat (DA Acres) (5 Area Acres)	TL 3/1-6/30(1/2 Mile) 0 0	TL 3/1-6/30 (3 Miles) 2,800 0	NSO 3 Miles 2,800 0	TL 3/1-6/30 (3 Miles) 2,800 0
Sage Grouse Winter/Spring Range (DA Acres) (5 Area Acres)	TL 12/1-5/15 67,000 acres 43 acres	TL 12/1-5/15 67,000 acres 43 acres	NL 67,000 acres 43 acres	TL 12/1-5/15 67,000 acres 43 acres
Gray Wolf Den/Rendezvous Sites (DA Acres) (5 Area Acres)	CSU 1 Mile 700 acres 0 acres	TL 4/15-6/30 (1 Mile) 700 acres 0 acres	NSO 1 Mile 700 acres 0 acres	CSU 1 Mile 700 acres 0 acres
Grizzly Bear Recovery Zone (DA Acres) (5 Area Acres)	CSU 7,400 acres 0 acres	NSO 7,400 acres 0 acres	NSO 7,400 acres 0 acres	CSU 7,400 acres 0 acres
Grizzly Bear Distribution Zone (DA Acres) (5 Area Acres)	CSU 54,000 acres 4,000 acres	TL 4/1-6/30 TL 9/15-10/15 54,000 acres 4,000 acres	NSO 54,000 acres 4,000 acres	CSU 54,000 acres 4,000 acres

Leasing solid and fluid minerals and geothermal resources, and mineral exploration and development could lead to disturbances and removal of special-status species during exploration and development.

Field inspections prior to authorized surface disturbing activities would reduce the possibility of special status plant habitat or population loss.

Oil and gas controlled surface use leasing restrictions would protect special status plant habitat in all alternatives.

Effects of Alternative A

Wildlife

Vegetation types within the Decision Area are represented by grassland, shrubland, dry forest, wet forest, and riparian. Dry forest is the most dominant forest type and represents 38 percent (115,000 acres) of all vegetation communities. Dry forests are currently well outside the historic average of natural variability due to fire suppression and heavy historic grazing. The effects on special status wildlife species from treatments under Alternative A in dry forest would be the same as described under “Effects of Alternative A” of the general Wildlife section. Alternative A would have fewer benefits from restoring dry forest habitats for migratory birds, northern goshawk, flammulated owl, long-legged myotis, long-eared myotis, and fringed myotis in comparison to Alternatives B and D, but would restore more acres than Alternative C.

Cool, moist forest comprises only about 7 percent (20,200 acres) of the total amount of vegetation in the Decision Area and is close to being within the range of natural variability. The effects on special status wildlife species from treatments under Alternative A in cool, moist forest habitats would be the same as described under “Effects of Alternative A” in the general Wildlife section. Alternative A would have fewer benefits from treatments in cool, moist forests for migratory birds, lynx, fisher, wolverine, and bats species in comparison to Alternatives B and D, but would restore more acres than Alternative C.

Alternative A provides no retention guidelines or recommendations for restoration of snag and down woody habitat (described under “Effects of Alternative A” in the general Wildlife section). This alternative could result in a decline of habitat for those special status species (black-backed and three toed woodpeckers, long-eared myotis and long-legged myotis) dependent upon dead and dying trees for breeding, foraging or denning habitat, and could have major and long-term negative effects. The lack of restrictions on maintaining or restoring snag and down woody habitats could have long-term detrimental effects on a variety of special status species that use these habitats.

Grassland vegetation represents approximately 45 percent of the total available habitat in the Decision Area. Sagebrush shrublands only represent roughly 7 percent of the total available habitat within the Decision Area but provide crucial habitat for sagebrush obligate species. The quality and quantity of grasslands and shrublands is declining due to fire suppression and heavy historic livestock grazing.

Under Alternative A, the effects on special status wildlife species from treatments in grasslands and shrublands would be the same as described under “Effects of Alternative A” in the general Wildlife section. Alternative A would have fewer beneficial effects from restoring grasslands and shrublands (Alternative A would not propose restoration of sagebrush shrublands) for migratory birds, golden eagle, ferruginous hawk, Swainson’s hawk, long-billed curlew, Brewer’s sparrow, mountain plover, sage grouse and pygmy rabbit in comparison to Alternatives B and D, but would restore more acres and have more benefits than Alternative C.

Noxious weed management would have minimal negative impacts on special status species but could provide substantial beneficial effects. The effects on special status wildlife species from noxious weeds would be the same as described under “Effects of Alternative A” in the general Wildlife section. Fewer acres of noxious weeds would be treated under Alternative A compared to Alternatives B and D but more than Alternative C. This could result in more loss of habitat for special status species under Alternative A than Alternatives B and D but less loss of habitat than under Alternative C.

Under Alternative A, the implementation of the Streamside Management Zones (SMZs) would result in smaller areas of riparian habitat being managed for the benefit of riparian habitats than under Alternatives B and C but the same as Alternative D. Smaller riparian management areas proposed under Alternatives A and D, along with the types and extent to management activities allowed in SMZs, could reduce breeding, brood rearing and foraging habitat as well as reduce the quality and quantity of movement corridors for the majority of special status species. The effects would be the same as described under “Effects Common to All Alternatives” and “Effects of Alternative A” in the general Wildlife section. Alternative A would also actively restore the least amount of riparian vegetation in comparison to the action alternatives. Riparian areas provide crucial habitat and critical travel corridors for special status species found in the Decision Area including but not limited to; grizzly bears, lynx, migratory and resident birds, raptors, bats and boreal toads.

Alternatives A and D would not utilize timing restrictions to protect breeding migratory and resident birds during prescribed burning or mechanical treatments. Because prescribed burning and mechanical treatments could occur during the breeding season, these alterna-

tives could have the greatest loss of migratory and special status resident.

There would be substantially more miles of open roads under Alternative A compared to the action alternatives. The effects of roads on special status species would be the same as described under “Effects Common to All Alternatives” and “Effects of Alternative A” in the general Wildlife section. High open road densities under Alternative A could result in the loss of year-round habitat and migration corridors, disturbance and displacement of wildlife, road kill and fragmentation of habitat. Special status species that are especially sensitive to roads include (but are not limited to) grizzly bear, lynx, wolverine and some raptors. The detrimental effects of open road densities to special status species under Alternative A could be minor to major and long-term.

High densities of open roads can impact the quality and quantity of grizzly bear habitat. Research has indicated that grizzly bears underutilize habitat near roads and other human activities (Mace et al. 1996; McLellan and Shackleton 1989). Restricting motorized access can aid in minimizing negative impacts on bears related to disturbance and interactions with humans. Under Alternative A, road densities within occupied grizzly bear habitat of the Lewis and Clark County NW TPA in both the Planning and Decision Areas would be higher than under the action alternatives. Alternative A would have the least amount of closed roads compared to the action alternatives and would have the most negative effects to occupied grizzly bear habitat of all the alternatives. See the Wildlife discussion in the Lewis and Clark County NW TPA section later in this chapter for more details.

The negative effects related to mineral development, including oil and gas, would be the same as described under “Effects Common to All Alternatives” and “Effects of Alternative A” in the general Wildlife section.

All alternatives would have 12 stipulations to lessen the effects of oil and gas development on special status species (stipulations that affect wildlife are described in the general “Wildlife” section) (Table 4-12).

Under Alternative A, these stipulations would include: NSO around bald eagle nests, peregrine falcon nests, other raptor nests, and sage grouse leks; timing restrictions in bald eagle breeding habitat and sage grouse winter, spring and breeding habitat; and controlled surface use in grizzly bear habitat and around gray wolf den sites. A No Surface Occupancy stipulation would prevent the loss of breeding, foraging, security and migration habitats as well as prevent any type of disturbance associated with oil and gas development. The more acres within a NSO stipulation, the more overall protection a wildlife species (as well as other species) would have from oil and gas development. When comparing alternatives, those with more acres in NSO provide the least negative effects to wildlife. Timing restrictions protect species during the crucial breeding season (such as bald

eagle and sage grouse) and/or during the sensitive over-winter season (such as with sage grouse). As with NSO stipulations, when comparing alternatives, the more acres within a timing restriction, the more a species is protected from disturbance during crucial seasons of use. This stipulation is only for oil and gas exploration and habitat loss could still occur for those species with timing stipulations.

There are approximately 652,194 acres of federal mineral estate lands in the Decision Area. In the Decision Area, five areas have been identified with the most potential for oil and gas exploration and development (low to moderate potential overall) where there would most likely be reasonably foreseeable development and drilling activity (Appendix M). The five areas are located near the southern Deerlodge Valley, Sleeping Giant, Canyon Ferry, Bozeman, and Livingston. The total area within these five areas is roughly 116,295 acres. Each of the five areas ranges in size from 1,400 to 50,600 acres.

The southern Deerlodge Valley area located north of Anaconda has approximately 8,700 acres of federal mineral estate with no BLM surface ownership within the area. There is currently one known bald eagle nest in this area but this nest is well outside of federal mineral estate lands. There are no known ferruginous hawk, peregrine falcon, or other raptor breeding territories in this area. There are no known sage grouse leks, sage grouse habitat, or prairie dog towns in this area. This area is not within the distribution or recovery zone of the grizzly bear and there are no known gray wolf den sites.

The Sleeping Giant area is located north of Helena and is approximately 47,000 total acres of federal mineral estate, of which approximately 22,000 acres are BLM surface lands. Currently, there are eight known bald eagle nests sites in this area and approximately 740 acres would be protected with a NSO stipulation. An additional 1,750 acres beyond the 0.5 mile bald eagle nest NSO would have a 2/1–8/31 timing restriction. There are no known ferruginous hawk breeding territories, sage grouse leks, sage grouse habitat, or prairie dog towns in this area. There is one known peregrine nest site in the vicinity but it is outside of federal mineral estate lands. Other raptor breeding territories (such as golden eagles) in the Sleeping Giant area would be protected with approximately 340 acres in a NSO stipulation with approximately one-half of these acres overlapping with the bald eagle stipulations. Approximately 2,600 acres are within the distribution of grizzly bear and would be protected with a CSU stipulation. Under a CSU, there could be exploration and development but with some restrictions. There are no known gray wolf den sites in this area.

The Canyon Ferry area is located in and around the town of Townsend and is the largest area with potential oil and gas development with approximately 51,000 acres of federal mineral estate. Approximately 35,000 acres of BLM lands (surface) have the potential for oil and gas development with the majority of the acres located in the

National Guard Firing Range. Currently, there are six known bald eagle nests in this area and approximately 330 acres would be protected with a NSO stipulation. An additional 1,100 acres beyond the 0.5 mile bald eagle nest NSO would be protected with a 2/1–8/31 timing restriction. There are no known ferruginous hawk nests, peregrine falcon breeding territories, sage grouse leks, sage grouse habitat, or prairie dog towns in this area. Other raptor breeding territories in the Canyon Ferry area would be protected with approximately 125 acres in a NSO stipulation. The area is not within the recovery zone or the distribution of the grizzly bear and there are currently no known gray wolf den sites.

The Bozeman area is located approximately 10 miles east of Bozeman and is approximately 1,400 acres of federal mineral estate. There are no BLM lands (surface) in this area. There are currently no known bald eagle nest sites, ferruginous hawk breeding territories, peregrine nests sites, sage grouse leks, sage grouse habitat, or prairie dog towns in this area. Approximately 1,300 acres are within the distribution of grizzly bear and would be protected with a CSU stipulation. Under a CSU, there could be exploration and development but with some restrictions. There are no known gray wolf den sites in this area.

The Livingston area is located immediately east of the town of Livingston and is approximately 8,450 acres of federal mineral estate. There are approximately 1,600 acres of BLM lands (surface) in this area. Currently, there are four known bald eagle nests in this area and approximately 40 acres would be protected with a NSO stipulation. An additional 300 acres beyond the 0.5 mile bald eagle nest NSO would have a 2/1–8/31 timing restriction. There are no known ferruginous hawk nests, other raptor nest sites, sage grouse leks, sage grouse breeding habitat, or prairie dog towns in this area. There are, however, approximately 43 acres within sage grouse winter and spring habitat that would be protected with a 12/1-5/15 timing restriction. There is one currently known peregrine breeding territory in the Livingston area that would be protected with approximately 11 acres in a NSO stipulation. Approximately 100 acres are within the distribution of grizzly bear and would be protected with a CSU stipulation. Under a CSU, there could be exploration and development but with some restrictions. There are no known gray wolf den sites in this area.

In the Decision Area, there would be 2,600 acres surrounding bald eagle nest sites that would be protected with a NSO stipulation under Alternatives A, B and D (0.5 mile from nest) (**Table 4-12**).

Three of the five areas with the most potential for oil and gas development have bald eagle nest sites (1,110 acres) that would be protected with the 0.5 mile NSO stipulation and an additional 3,150 acres beyond the NSO boundary would be protected with a timing restriction of 2/1-8/31 (Alternatives A, B and D).

Currently, there are no known ferruginous hawk nest sites within the Decision Area (including the five areas with the most potential). When located, Alternative A would protect the fewest acres from habitat loss with a ¼ mile NSO around nest sites compared to Alternatives B and C (1/2 mile NSO).

In the entire Decision Area, there would be 240 acres surrounding peregrine falcon nest sites protected with a NSO stipulation within 0.25 mile of nest sites. Alternative A would protect the fewest acres from habitat loss around peregrine falcon nest sites of all the alternatives. Only one of the five areas with the most potential for oil and gas development currently has a known nest site within surface or subsurface ownership and a total of 11 acres would be protected with a NSO of 0.25 mile surrounding the nest (**Table 4-12**).

In the entire Decision Area, there would be 2,200 acres of other known raptor breeding territories (such as golden eagles) protected with a NSO stipulation (0.25 mile from nest). Alternative A would protect more acres from habitat loss around raptor nest sites than Alternatives B and D. Only two of the five areas with the most potential for oil and gas development currently have other known raptor breeding territories that would be protected with the NSO (460 acres) (**Table 4-12**).

Currently, there are no known active prairie dog towns within the Decision Area (including the five areas with the most potential). When located, all alternatives would protect prairie dog towns with a NSO. When located, Alternative A would protect more habitat around prairie dog towns (for expansion of the town) with a NSO than the Action Alternatives.

Currently, there are no known sage grouse leks within the Decision Area (including the five areas with the most potential). When located, Alternative A would protect substantially fewer acres from habitat loss with a 500' NSO around leks compared to the Action Alternatives.

In the Decision Area there are approximately 67,000 acres within sage grouse winter and spring range that would be protected with a 12/1-5/15 timing restriction. Compared to Alternatives B and D, Alternative A would allow for more disturbance adjacent to sage grouse leks with a ½ mile timing restricting during the breeding season. Alternative A could have more negative effects on the reproductive capability of sage grouse than the Action Alternatives. One of the five areas with the most potential for oil and gas development has a small amount of known sage grouse winter or spring range (43 acres) that would be protected with the timing restriction under Alternative A (**Table 4-12**).

Currently in the Decision Area, there is only one known gray wolf den site. Approximately 700 acres would be protected around this den site with a CSU. Alternatives A and D would not fully protect the area surrounding dens because CSUs allow exploration and development with some limitations. However, none of the five areas

with the most potential for oil and gas development have known wolf den sites.

Decision Area-wide, there are approximately 7,400 acres in grizzly bear recovery areas and 54,000 acres within the range of distribution of grizzly bear that would be protected with a CSU stipulation. Alternatives A and D could protect fewer acres of grizzly bear habitat and could allow for more disturbance to this species than Alternatives B and C. Three of the five areas with the most potential for oil and gas development are within the distribution of grizzly bear (Sleeping Giant and Livingston) and approximately 4,000 acres would have limited protection with a CSU stipulation.

Fish

The effects described under “Effects Common to All Alternatives” and “Effects of Alternative A” in the general Fish section would be the same for special status fish species.

Under Alternatives A and D, riparian areas would only be protected with SMZs of 50 feet for fish bearing and non-fish bearing streams. Effects would be the same as described for Alternative A in the general Fish section. The type and extent of projects that would be allowed in riparian areas under Alternatives A and D would cause more negative effects to special status aquatic species from increased sedimentation, runoff and loss of riparian and instream habitats than under Alternatives B and C.

Of all alternatives, Alternative A would protect the fewest miles of habitat for special status fish (0 miles), associated with designation of ACECs.

All alternatives would have five stipulations to lessen the effects of oil and gas development on special status fish (other stipulations that generally affect fish are described in the general Fish section). Under Alternative A, these stipulations would include No Surface Occupancy (NSO) adjacent to Arctic grayling and westslope and Yellowstone cutthroat trout streams and Controlled Surface Use (CSU) adjacent to bull trout streams (Table 4-13).

In the Decision Area, five areas have been identified with the most potential for oil and gas exploration and development (low to moderate potential overall) where there would most likely be reasonably foreseeable development and drilling activity (Appendix M). The five areas are located near the southern Deerlodge Valley, Sleeping Giant, Canyon Ferry, Bozeman, and Livingston. The total acreage within these five areas is roughly 116,295 acres. Each of the five areas ranges in size from 1,400 to 50,600 acres.

There is no habitat for Yellowstone cutthroat trout and Arctic grayling in the southern Deerlodge Valley and no known habitat for 90-100 percent genetically pure westslope cutthroat trout. Lost Creek, a bull trout stream, flows outside of the southern Deerlodge Valley area but when a CSU stipulation (0.5 mile on either side of stream) is applied, approximately 32 acres adjacent to this stream in subsurface ownership would have some degree of protection in the Deerlodge valley.

There is no habitat for Yellowstone cutthroat trout, Arctic grayling, or bull trout in the Sleeping Giant area and there is no known habitat for 90-99 percent genetically pure westslope cutthroat trout. However, there are approximately 330 acres adjacent to 99-100 percent genet-

Resource	Alternative A	Alternative B	Alternative C	Alternative D
Arctic Grayling (DA Acres) (5 Area Acres)	NSO ¼ Mile 13,000 acres 0 acres	NSO ½ Mile 27,400 acres 0 acres	NSO ½ Mile 27,400 acres 0 acres	CSU ½ Mile 27,400 acres 0 acres
Westslope Cutthroat Trout (90-99 % genetically pure) (DA Acres) (5 Area Acres)	NSO ¼ Mile 800 acres 0 acres	NSO ½ Mile 2,200 acres 0 acres	NSO ½ Mile 2,200 acres 0 acres	CSU ½ Mile 2,200 acres 0 acres
Westslope Cutthroat Trout (99-100 % genetically pure) (DA Acres) (5 Area Acres)	NSO ¼ Mile 4,900 acres 330 acres	NSO ½ Mile 11,000 acres 700 acres	NL ½ Mile 11,000 acres 700 acres	NSO ½ Mile 11,000 acres 700 acres
Yellowstone Cutthroat Trout (DA Acres) (5 Area Acres)	NSO ¼ Mile 2,600 acres 316 acres	NSO ½ Mile 7,100 acres 930 acres	NL ½ Mile 7,100 acres 930 acres	CSU ½ Mile 7,100 acres 930 acres
Bull Trout (DA Acres) (5 Area Acres)	CSU ½ Mile 4,000 acres 32 acres	NSO ½ Mile 4,000 acres 32 acres	NL 1 Mile 9,200 acres 420 acres	NSO ½ Mile 4,000 acres 32 acres

ically pure westslope cutthroat trout streams in this area that would be protected with a NSO stipulation (0.25 mile on either side of the stream) (**Table 4-13**).

There is no habitat for Yellowstone cutthroat trout, Arctic grayling, or bull trout in the Canyon Ferry area and there is no known habitat for 90-100 percent genetically pure westslope cutthroat trout.

There is no habitat for Arctic grayling, bull trout, or habitat for 90-100 percent genetically pure westslope cutthroat trout in the Bozeman area. There would be approximately 3 acres adjacent to streams with Yellowstone cutthroat trout that would be protected with a NSO stipulation (0.25 mile on either side of the stream).

There is no habitat for Arctic grayling, bull trout, or habitat for 90-100 percent genetically pure westslope cutthroat trout in the Livingston area. There would be approximately 313 acres adjacent to streams with Yellowstone cutthroat trout that would be protected with a 0.25 mile NSO stipulation.

None of the five areas with the most potential for oil and gas development have habitat for Arctic grayling (**Table 4-13**). Elsewhere in the Decision Area, there would be 13,000 acres adjacent to streams with Arctic grayling that would be protected with a NSO stipulation under Alternative A (0.25 mile on either side of stream). Alternative A would protect substantially fewer acres adjacent to Arctic grayling streams from development due to oil and gas than Alternatives B and C but more than Alternative D.

Across the Decision Area, there would be 4,900 acres adjacent to streams with 99-100 percent genetically pure westslope cutthroat trout that would be protected with a NSO stipulation under Alternative A (0.25 mile on either side of stream). Alternative A would protect substantially fewer acres adjacent to westslope cutthroat trout (99-100 percent pure) streams from development due to oil and gas than the Action Alternatives.

Across the Decision Area, there would be 2,600 acres adjacent to streams with Yellowstone cutthroat trout that would be protected with a NSO stipulation under Alternative A (0.25 mile on either side of stream). Alternative A would protect substantially fewer acres adjacent to Yellowstone trout streams from development due to oil and gas than Alternatives B and C. Two of the five areas with the most potential for oil and gas development (Bozeman and Livingston) have habitat for Yellowstone cutthroat trout and approximately 316 acres adjacent to these streams would be protected with a NSO stipulation (**Table 4-13**).

Across the Decision Area, there would be 4,000 acres adjacent to streams with bull trout that would have a CSU stipulation under Alternative A (0.5 mile from either side of stream). Alternative A would protect substantially fewer acres adjacent to bull trout streams from development due to oil and gas than Alternatives B and C. One of the five areas with the most potential for oil

and gas development (southern Deerlodge Valley) has habitat for bull trout and approximately 32 acres adjacent to these streams would be protected with a CSU stipulation.

Spills can be a major source of contamination in oil and gas producing areas. Oil partially consists of chemicals that can dissolve in water and exposure to these chemicals by fish and other aquatic species can result in death or disease. During oil and gas development, sediment can also be released into streams and rivers from road building, pipeline development, excavation, and site development. Sediments can increase the amount of stress that fish experience, disrupting feeding, growth, social behavior, and susceptibility to disease. Sediment can fill interstitial spaces and smother fish eggs and affect the survival of juvenile fish (Pembina 2006).

Seismic exploration uses a series of explosions to provide the shock waves necessary for companies to record the location of oil and gas. The detonation of explosives in or near water can damage fish swim bladders (the organ that keeps fish afloat), livers, kidneys, and spleens. The explosions can also change fish behavior and result in chemical and physical changes to aquatic habitat. Byproducts from the detonation of explosives can include ammonia or similar compounds that can be toxic to fish and other aquatic organisms.

The development of roads and other infrastructure to support the operation of oil and gas can also alter habitat, allow for an increase in runoff, and cause a spread in noxious weeds (that can reduce the quality and quantity of riparian vegetation).

Streams, rivers, and wetlands can be severely impacted by oil and gas development due to altered hydrology from changes in surface and subsurface drainage patterns. Soil compaction from construction can result in reduced infiltration rates of precipitation into the soil and groundwater, thereby increasing surface runoff as well as sediment load and potential contaminants to streams. Water removal during drilling or the disposal of produced water may alter the subsurface hydrology on which aquatic systems depend. Shallow groundwater can become contaminated from disposal or injection of produced water and could potentially negatively affect rivers, streams, wetlands, and those species dependent upon those habitats.

Although Alternative A does provide protection to streams with special status species from oil and gas development, there would still be a risk from contamination due to spills, water discharge, and sedimentation compared to the action alternatives. There would also be a much larger risk to fish and other aquatic species under Alternative A from a change in subsurface flow (due to directional drilling) that could reduce the quality or quantity of water within streams and rivers.

Under Alternatives A, B and D, Muskrat Creek would not have a mineral withdrawal on 180 acres of riparian

areas and would not be protected from direct effects of mining. The 180 acres proposed for the Muskrat/Nursery Creek withdrawal under Alternative C would provide the minimum amount of protection to water quality, stream morphology, and riparian function to protect the restored and unique population of westslope cutthroat trout. Alternatives A, B, and D would not necessarily protect the genetically pure westslope cutthroat trout population in Muskrat Creek. These alternatives could result in a loss of riparian vegetation, streambed and bank destabilization, erosion and sedimentation, loss of floodplain vegetation, alteration of floodplain morphology, and alteration of stream channel morphology that could occur in association with locatable mineral activity, particularly placer mining. Another key impact that placer mining (including casual use) could have on westslope cutthroat trout is excavation, crushing or disturbance of streambed gravels during the critical period when trout are spawning and eggs are incubating/hatching (approximately 6/1-8/31).

MFWP, BLM, USFS, and other entities are currently making efforts to restore westslope cutthroat trout (a sensitive species) populations in a portion of their historic, but currently unoccupied habitat in the Upper Missouri River basin. One goal of these efforts is to prevent a federal listing of this species under the Endangered Species Act. The Muskrat Creek westslope cutthroat trout population is used by MFWP as a donor source of fish to re-establish populations in other streams within and beyond the Planning Area boundaries. In this sense, the Muskrat Creek population is disproportionately important to westslope cutthroat trout restoration throughout the Upper Missouri River basin. If mining operations cause a decline in this population, the population may no longer be able to function as a donor source and efforts to restore other populations and prevent a federal listing of this species may be impeded.

Plants

Assuming that the low end of the range of proposed weed treatments is implemented under any alternative, under Alternative A, the least amount of noxious weed spread (43,000 acres) would occur; therefore the threat of special status plant habitat loss would be least for this alternative. If the high end of the range of proposed weed treatments is implemented under the action alternatives, the greatest amount of weed spread would occur under Alternative A. The protections afforded by SMZs for the forested riparian species Idaho sedge and small yellow lady's slipper would be less than the buffers in Alternatives B and C. Dry forest, shrubland and grassland treatments (10,350 acres per decade) to maintain or restore habitat of Lemhi penstemon, sapphire rockcress and lesser rushy milkvetch would be higher than under Alternative C, but less than under Alternatives B or D.

Oil and gas leasing NSO restrictions within 0.25 mile of known populations would protect them by decreasing the potential for disturbance. The most acres of the field

office would be available for locatable mineral entry, causing this alternative along with Alternative D to have the highest possibility of habitat disturbance.

Effects Common to Action Alternatives

Wildlife

Effects described in "Effects Common to Action Alternatives" in the general Wildlife section would also apply to special status species.

All federally listed and BLM sensitive species and their habitats would be considered "priority" species and "priority" habitats. By designating these species and habitats as "priority", they would be given additional protection and consideration during project planning and implementation. Protection and maintenance of habitat would ensure special status species maintain viable and diverse populations and ensure short-term and long-term protection of wildlife species within the Decision Area. Protection of special habitat components such as caves and cliffs would maintain habitat for species such as bats and peregrine falcons.

Closing rock climbing in areas with active raptor nests would reduce disturbance and prevent nest abandonment to special status raptor species.

Virtually all bird species are susceptible to disturbance on nesting sites (Joslin et al. 1999). Raptors are susceptible to disturbance while nesting, and may abandon nests with eggs or chicks if the level of disturbance is unacceptable. Acceptable disturbance varies by species, but could cause the failure of nests, reducing the productivity of species already in decline. The use of timing restrictions for special status species during the breeding season would substantially increase the likelihood of nesting success.

Seasonal closures during winter and breeding seasons to protect special status bat species would limit disturbance and allow these species to conserve energy during critical times of their life cycle. Disturbance of bat hibernacula could cause bats to flee and expend valuable energy during the winter which could lead to mortality. Disturbance of maternity colonies could cause young bats to fall and be predated on. Installation of bat gates at abandoned mine sites with bat use would protect bats from disturbance, displacement and direct mortality.

Protection of wildlife linkage corridors would reduce isolation of individuals and improve gene flow and viability of many special status species populations. All projects would maintain connectivity and reduce fragmentation of habitat. This would allow special status species to maintain genetic flow across the Planning Area.

Complying with all standards and guidelines in the Canada Lynx Conservation Assessment and Strategy would protect Canada lynx habitat and ensure that the population of this species is maintained or increased over time.

Disturbance associated with projects in occupied grizzly bear habitat would be restricted. Bears that become habituated to human foods can pose a threat to humans in the area. Habituated bears often are moved to new locations or killed to prevent harm to humans. BLM would develop and implement food regulations and guidelines within occupied grizzly bear habitat, which would reduce grizzly bear/human interactions and protect bears from disturbance, displacement, or death.

All programs would be required to meet or move towards meeting Land Health Standards. This would minimize the negative impacts on special status species from all programs including but not limited to; vegetation management, range, mining, forestry, rights-of-way and energy development.

Dry forest treatments would be designed to mimic natural fire events and result in an increase of large mature trees with open canopies and a diversity of understory species. Uneven-aged management and retaining old forest structure within dry forest types would improve habitat for those special status wildlife species such as the northern goshawk and flammulated owl as well as other species that prefer mature forests of ponderosa pine and Douglas-fir forests.

Alternatives B, C, and D would emphasize restoration and protection of sagebrush habitat and maintain, to the extent possible, large patches of high quality sagebrush. The action alternatives would improve connectivity of habitat and would enlarge the size of sagebrush patches in occupied or historic sage grouse habitat. This would protect sage grouse, pygmy rabbits, other sagebrush obligates and all species that depend on or use sagebrush habitat. This would also allow for the potential expansion of sage grouse into currently unoccupied habitats.

Protection and restoration of riparian areas would maintain or improve breeding, foraging, hiding cover and migration corridors for bald eagles, Swainson's hawks, bats and lynx as well as the majority of other special status species.

High priority lands for retention and future acquisitions would include areas important to special status species including ACECs, Wild and Scenic River corridors, WSAs, and additional habitat for priority and special status species. This would ensure long-term protection and/or restoration of habitat important to special status species.

Fish

The BLM would work with MFWP to remove non-native fish species to restore special status fish populations and increase the distribution of these species.

Habitat for westslope cutthroat trout, Yellowstone cutthroat trout, Arctic grayling, bull trout, and other native fishes would be enhanced or restored. Watershed restoration projects would be designed and implemented in a manner that promotes the long-term ecological integrity

of ecosystems, conserves the genetic integrity of native species, and contributes to meeting riparian goals and objectives.

All action alternatives would reduce the negative effects of the transportation system on special status fish species by removing barriers (when desirable), reducing sedimentation and restoring or maintaining riparian vegetation.

Plants

Oil and gas leasing would be subject to controlled surface use stipulations on special status plant habitat.

Effects of Alternative B

Wildlife

The effects of Alternative B on special status wildlife species would be the same as described under "Effects of Alternative B" in the general Wildlife section.

Vegetation types within the Decision Area are represented by grassland, shrubland, dry forest, wet forest, and riparian. Dry forest is the most dominant forest type and represents 38 percent (115,000 acres) all vegetation communities. Dry forest are currently well outside the historic average of natural variability due to fire suppression and heavy historic grazing. The effects on special status wildlife species from treatments under Alternative B in dry forests would be the same as described under "Effects of Alternative B" in the general Wildlife section. Alternative B would restore more dry forest habitat for migratory birds, northern goshawk, flammulated owl, long-legged myotis, long-eared myotis, and fringed myotis compared to Alternatives A and C but would restore fewer acres than Alternative D. The short-term impacts from disturbance would be more than with Alternatives A and C, but less than with Alternative D. It is expected that the long-term benefits of restoring habitat for dry forest species would outweigh any short-term impacts.

The effects on special status wildlife species from treatments under Alternative B in cool, moist forests would be the same as described under "Effects of Alternative B" in the general Wildlife section. Alternative B would restore more acres of cool, moist forest habitat for migratory birds, lynx, fisher, wolverine, and bat species compared to Alternatives A and C, but would restore fewer acres than Alternative D.

The BLM would use an existing protocol developed by the Forest Service to determine the range of natural conditions for snag habitat until additional studies are completed. This would provide criteria for determining how much snag habitat should be retained (or created) in different habitat types and would aid in assessing impacts to special status species associated with management actions.

Throughout the Decision Area, there are snag deficient areas due to past mining, firewood cutting and timber harvest. In these areas, snags would be targeted for creation. Within other forested stands in the Decision Area, snags have been created naturally through forest insects, disease, and fire. In these areas, blocks of dead and dying forests would be retained to provide habitat for snag dependant species while still allowing some commodity forest product removal.

The proactive creation of snags in snag deficient areas would improve habitat diversity, increase habitat for snag dependant species and improve species viability.

When timber salvage is proposed in dead and dying forests, Alternative B would maintain contiguous acres of undisturbed standing and down woody material in adequate amounts for those special status species that depend on this habitat type for breeding, foraging, and denning. This would protect snag habitat for a variety of snag dependent species including migratory and resident birds, raptors, bats, and three-toed and black-backed woodpeckers.

Where salvage would be allowed to occur, forest openings would be a size that is appropriate to the site and would include snag retention patches. Alternative B would protect more habitat for those special status species that depend on dead and dying forests than Alternatives A and D, but less than Alternative C.

Grassland vegetation represents approximately 45 percent of the total available habitat in the Decision Area and sagebrush shrublands represent roughly 7 percent. The quality and quantity of grasslands and shrublands is declining due to fire suppression, conifer encroachment, and noxious weed infestations.

Under Alternative B, the effects on special status wildlife species from restoration of grasslands and shrublands would be the same as described under “Effects of Alternative B” in the general Wildlife section. Alternative B would restore more grassland and sagebrush shrubland habitats for migratory birds, golden eagles, ferruginous hawks, Swainson’s hawks, long-billed curlews, Brewer’s sparrow, mountain plovers, sage grouse and pygmy rabbit compared to Alternatives A and C, but would restore fewer acres than Alternative D.

The effects on special status wildlife species from noxious weeds under Alternative B would be the same as described under “Effects of Alternative B” in the general Wildlife section. This alternative could result in an increase in the quality and quantity of habitat for special status species compared to Alternatives A and C.

Alternative B would reduce the risk of mortality to special status nesting birds, including migratory and resident birds, during prescribed fire by excluding the use of fire during the breeding season in areas that have substantial use by breeding birds. However, because other methods of vegetation treatments, such as mechanical,

would not have timing restrictions, there could still be detrimental impacts to breeding birds under this alternative. Alternative B would protect breeding birds more than Alternatives A and D, but less than C (which would have timing restrictions for prescribed fire and mechanical treatments).

The limited amount of riparian habitat in the Decision Area and the substantial use these areas receive by special status species, makes this habitat type the most crucial to restore or protect. Riparian Management Zones (RMZs) would be established for this alternative that are wider than Alternatives A and D but narrower than Alternative C. These zones would vary from 50 feet (intermittent streams) to approximately 160 feet for fish-bearing streams Riparian Management Zones under Alternative B would provide more protection for terrestrial special status wildlife than SMZs alone (Alternatives A and D) by requiring all management activities restore or maintain riparian and stream function. The width of the RMZs would ensure that riparian habitat is maintained along streams not only for water quality and aquatic habitat but also for the numerous terrestrial wildlife species that use riparian areas for breeding, foraging, hiding cover and for movement corridors.

There would be fewer negative effects from a loss of large woody material, desired vegetation or movement corridors under Alternative B than with Alternatives A and D.

There would be substantially fewer miles of open roads under Alternative B compared to Alternative A. Alternative B would also have fewer open roads than Alternative D but more open roads than Alternative C. The effects of roads on special status species would be the same as described under “Wildlife Effects Common to All Alternatives” and “Effects of Alternative B” in the general Wildlife section. Open road densities under Alternative B would result in more year-round habitat and migration corridors and less disturbance and displacement of wildlife, road kill, and fragmentation of habitat compared to Alternatives A and D. The beneficial effects to special status wildlife from closing roads would be slightly less under Alternative B than under Alternative C.

Alternative B would prevent loss of habitat or disturbance in occupied grizzly bear habitat by allowing no net increase in permanent roads where open road densities are 1 mi/mi² or less in the distribution of grizzly bear. The BLM would also emphasize closing roads in occupied grizzly bear habitat where open road densities exceed 1 mi/mi².

Grizzly bears generally adjust to disturbance associated with roads by avoiding the area (Mace et al. 1996). This results in a reduction in the amount of habitat available to the bears. Roads also provide increased access into remote areas and encourage human settlement, recreational use, and other land uses. These activities can in-

crease the frequency of human/bear conflicts and ultimately reduce habitat availability and grizzly populations. By increasing and protecting low road density areas, Alternative B would provide more suitable habitat for grizzly bears than Alternatives A and D, but less suitable habitat compared to Alternative C.

Under Alternative B, there would be fewer acres open for cross-country snowmobile use (112,682 acres) than Alternatives A and D but more than Alternative C. The negative affects due to cross-country snowmobile use could include harassment of special status species during a season of high stress. This could cause individuals to leave an area (temporarily or permanently) and/or an increase in stress that could lead to mortality. Alternative B would have fewer detrimental effects to special status species from cross-country snowmobile use than Alternatives A and D, but substantially more than Alternative C.

Alternative B would improve habitat for special status bat species by retaining vegetation around caves and abandoned mines occupied by bats. This would assist in maintaining the desired temperature and humidity in the cave or mine. This would also reduce visibility of the cave or mine and lessen the risk of the feature being disturbed by humans.

Implementation of a 0.5 mile buffer around raptor nests from noise and disturbance during the breeding season would prevent raptors from abandoning the nest during the critical breeding and brood rearing seasons. Reduction in disturbance and stress to birds during this critical period would increase the potential for recruitment and would benefit the population within the Decision Area over the long-term. Alternative B would provide more protection from noise disturbance than Alternatives A or D, but less than Alternative C.

Protection of unoccupied raptor nests for five years and the retention of suitable forest habitats within 0.25 mile around unoccupied nests would protect nesting sites for raptors. Alternative B would provide more protection of these important areas than Alternatives A and D but less than Alternative C.

Alternatives B and C would actively restore vegetation around or near bald eagle nest trees (after the breeding season) to protect nest trees from fire and to promote development of nesting and perching habitat.

The effects related to mineral development, including oil and gas would be the same as described under “Effects Common to All Alternatives” and “Effects of Alternative B” in the general Wildlife section.

All alternatives would have 12 stipulations to lessen the effects of oil and gas development on special status species (stipulations that affect wildlife are described in the general Wildlife section) (**Table 4-12**).

Under Alternative B, these stipulations would include: NSO around bald eagle nests, peregrine falcon nests,

ferruginous hawk nests, prairie dog towns and sage grouse leks and timing restrictions in grizzly bear habitat, sage grouse winter, spring and breeding habitat, other raptor breeding habitat and bald eagle breeding habitat

The five areas with the most potential for oil and gas development in the Decision Area are located near the southern Deerlodge Valley, Sleeping Giant, Canyon Ferry, Bozeman, and Livingston. There is currently one known bald eagle nest in the southern Deerlodge Valley area but is outside of federal mineral estate lands. There are no known ferruginous hawk, peregrine falcon, or other raptor breeding territories in this area. There is no known sage grouse habitat or prairie dog towns in this area. This area is not within the distribution or recovery zone of grizzly bear and there are no known gray wolf den sites.

Currently, there are eight known bald eagle nest sites in the Sleeping Giant area and approximately 740 acres would be protected with a NSO stipulation (0.5 mile within nest sites). An additional 1,750 acres beyond the 0.5 mile NSO buffers around bald eagle nest sites would have a 2/1–8/31 timing restriction (same as Alternatives A and D). There are no known ferruginous hawk breeding territories, sage grouse habitat, or prairie dog towns in this area. There is one known peregrine falcon nest site outside of surface and subsurface ownership. Approximately 30 acres would be protected with a NSO (1 mile within nest site). Other raptor breeding territories in the Sleeping Giant area would be protected with approximately 1,330 acres with a timing restriction of 3/1-7/31. This would be less protective than Alternatives A, C and D which prohibit habitat loss and disturbance around the nest site. Approximately 2,600 acres are within occupied grizzly bear habitat and would be protected with spring (4/1-6/30) and fall (9/15-10/15) timing restrictions. This would ensure grizzly bears would be free from disturbance due to oil and gas exploration during important times in their life cycle. There are no known gray wolf den or rendezvous sites in this area.

Currently, there are six known bald eagle nests sites in the Canyon Ferry area and approximately 330 acres would be protected with the 0.5 mile NSO stipulation. An additional 1,100 acres beyond the 0.5 acre NSO buffer around bald eagle nests would have a 2/1–8/31 timing restriction (same as Alternatives A and D). There are no known ferruginous hawk nests, peregrine falcon breeding territories, sage grouse habitat, or prairie dog towns in this area. Other raptor breeding territories in the Canyon Ferry area would be protected with approximately 500 acres in a timing restriction of 3/1-7/31. The area is not within the recovery zone or occupied grizzly bear habitat and there are currently no known gray wolf den or rendezvous sites.

In the Bozeman area, there are currently no known bald eagle nest sites, ferruginous hawk breeding territories, peregrine falcon nests sites, sage grouse habitat, or prairie

rie dog towns. Approximately 1,300 acres are within occupied grizzly bear habitat and would be protected with spring (4/1-6/30) and fall (9/15-10/15) timing restrictions. This would ensure grizzly bears are free from disturbance due to oil and gas exploration during important time of their life cycle. There are no known gray wolf den or rendezvous sites in this area.

Currently, there are four known bald eagle nests in the Livingston area and approximately 40 acres would be protected with the NSO stipulation. An additional 300 acres beyond the 0.5 mile NSO buffer would have a 2/1-8/31 timing restriction. There are no known ferruginous hawk nests, other raptor nest sites, sage grouse leks/ breeding habitat, or prairie dog towns in this area. There are, however, approximately 43 acres within sage grouse winter and spring habitat that would be protected with a 12/1-5/15 timing restriction (same as Alternatives A and D). There is one known peregrine falcon breeding territory in the Livingston area that would be protected with approximately 60 acres in a NSO stipulation. Approximately 100 acres within occupied grizzly bear habitat would be protected with spring (4/1-6/30) and fall (9/15-10/15) timing restrictions. There are no known gray wolf den or rendezvous sites in this area.

Across the Decision Area, there would be 2,600 acres surrounding bald eagle nest sites that would be protected with a NSO stipulation under Alternatives A, B and D (Table 4-12). Three of the five areas with the most potential for oil and gas development have bald eagle nest sites (1,110 acres) that would be protected with the NSO stipulation. An additional 3,150 acres would be protected beyond the bald eagle nest NSO boundary with a timing restriction of 2/1-8/31 (Table 4-12). This would be the same amount of protection provided under Alternatives A and D but less protection than under Alternative C (NL 1 mile adjacent to nests).

Across the Decision Area including within the five areas with the most potential for oil and gas development, there would be 0 acres protected with a NSO stipulation for ferruginous hawks because there are no known breeding territories (Table 4-12). When located, ferruginous hawk breeding territories would be given more protection under Alternative B compared to Alternatives A and D but less than Alternative C.

Across the Decision Area, there would be 3,820 acres surrounding peregrine falcon nest sites protected with a 1 mile NSO stipulation. Two of the five areas with the most potential for oil and gas development currently have known nest sites (Sleeping Giant and Livingston) within federal mineral estate lands. A total of 90 acres would be protected with a 1 mile NSO surrounding peregrine falcon nest sites (Table 4-12).

Alternative B would provide substantially more protection to peregrine falcons by reducing disturbance and preventing loss of habitat than Alternative A. The other

action alternatives would provide the same amount of protection as Alternative B.

Across the Decision Area, there would be 7,400 acres of other known raptor breeding territories (such as golden eagles) protected with a 0.5 mile timing restriction. Only two of the five areas with the most potential for oil and gas development (Sleeping Giant and Canyon Ferry) currently have other known raptor breeding territories that would be protected with the timing restriction of 3/1-7/31 (1,830 acres). Unlike Alternatives A, C and D, this alternative would not protect habitat from alteration. Alternative B would protect more area from disturbance than Alternatives A and D, but would protect the same area as Alternative C.

Currently, there are no known active prairie dog towns within the Decision Area (including the five areas with the most potential). When located, all alternatives would protect the actual prairie dog town with a NSO but only Alternative A would protect habitat around prairie dog towns for expansion of the town. Alternative A would provide more protection to prairie dogs than all other alternatives.

Within the Decision Area and the five areas with the most potential for oil and gas development there are no known sage grouse lek sites. However, across the Decision Area there would be approximately 2,800 acres of sage grouse breeding habitat located within 3 miles of lek sites protected with a timing restriction of 3/1-6/30. In the five areas with the most potential for oil and gas development there is currently no known sage grouse breeding habitat. This alternative would provide the same amount of protection as under Alternative D, less protection than Alternative C but more than Alternative A. Decision Area-wide there are approximately 67,000 acres within sage grouse winter and spring range that would be protected with a 12/1-5/15 timing restriction (same as Alternatives A and D). One of the five areas with the most potential for oil and gas development has a small amount of known sage grouse winter or spring range (43 acres) that would be protected with the timing restriction.

Currently in the Decision Area, there is only one known gray wolf den site. Approximately 700 acres would be protected around this den site with a timing restriction of 4/15-6/30 (1 mile from den or rendezvous site). Unlike Alternatives A and D, this alternative would ensure that the den and rendezvous sites are not disturbed from oil and gas exploration.

Decision Area-wide, there are approximately 7,400 acres in grizzly bear recovery areas that would be protected with a NSO stipulation. None of the five areas with high potential for oil and gas development are within the recovery zone of the grizzly bear. Approximately, 54,000 acres within occupied grizzly bear would be protected with spring (4/1-6/30) and fall (9/15-10/15) timing restrictions. Three of the five areas with the most

potential for oil and gas development are within the distribution of grizzly bear (Sleeping Giant and Livingston) and approximately 4,000 acres would have the spring and fall timing restrictions under Alternative B. Unlike Alternatives A and D, Alternative B would ensure that grizzly bears are free from disturbance associated with oil and gas exploration during crucial times of the year.

Fish

The effects described under “Effects Common to All Alternatives” and “Effects of Alternative B” in the general Fish section would be the same for special status fish species.

Riparian Management Zones (RMZs) would be established for this alternative that would be wider than SMZs of Alternatives A and D but narrower than RMZs of Alternative C. Effects would be the same as described under “Effects of Alternative B” in the general Fish section.

Riparian Management Zones under Alternative B would offer more protection to special status species than Alternatives A or D but less than half the protection offered under Alternative C (Table 4-9 and Table 4-10). Effects would be the same as described under “Effects of Alternative B” in the general Fish section.

Restoration activities could have minor to moderate and short-term effects from a pulse of fine sediment and runoff to streams due to a reduction in riparian vegetation. However, the long-term benefits to aquatic and riparian resources from an increase in diversity and vigor of riparian vegetation would outweigh the short-term impacts.

Under Alternative B, there would be an emphasis on maintaining and restoring habitat for genetically pure and slightly hybridized (<20 percent) populations of westslope cutthroat trout. Alternative B would focus protection on more populations of westslope cutthroat trout than Alternatives A and D, but fewer than Alternative C.

Alternatives B and C would emphasize the removal (through various means) of non-native aquatic species that out-compete or breed with westslope cutthroat trout. This would increase the quantity of available habitat for native species and reduce hybridization between rainbow trout and westslope cutthroat trout.

Alternatives B and C would contain the greatest amount of habitat protected for special status fish species (5 miles) due to the designation of ACECs.

All alternatives would have five stipulations to lessen the effects of oil and gas development on special status fish (other stipulations that affect fish are described in the general Fish section) (Table 4-13). Under Alternative B, these stipulations would include NSO adjacent to

Arctic grayling, bull trout and westslope and Yellowstone cutthroat trout streams.

The five areas with the most potential for oil and gas development in the Decision Area are located near the southern Deerlodge Valley, Sleeping Giant, Canyon Ferry, Bozeman, and Livingston. In the southern Deerlodge Valley area, there is no habitat for Yellowstone cutthroat trout and Arctic grayling and no known habitat for 90-100 percent genetically pure westslope cutthroat trout. Lost Creek, a bull trout stream, flows outside of the southern Deerlodge Valley area but when a 0.5 mile NSO buffer is applied, approximately 32 acres adjacent to this stream on federal mineral estate lands would be protected from loss of habitat.

In the Sleeping Giant area, there is no habitat for Yellowstone cutthroat trout, Arctic grayling, or bull trout and there is no known habitat for 90-99 percent genetically pure westslope cutthroat trout. However, there are approximately 700 acres adjacent to streams with 99-100 percent genetically pure westslope cutthroat trout that would be protected with a 0.5 mile NSO stipulation on either side of the stream. This would provide greater protection to riparian habitat, aquatic habitat, water quality, and surface/subsurface flows than Alternative A.

In the Canyon Ferry area, there is no habitat for Yellowstone cutthroat trout, Arctic grayling, or bull trout and there is no known habitat for 90-100 percent genetically pure westslope cutthroat trout.

In the Bozeman area, there is no habitat for Arctic grayling, bull trout, or habitat for 90-100 percent genetically pure westslope cutthroat trout. There would be approximately 30 acres adjacent to streams with Yellowstone cutthroat trout that would be protected with a 0.5 mile NSO stipulation on either side of streams. Alternative B would protect more acres from loss of riparian habitat and upslope habitat that could affect riparian and aquatic functions for this species than Alternatives A and D.

In the Livingston area, there is no habitat for Arctic grayling, bull trout, or 90-100 percent genetically pure westslope cutthroat trout. There would be approximately 930 acres adjacent to streams with Yellowstone cutthroat trout that would be protected with a 0.5 mile NSO stipulation. Alternative B would protect more acres from loss of riparian habitat and upslope habitat that could affect riparian and aquatic functions than Alternatives A and D.

Decision Area-wide, there would be 27,400 acres adjacent to streams with Arctic grayling that would be protected with a NSO stipulation under Alternative B (0.5 mile from either side of streams). Alternatives B and C would protect substantially more acres adjacent to Arctic grayling streams from development due to oil and gas than Alternative A. None of the five areas with the most potential for oil and gas development have habitat for Arctic grayling (Table 4-13).

Decision Area-wide, there would be 2,200 acres adjacent to streams with 90-99 percent genetically pure westslope cutthroat trout that would have a NSO stipulation under Alternative B (0.5 mile from either side of stream). None of the five areas with the most potential for oil and gas development have known habitat for 90-99 percent genetically pure westslope cutthroat trout (**Table 4-13**).

Decision Area-wide, there would be 11,000 acres adjacent to streams with 99-100 percent genetically pure westslope cutthroat trout that would have a NSO stipulation under Alternative B (0.5 mile from either side of stream). One of the five areas with the most potential for oil and gas development (Sleeping Giant) has habitat for 99-100 percent genetically pure westslope cutthroat trout and approximately 700 acres adjacent to these streams would be protected with a NSO (**Table 4-13**). Alternatives B, C and D would protect substantially more acres adjacent to westslope cutthroat trout (99-100 percent pure) streams from development due to oil and gas than Alternative A.

In the Decision Area, there would be 7,100 acres adjacent to streams with Yellowstone cutthroat trout that would have a NSO stipulation under Alternative B (0.5 mile from either side of stream). Two of the five areas with the most potential for oil and gas development (Bozeman and Livingston) have habitat for Yellowstone cutthroat trout and approximately 930 acres adjacent to these streams would be protected with a NSO (**Table 4-13**). Alternatives B and C would protect substantially more acres adjacent to Yellowstone trout streams from development due to oil and gas than the Alternative A.

In the entire Decision Area, there would be 4,000 acres adjacent to streams with bull trout that would have a NSO stipulation under Alternative B (0.5 mile from either side of stream). One of the five areas with the most potential for oil and gas development (southern Deerlodge Valley) has habitat for bull trout and approximately 32 acres adjacent to these streams would be protected with a NSO (**Table 4-13**). Unlike Alternative A, Alternatives B, C, and D would ensure that bull trout habitat would not be lost due to oil and gas exploration and development.

Under Alternatives B, D and A, westslope cutthroat trout would not be protected in the Muskrat and Nursery Creek drainages with a 180-acre mineral withdrawal of the streams and riparian areas. Muskrat Creek has importance to westslope cutthroat trout restoration beyond the local level because after a ten year, \$50,000 restoration effort, its population is now used as a donor source to re-establish westslope cutthroat trout populations in a number of different locations in the state of Montana. Without the protection of a mineral withdrawal, this genetically pure population of westslope cutthroat trout could be impacted or lost due to a loss of riparian vegetation, streambed and bank destabilization, erosion and sedimentation, loss of floodplain vegetation, alteration of floodplain morphology, and alteration of stream

channel morphology that could occur in association with locatable minerals, particularly placer mining. Another significant key impact placer mining would have on westslope cutthroat trout is excavation, crushing, or disturbance of streambed gravels during the critical period of 6/1-8/31 when cutthroat trout are spawning and eggs are incubating/hatching in redds in the streambed. If extensive mining impacts occurred in Muskrat Creek, it may not be possible to reclaim the stream adequately to re-establish the current population level of westslope cutthroat trout.

MFWP, BLM, USFS, and other entities are currently making efforts to restore westslope cutthroat trout (a sensitive species) populations in a portion of their historic, but currently unoccupied habitat in the Upper Missouri River basin. One goal of these efforts is to prevent a federal listing of this species under the Endangered Species Act. The Muskrat Creek westslope cutthroat trout population is used by MFWP as a donor source of fish to re-establish populations in other streams within and beyond the Planning Area boundaries. In this sense, the Muskrat Creek population is disproportionately important to westslope cutthroat trout restoration throughout the Upper Missouri River basin. If mining operations cause a decline in this population, the population may no longer be able to function as a donor source and efforts to restore other populations and prevent a federal listing of this species may be impeded.

Plants

Assuming that the low end of the range of proposed weed treatments is implemented under any alternative, under Alternative B, 48,000 acres of noxious weed spread is projected. This would be more weed spread than under Alternatives A or D, therefore the threat of special status plant habitat loss caused by noxious weed spread could be more for this alternative than Alternatives A or D. The reduced disturbances afforded by RMZs for the forested riparian species Idaho sedge and small yellow lady's slipper would be more than under Alternatives A or D, but less than under Alternative C. Additionally, the buffer on non-forested riparian areas would reduce the threat of habitat disturbance for species such as dwarf purple monkey-flower, mealy primrose or Ute ladies' tresses. Dry forest, shrub and grass treatments (30,200 acres per decade) to maintain or restore habitat of Lemhi penstemon, sapphire rockcress and lesser rushy milkvetch would be higher than under all alternatives except Alternative D.

Oil and gas leasing NSO restrictions within 0.25 mile of known populations would protect them by decreasing the potential for disturbance. Fewer acres of the field office would be available for locatable mineral entry, causing this alternative along with Alternative C to have the least possibility of habitat disturbance.

Effects of Alternative C

Wildlife

The effects from Alternative C to special status wildlife species would be the same as described under “Effects of Alternative C” in the general Wildlife section.

Alternative C would emphasize “passive” restoration and would treat the least amount of dry forest habitat for migratory birds, northern goshawks, flammulated owls, long-legged myotis, long-eared myotis, and fringed myotis compared to Alternatives A, B and D. The short-term impacts from disturbance would be much less than with the other alternatives but the long-term benefits of restoring habitat for dry forest species would be substantially less than under Alternatives B and D.

The effects on special status wildlife species from treatments under Alternative C in cool, moist forest habitat would be the same as described under “Effects of Alternative C” in the general Wildlife section. Alternative C would restore the fewest acres of cool, moist forest habitat for migratory birds, lynx, fisher, wolverine, and bat species compared to the other alternatives.

Determining the range of natural conditions for snag habitat would be the same as Alternative B. However, the creation of snags would only be done opportunistically through other projects. Snags would be protected but not necessarily created in snag deficient areas like under Alternative B. Due to lack of vegetation treatments and active snag management, Alternative C would create less snag habitat in snag deficient areas over the long-term than Alternative B but would be similar to Alternatives A and D.

Whereas Alternative B would not entail identifying the acres of dead and dying forest that would be retained during timber salvage, Alternative C would require 50 percent of dead and dying forest be retained in stands that exceed 1,000 acres (unless human safety is an issue). Although all action alternatives would provide some protection to dead and dying forests, Alternative C would guarantee the retention of moderate to large-sized blocks of dead and dying forests for special status species. Connectivity and diversity of habitats as well as species productivity would be greatest for those species dependent on snag habitat, such as three-toed and black-backed woodpeckers, under Alternative C than under any other alternative.

The effects on special status wildlife species from treatments under Alternative C in grasslands and shrublands would be the same as described under “Effects of Alternative C” in the general Wildlife section. Alternative C would restore the fewest acres of grassland and sagebrush shrubland of all the alternatives, especially Alternatives B and D, for migratory birds, golden eagles, ferruginous hawks, Swainson’s hawks, long-billed curlews, Brewer’s sparrows, mountain plovers, sage grouse, and pygmy rabbit. Alternative C would restore substan-

tially fewer acres compared to Alternatives B and D and slightly less grassland than Alternative A. Alternative C would restore more acres of sagebrush than Alternative A.

Noxious weed management would have minimal negative impacts on special status species but could provide substantial beneficial effects. The effects on special status wildlife species from noxious weeds under Alternative C would be the same as described under “Effects of Alternative C” in the general Wildlife section.

Alternative C would reduce the risk of mortality to special status nesting birds, including migratory and resident birds, during prescribed fire and mechanical treatments. Alternative C would exclude project implementation during the breeding season in areas that have substantial use by breeding birds. This would prevent the most mortality to migratory and resident birds during the breeding season of all alternatives.

Under Alternative C, Riparian Management Zones would be established that would be wider than under all other alternatives. A 300-foot RMZ for fish bearing streams and a 150-foot zone for non-fish bearing streams would be implemented under Alternative C. As with the other alternatives, the RMZs could have management activities. Unlike Alternatives A and D, Alternative C and B would only allow management within riparian areas that protect, enhance or restore the riparian goals and objectives. Unlike Alternative B, trees could not be removed from the RMZ during restoration unless they would be used for other restoration activities (i.e. in-stream restoration or erosion control) under this alternative.

Alternative C would establish the most acres of all alternatives where the emphasis would be to restore, protect, or enhance riparian habitats for aquatic and terrestrial species that use riparian zones for all or part of their lifecycle. Alternative C would provide the best protection to all special status species that use riparian areas of all alternatives. This alternative would also ensure that critical movement corridors are maintained for numerous special status species.

There would be substantially fewer miles of open roads under Alternative C compared to Alternative A. Alternative C would also have fewer open roads than Alternatives B and D. The effects of roads on special status species would be the same as described under “Effects Common to All” and “Effects of Alternative C” in the general Wildlife section.

Alternative C would prevent the greatest loss of habitat or disturbance to bears in occupied grizzly bear habitat of all alternatives by allowing no net increase in permanent roads where open road densities are 1.5 mi/mi² or less. The BLM would also emphasize closing roads in occupied grizzly bear habitat where open road densities exceed 0.5 mi/mi². Alternative C would provide the most acres of suitable habitat for grizzly bears and re-

duce the potential for human-bear interactions more than all other alternatives.

Through travel management, Alternative C would provide the greatest benefit to grizzly bears and other special status species by reducing fragmentation of habitats, protecting larger blocks of habitat and reducing disturbance.

Alternative C would have the fewest acres open for cross-country snowmobile use (26,148 acres). The detrimental affects to special status species due to cross-country snowmobile use would be substantially less under Alternative C than under all other alternatives.

The retention of vegetation around caves and abandoned mines for special status bat species would be the same as under Alternative B.

Implementation of a 1-mile buffer around raptor nests from noise and disturbance during the breeding season would prevent raptors from abandoning the nest during the critical breeding and brood rearing seasons more than under all other alternatives. Reduction in disturbance and stress to birds during this critical period would increase the potential for recruitment and benefit the population within the Decision Area over the long-term. Alternative C would provide more protection from noise disturbance than all other alternatives.

Unoccupied raptor nests would also have greater protection under this alternative than under all other alternatives. Alternative C would require all unoccupied raptor nests that are in good condition to be maintained for 7 years. This alternative would also require that suitable forested habitat within 0.5 mile around the unoccupied nests be maintained.

Restoration of vegetation around bald eagle roost and nest trees would be the same as under Alternative B.

The effects related to mineral development, including oil and gas would be the same as described under "Effects Common to All Alternatives" and "Effects of Alternative C" in the general Wildlife section.

All alternatives would have 12 stipulations to lessen the effects of oil and gas development on special status species (stipulations that affect wildlife are described in the general Wildlife section). Under Alternative C, these stipulations would include No Surface Occupancy (NSO) in sage grouse breeding habitat, grizzly bear habitat; and No Lease (NL) in and around prairie dog towns, sage grouse winter, spring and strutting grounds (leks), bald eagle nests, peregrine falcon nests and ferruginous hawk nests. There would also be a timing restriction around ferruginous hawk nests under this alternative.

The five areas with the most potential for oil and gas development in the Decision Area are located near the southern Deerlodge Valley, Sleeping Giant, Canyon Ferry, Bozeman, and Livingston. There is currently one

known bald eagle nest site in the southern Deerlodge Valley area but it is well outside of any federal mineral estate lands. There are no known ferruginous hawk nests, peregrine falcon nests or other raptor breeding territories in this area. There is no known sage grouse habitat or prairie dog towns in this area. This area is not within the distribution or recovery zone of grizzly bear and there are no known gray wolf den or rendezvous sites.

Currently, there are eight known bald eagle nests sites in the Sleeping Giant area and approximately 2,530 acres would be protected with a NL stipulation. There are no known ferruginous hawk nests, sage grouse habitat, or prairie dog towns in this area. There is one known peregrine falcon nest site just outside of federal mineral estate lands. After applying the 1 mile buffer to this nest, approximately 30 acres of federal mineral estate lands would be protected with NL. Other raptor breeding territories in the Sleeping Giant area would be protected with approximately 1,330 acres in NL. This would be the most restrictive alternative and would provide the most protection to raptors from disturbance and loss of habitat. Approximately 2,600 acres are within occupied grizzly bear habitat and would be protected with a NSO. This would ensure grizzly bears are free from disturbance due to oil and gas exploration and that there would be no loss of habitat. There are no known gray wolf den or rendezvous sites in this area.

Currently, there are six known bald eagle nests sites in the Canyon Ferry area and approximately 1,500 acres would be protected with NL. There are no known ferruginous hawk nests, peregrine falcon nest, sage grouse habitat, or prairie dog towns in this area. Other raptor breeding territories in the Canyon Ferry area would be protected with approximately 500 acres in NL. The area is not within the recovery zone or the distribution of grizzly bear and there are currently no known gray wolf den or rendezvous sites.

There are currently no known bald eagle nest sites, ferruginous hawk nests, peregrine falcon nests, sage grouse habitat, or prairie dog towns in the Bozeman area. Approximately 1,300 acres are within occupied grizzly bear habitat and would be protected with a NSO stipulation. This would ensure grizzly bears are free from disturbance due to oil and gas exploration and development and that there would be no loss of habitat. There are no known gray wolf den or rendezvous sites in this area.

Currently, there are four known bald eagle nest sites in the Livingston area and approximately 300 acres would be protected with NL. There are no known ferruginous hawk nests, other raptor nest sites, sage grouse leks/breeding habitat, or prairie dog towns in this area. There are however, approximately 43 acres within sage grouse winter and spring habitat that would be protected with NL. There is one known peregrine falcon nest site in the Livingston area that would be protected with approximately 60 acres in a NL area. Approximately 100

acres are within occupied grizzly bear habitat and would be protected with a NSO stipulation. There are no known gray wolf den or rendezvous sites in this area.

Decision Area-wide, there would be 9,450 acres surrounding bald eagle nest sites and breeding habitats that would have a NL stipulation under Alternative C (1 mile from nest). Three of the five areas with the most potential for oil and gas development (Sleeping Giant, Canyon Ferry and Livingston) have bald eagle nest sites (4,330 acres) that would be protected with the 1 mile NL stipulation (**Table 4-12**).

This alternative would protect breeding bald eagles from disturbance or loss of habitat associated with oil and gas exploration and development more than any other alternative.

Decision Area-wide and within the five areas with the most potential for oil and gas development, there would be 0 acres protected for ferruginous hawks (there are no known breeding territories). When located, ferruginous hawk breeding territories would be given more protection under Alternative C compared to all other alternatives.

Across the Decision Area, there would be 3,820 acres surrounding peregrine falcon nest sites with a NSO (1 mile) stipulation. Two of the five areas with the most potential for oil and gas development currently have known nest sites (Sleeping Giant and Livingston) within surface or subsurface ownership and a total of 90 acres would be protected with NL (**Table 4-12**).

Alternatives B, C and D would provide substantially more protection to peregrine falcons by reducing disturbance and preventing loss of habitat than Alternative A. Alternative C would provide additional protection to peregrine falcons over Alternatives B and D by preventing directional drilling under the 3,800 acres surrounding the nest site. Prohibiting directional drilling could prevent negative impacts on water quality and/or quantity in peregrine falcon habitat.

Decision Area-wide, there would be 7,400 acres of other known raptor breeding territories (such as golden eagles) protected with NL (0.5 mile). Only two of the five areas with the most potential for oil and gas development (Sleeping Giant and Canyon Ferry) currently have other known raptor breeding territories that would be protected with the NL stipulation (1,830 acres). Alternative C would provide the most protection from disturbance and habitat loss compared to the other alternatives from oil and gas exploration and development.

Currently, there are no known active prairie dog towns within the Decision Area (including the five areas with the most potential) (**Table 4-12**). When located, all alternatives would protect the actual prairie dog town with a NSO but only Alternative A would protect habitat around prairie dog towns for expansion of the town.

Alternative A would provide more protection to prairie dogs than all other alternatives.

Within the Decision Area and the five areas with the most potential for oil and gas development there are no known sage grouse lek sites. However, across the Decision Area there would be approximately 2,800 acres of sage grouse breeding habitat located within 3 miles of lek sites protected with a NSO. In the five areas with the most potential for oil and gas development there is currently no known sage grouse breeding habitat. Across the Decision Area, there are approximately 67,000 acres within sage grouse winter and spring range that would be protected with NL. One of the five areas with the most potential for oil and gas development has a small amount of known sage grouse winter or spring range (43 acres) that would be protected with the NL stipulation (**Table 4-12**).

Overall, this alternative would provide the greatest amount of protection to breeding and overwintering sage grouse compared to all other alternatives. Alternative C would not only prevent disturbance to nesting sage grouse, thereby ensuring successful reproduction, but would also prevent any habitat loss or degradation due to oil and gas development. Prohibiting directional drilling could prevent negative impacts on water quality and/or quantity in sage grouse habitat.

Currently in the Decision Area, there is only one known gray wolf den site. Approximately 700 acres would be protected around this den site with a NSO (1 mile from den or rendezvous site) stipulation. Unlike Alternatives A, B and D, this alternative would ensure that den and rendezvous sites are not disturbed from oil and gas exploration and development. There are no known den or rendezvous sites in the five areas with the most potential for oil and gas development.

In the Decision Area, there are approximately 7,400 acres in grizzly bear recovery areas would be protected with a NSO stipulation. None of the five areas with high potential for oil and gas development are within the grizzly bear recovery zone. Approximately 54,000 acres within occupied grizzly bear habitat would be protected with a NSO stipulation. Three of the five areas with the most potential for oil and gas development are within occupied grizzly bear habitat (Sleeping Giant and Livingston) and approximately 4,000 acres would have the NSO stipulation. Unlike Alternatives A, B and D, Alternative C would ensure that grizzly bears are not only free from disturbance but also from loss of habitat due to oil and gas exploration and development.

All stipulations under Alternative C would be either NSO or NL for special status species. In addition, the buffer around bald eagle nest sites and sage grouse breeding habitat would be larger than the other alternatives. Under Alternative C, essential habitat for special status species would not be altered or lost due to oil and gas exploration or development. Alternative C would

protect more habitat for these species compared to all other alternatives. For those special species with a NL stipulation (bald eagle, peregrine falcon and other raptors, and sage grouse), additional protection is given by preventing directional (subsurface) drilling that could degrade water quality or reduce water in streams, rivers and wetlands within crucial habitat for these species.

Fish

The effects described under “Effects Common to All Alternatives” and “Effects of Alternative C” in the general Fish section would be the same for special status fish species.

Like Alternative B, Alternative C would also establish additional protection to streams through Riparian Management Zones (RMZs). However, these RMZs would be wider under Alternative C than Alternative B. Riparian Management Zones under Alternative C would provide the most acreage adjacent to streams where emphasis would be placed on maintenance, restoration, and/or protection of riparian and stream functions of all alternatives.

This alternative would provide exceptional and nearly complete protection for special status fish and other aquatic organisms by only allowing activities in riparian areas that would restore or maintain riparian and stream habitats and functions. The width of these RMZs would ensure that the introduction of fine sediment would be negligible and the delivery of large woody material and organic matter would be maximized. Effects would be the same as described under “Effects of Alternative C” in the general Fish section.

Unlike the other alternatives, Alternative C would emphasize maintaining or restoring habitat for all populations of westslope cutthroat trout, regardless of hybridization. As with Alternative B, Alternative C would emphasize removing brook trout and other non-native species that out-compete or breed with westslope cutthroat trout.

Alternatives B and C would contain the greatest amount of habitat protected for special status fish species (5 miles) due to the designation of ACECs.

All alternatives would have five stipulations to lessen the effects of oil and gas development on special status fish (other stipulations that affect fish are described in the general Fish section) (**Table 4-13**). Under Alternative C, these stipulations would include NSO adjacent to Arctic grayling and westslope cutthroat trout (90-99 percent genetically pure); and NL for bull trout streams, westslope cutthroat trout (99-100 percent genetically pure) and Yellowstone cutthroat trout.

The five areas with the most potential for oil and gas development in the Decision Area are located near the southern Deerlodge Valley, Sleeping Giant, Canyon Ferry, Bozeman, and Livingston. In the southern Deerlodge Valley area, there is no habitat for Yellowstone

cutthroat trout and Arctic grayling and no known habitat for 90-100 percent genetically pure westslope cutthroat trout. Lost Creek, a bull trout stream, flows outside of the southern Deerlodge Valley area but when a 1-mile NL buffer is applied, approximately 420 acres of federal mineral estate lands adjacent to this stream would be protected from loss of habitat, water quality or water quantity.

In the Sleeping Giant area, there is no habitat for Yellowstone cutthroat trout, Arctic grayling, or bull trout and there is no known habitat for 90-99 percent genetically pure westslope cutthroat trout. However, there are approximately 700 acres adjacent to 99-100 percent genetically pure westslope cutthroat trout streams in this area that would be protected with a 0.5 mile NL on either side of streams. This would provide greater protection to riparian habitat, aquatic habitat, water quality and surface/subsurface flows than Alternatives A, B or D.

In the Canyon Ferry area, there is no habitat for Yellowstone cutthroat trout, Arctic grayling, or bull trout and there is no known habitat for 90-100 percent genetically pure westslope cutthroat trout.

In the Bozeman area, there is no habitat for Arctic grayling, bull trout, or habitat for 90-100 percent genetically pure westslope cutthroat trout. There would be approximately 30 acres adjacent to streams with Yellowstone cutthroat trout that would be protected with a 0.5 mile NL. This would provide greater protection to riparian habitat, aquatic habitat, water quality and surface/subsurface flows than Alternatives A, B or D.

In the Livingston area, there is no habitat for Arctic grayling, bull trout, or habitat for 90-100 percent genetically pure westslope cutthroat trout. There would be approximately 900 acres adjacent to streams with Yellowstone cutthroat trout that would be protected with a 0.5 mile NL.

Decision Area-wide, there would be 27,400 acres adjacent to streams with Arctic grayling that would have a NSO stipulation under Alternative C (0.5 mile from either side of stream) (**Table 4-13**). This would be the same as Alternative B and more protective than Alternatives A and D. None of the five areas with the most potential for oil and gas development have habitat for Arctic grayling.

Across the Decision Area, there would be 2,200 acres adjacent to streams with 90-99 percent genetically pure westslope cutthroat trout that would have a NSO stipulation under Alternative C (0.5 mile from either side of stream). None of the five areas with the most potential for oil and gas development have habitat for 90-99 percent genetically pure westslope cutthroat trout. Alternatives C and B would provide the same amount of protection to 90-99 percent genetically pure westslope cutthroat trout populations, but more protection than Alternatives A and D.

Decision Area-wide, there would be 11,000 acres adjacent to streams with 99-100 percent genetically pure westslope cutthroat trout that would have a NL stipulation under Alternative C (0.5 mile from either side of stream). Alternatives B, C and D would protect substantially more acres adjacent to westslope cutthroat trout (99-100 percent pure) streams from development due to oil and gas than Alternative A. Alternative C would provide additional protection to westslope cutthroat trout over Alternatives B and D by preventing directional drilling beneath 11,000 acres adjacent to streams. Prohibiting directional drilling could prevent negative impacts on water quality and/or quantity in cutthroat trout habitat. One of the five areas with the most potential for oil and gas development (Sleeping Giant) has habitat for 99-100 percent genetically pure westslope cutthroat trout and approximately 700 acres adjacent to these streams would be protected with a NL (**Table 4-13**).

Across the Decision Area, there would be 7,000 acres adjacent to streams with Yellowstone cutthroat trout that would have a NL stipulation under Alternative C. Alternative C would protect substantially more acres adjacent to bull trout streams from development due to oil and gas than all other alternatives. Alternative C would provide additional protection to bull trout by preventing directional drilling beneath 9,200 acres adjacent to streams. Prohibiting directional drilling could prevent negative impacts on water quality and/or quantity in bull trout habitat. Two of the five areas with the most potential for oil and gas development (Bozeman and Livingston) have habitat for Yellowstone cutthroat trout and approximately 930 acres adjacent to these streams would be protected with NL (**Table 4-13**).

Decision Area-wide, there would be 9,200 acres adjacent to streams with bull trout that would have a NL stipulation under Alternative C (1 mile from either side of stream). One of the five areas with the most potential for oil and gas development (southern Deerlodge Valley) has habitat for bull trout and approximately 420 acres adjacent to these streams would be protected with a NL (**Table 4-13**). Alternative C would protect substantially more acres adjacent to bull trout streams from development due to oil and gas than all other alternatives. Alternative C would provide additional protection to bull trout by preventing directional drilling beneath 9,200 acres adjacent to streams. Prohibiting directional drilling could prevent negative impacts on water quality and/or quantity in bull trout habitat.

Unlike all other alternatives, genetically pure westslope cutthroat would be protected from mineral activity in the Muskrat Creek drainage under Alternative C with a 180-acre mineral withdrawal. This would ensure the long-term viability of the new restored population of westslope cutthroat trout in Muskrat Creek. Muskrat Creek has importance to westslope cutthroat trout restoration beyond the local level because after a ten year, \$50,000 restoration effort, its population is now used as

a donor source to re-establish westslope cutthroat trout populations in a number of different locations in the state of Montana. This withdrawal would benefit the genetically pure westslope cutthroat trout population in Muskrat Creek by preventing loss of riparian vegetation, streambed and bank destabilization, erosion and sedimentation, loss of floodplain vegetation, alteration of floodplain morphology, and alteration of stream channel morphology that could occur in association with locatable minerals activities, particularly placer mining. Another key impact that placer mining could have on westslope cutthroat trout is excavation, crushing, or disturbance of streambed gravels during the critical period of 6/1-8/31 when westslope cutthroat trout are spawning and eggs are incubating/hatching in redds in the streambed.

Plants

Assuming that the low end of the range of proposed weed treatments is implemented under any alternative, under Alternative C the highest rate of noxious weed spread is projected, therefore the threat of special status plant habitat loss could be greatest for this alternative. The protections afforded by RMZs for special status species dependent on riparian areas would be highest under this alternative. Dry forest, shrub, and grass treatments (7,550 acres per decade) to maintain or restore habitat of Lemhi penstemon, sapphire rockcress and lesser rushy milkvetch would be the least under this alternative: on the other hand the possibility of disturbing unknown populations would be reduced. Treatments of cool, moist forest types would be least under this alternative, which would cause the least amount of road construction thus reducing threats to species such as muskroot and Sitka columbine.

Oil and gas leasing NSO restrictions within 0.5 mile of known populations would provide the greatest amount of protection to them with the largest disturbance-free buffer.

Effects of Alternative D

Wildlife

The effects from Alternative D to special status wildlife species would be the same as described under "Effects of Alternative D" in the general Wildlife section.

Dry forests are currently well outside the historic average of natural variability due to fire suppression and heavy historic grazing. The effects on special status wildlife species from treatments under Alternative D in dry forest would be the same as described under "Effects of Alternative D" in the general Wildlife section. Alternative D would restore the most acres of dry forest habitats for migratory birds, northern goshawks, flammulated owls, long-legged myotis, long-eared myotis, and fringed myotis compared to the other alternatives. The short-term impacts from disturbance would be greatest with this alternative but Alternative D would also pro-

vide the most long-term benefits of restoring habitat for dry forest species.

The effects on special status wildlife species from treatments under Alternative D in cool, moist forest habitats would be the same as described under “Effects of Alternative D” in the general Wildlife section. Alternative D would restore the most acres of cool, moist forest habitat for migratory birds, lynx, fisher, wolverine and bat species compared to all other Alternatives.

Like Alternative A, Alternative D would not have retention guidelines for snag and down woody habitat. Snag creation could occur in conjunction with vegetation management projects but snags would not be actively recruited in snag deficient areas.

Unlike Alternative A, snags that have been naturally created being through forest insects, disease, and fire would be retained, to some degree, under Alternative D. This would provide habitat for snag dependant species while still allowing some commodity forest product removal. Alternative D would retain substantially smaller patches of dead and dying forest than Alternatives B and C. Populations of special status species that depend on dead and dying forest would be at greater risk from the loss of nesting and foraging habitat with the implementation of Alternatives A and D than with Alternatives B and C.

Under Alternative D, the effects on special status wildlife species from treatments in grasslands and shrublands would be the same as described under “Effects of Alternative D” in the general Wildlife section. Alternative D would restore more acres of grassland and sagebrush shrubland habitat for migratory birds, golden eagles, ferruginous hawks, Swainson’s hawks, long-billed curlews, Brewer’s sparrows, mountain plovers, sage grouse, and pygmy rabbit compared to all other alternatives. The short-term effects from disturbance would be greatest under Alternative D.

Noxious weed management would have minimal negative impacts on special status species but could provide substantial beneficial effects. The effects on special status wildlife species from noxious weeds treatments under Alternative D would be the same as described under “Effects of Alternative D” in the general Wildlife section.

Fifty-foot SMZs would be implemented under Alternative D, the same as Alternative A. The effects from SMZs would be the same as described under “Effects Common to All Alternatives” and “Effects of Alternative D” in the general Wildlife section. Smaller riparian management areas proposed under Alternatives D and A, along with the types and extent to management activities allowed in SMZs, would reduce breeding, brood rearing, foraging, hiding cover and movement corridors for a wide range of special status species compared to Alternatives B and C.

Alternative D would actively restore the most acres of forest, riparian, grassland and shrubland habitats for special status species of all alternatives. The trade-off to habitat restoration would be an increase in short-term disturbance and the creation of new and temporary roads to access the Decision Area for vegetative treatments. An increase in temporary and, especially, permanent roads could cause detrimental effects to special status species but the effects would be less than under Alternative A.

Since Alternatives D and A would not have timing restrictions on prescribed burning (Alternatives B and C) or on mechanical treatments (Alternative C), these alternatives would have more mortality of migratory and resident birds during the breeding season through project implementation.

There would be fewer miles of open roads under Alternative D compared to Alternative A. Alternative D, however, would have more open roads than Alternatives B and C. The effects of roads on special status species would be the same as described under “Effects Common to All” and “Effects of Alternative D” in the general Wildlife section. Open road densities under Alternative D could result in fewer acres of year-round habitat and migration corridors, and more disturbance and displacement of wildlife, road kill, and fragmentation of habitat compared to Alternatives B and C.

Alternative D would provide less suitable habitat due to new road construction in occupied grizzly bear habitat than Alternatives B and C by allowing new permanent roads in areas where open road densities are greater than 0.5 mi/mi². Grizzly bears under utilize habitat adjacent to roads and the addition of permanent roads in grizzly bear habitat could result in bears avoiding areas. Under this alternative, the BLM would emphasize reducing open road densities in areas where they exceed 1.5 mi/mi². This would provide lower quality and less suitable grizzly bear habitat compared to Alternatives B and C but it would provide more habitat than Alternative A.

Alternative D would provide more acres of suitable habitat for grizzly bears and reduce the potential for human-bear interactions than Alternative A, but less than Alternatives B and C.

Through travel management, Alternative D would provide greater benefits to grizzly bears and other special status species by reducing fragmentation of habitats, protecting larger blocks of habitat, and reducing disturbance than Alternative A, but fewer benefits than Alternatives B and C.

Under Alternative D, there would be more acres open for cross-country snowmobile use (139,138 acres) than under Alternatives B and C but less than under Alternative A (no restricted areas). The negative affects due to cross-country snowmobile use to special status species would be greater under Alternative D than under Alternatives B and C but less than under Alternative A.

Like Alternative A, this alternative would not restrict clearing vegetation near special status bat habitat (caves and abandoned mines) and could lead to disturbance and detrimental alteration of these habitats.

Protection of breeding raptors from noise and other disturbances would be less restrictive with Alternative D than the other action alternatives with the implementation of a 0.25 mile buffer around active nests. Alternative D would provide greater protection from disturbance than Alternative A but would protect breeding raptors less than Alternatives B and C.

The protection of unoccupied raptor nests for 3 years and retention of suitable forested habitat within a 0.25 mile buffer around unoccupied nests would protect less habitat for raptors than under the other action alternatives but more than under Alternative A.

Like Alternative A, this alternative would not emphasize restoration of vegetation around bald eagle nest sites. This could have greater negative impacts than under Alternatives B and C.

The effects related to mineral development, including oil and gas would be the same as described under “Effects Common to All Alternatives” and “Effects of Alternative D” in the general Wildlife section.

All alternatives would have 12 stipulations to lessen the effects of oil and gas development on special status species (other stipulations that affect wildlife are described in the general Wildlife section) (Table 4-12).

Under Alternative D, these stipulations would include CSU for grizzly bear habitat and gray wolf den sites; NSO in and around prairie dog towns, sage grouse leks, bald eagle nest sites, other raptor breeding territories, peregrine falcon nest sites; and timing restrictions for sage grouse winter and spring range, sage grouse breeding habitat, bald eagle breeding habitat and ferruginous hawk nest sites.

The five areas with the most potential for oil and gas development in the Decision Area are located near the southern Deerlodge Valley, Sleeping Giant, Canyon Ferry, Bozeman, and Livingston. There is currently one known bald eagle nest site in the southern Deerlodge Valley area but it is well outside of any federal mineral estate lands. There are no known ferruginous hawk nests, peregrine falcon nests or other raptor breeding territories in this area. There is no known sage grouse habitat or prairie dog towns in this area. This area is not within the distribution or recovery zone of the grizzly bear and there are no known gray wolf den or rendezvous sites.

Currently, there are eight known bald eagle nests sites in the Sleeping Giant area and approximately 740 acres would be protected with a NSO stipulation. An additional 1,750 acres beyond the 0.5 mile bald eagle NSO would have a 2/1–8/31 timing restriction (same as Alternatives A and B). There are no known ferruginous hawk

nests, sage grouse habitat, or prairie dog towns in this area. There is one known peregrine falcon nest site outside of federal mineral estate lands but after buffering this nest site with a 1 mile buffer, approximately 30 acres would be protected with a NSO stipulation (same as Alternative B). Other raptor breeding territories in the Sleeping Giant area would be given minimal protection under Alternative D with Standard Lease Terms. This would be the same as Alternative A. Like Alternative A, approximately 2,600 acres are within occupied grizzly bear habitat and would have minimal protection with CSU. Under a CSU, there could be exploration and development but with some restrictions. There are no known gray wolf den or rendezvous sites in this area.

Currently, there are six known bald eagle nests sites in the Canyon Ferry area and approximately 330 acres would be protected with a NSO stipulation. An additional 1,100 acres beyond the 0.5 mile bald eagle NSO would have a 2/1–8/31 timing restriction (same as Alternatives A and B). There are no known ferruginous hawk nests, peregrine falcon breeding territories, sage grouse habitat, or prairie dog towns in this area. Other raptor breeding territories in the Canyon Ferry area would be given minimal protection under Alternative D with a Standard Lease Terms. This would be the same as Alternative A. The area is not within the recovery zone or occupied grizzly bear habitat and there are currently no known gray wolf den or rendezvous sites.

There are currently no known bald eagle nest sites, ferruginous hawk nests, peregrine falcon nests, sage grouse habitat, or prairie dog towns in the Bozeman area. Approximately 1,300 acres are within occupied grizzly bear habitat and would be minimally protected with a CSU stipulation. Under a CSU, there could be exploration and development but with some restrictions. There are no known gray wolf den or rendezvous sites in this area.

Currently, there are four known bald eagle nests sites in the Livingston area and approximately 40 acres would be protected with the NSO stipulation. An additional 300 acres beyond the 0.5 mile bald eagle NSO would have a 2/1–8/31 timing restriction. There are no known ferruginous hawk nests, other raptor nest sites, sage grouse leks/breeding habitat, or prairie dog towns in this area. There are, however, approximately 43 acres within sage grouse winter and spring habitat that would be protected with a 12/1-5/15 timing restriction (same as Alternatives A and B). There is one known peregrine falcon breeding territory in the Livingston area that would be protected with approximately 60 acres in a NSO stipulation. Approximately 100 acres are within occupied grizzly bear habitat and would be minimally protected with the CSU stipulation. There are no known gray wolf den or rendezvous sites in this area.

Decision Area-wide, there would be 2,600 acres surrounding bald eagle nest sites that would be protected with a NSO stipulation under Alternatives A, B and D (0.5 mile from nest). Three of the five areas with the

most potential for oil and gas development have bald eagle nest sites (1,110 acres) that would be protected with the 0.5 mile NSO stipulation (**Table 4-12**).

An additional 7,000 acres beyond the NSO boundary would be protected with a timing restriction of 2/1-8/31. This would provide the same protection as Alternatives A and B, but less protection than Alternative C which would have a 1 mile NL stipulation.

Currently in the Decision Area including the five areas with the most potential for oil and gas development, there would be 0 acres protected for ferruginous hawks (there are no known breeding territories). When located, ferruginous hawk breeding territories would be given more protection under Alternative D compared to Alternative A, but less than with Alternatives B and C.

Decision Area-wide, there would be 3,820 acres surrounding peregrine falcon nest sites with the NSO stipulation (1 mile). This would be the same as under Alternative B but more restrictive than under Alternative A. Two of the five areas with the most potential for oil and gas development currently have known nest sites (Sleeping Giant and Livingston) and a total of 90 acres would be protected with a NSO of 1 mile surrounding nest sites. Alternative D would provide more protection to peregrine falcons by reducing disturbance and preventing loss of habitat than Alternative A.

Currently, there are no known active prairie dog towns within the Decision Area (including the five areas with the most potential). When located, all alternatives would protect the actual prairie dog town with a NSO but only Alternative A would protect habitat around prairie dog towns for expansion of the town. Alternative A would provide more protection to prairie dogs than all other alternatives.

Within the Decision Area and the five areas with the most potential for oil and gas development there are no known sage grouse lek sites. However, across the Decision Area there would be approximately 2,800 acres of sage grouse breeding habitat located within 3 miles of lek sites protected with a timing restriction of 3/1-6/30. In the five areas with the most potential for oil and gas development, however, there is currently no known sage grouse breeding habitat. This alternative would provide the same amount of protection as under Alternative B, less protection than Alternative C but more than Alternative A. Decision Area-wide, there are approximately 67,000 acres within sage grouse winter and spring range that would be protected with a 12/1-5/15 timing restriction (same as Alternatives A and B). One of the five areas with the most potential for oil and gas development has a small amount of known sage grouse winter or spring range (43 acres) that would be protected with the timing restriction.

Currently in the Decision Area, there is only one known gray wolf den site. Approximately 700 acres would be minimally protected around this den site with a CSU

stipulation (1 mile from den or rendezvous site). Unlike Alternatives B and C, Alternatives A and D would not ensure that den and rendezvous sites are not disturbed from oil and gas exploration because some activity would be allowed near them.

Across the Decision Area, there are approximately 7,400 acres in grizzly bear recovery areas that would be protected with CSU (same as Alternative A). None of the five areas with high potential for oil and gas development are within the recovery zone of the grizzly bear. Approximately 54,000 acres are within occupied grizzly bear habitat and would be minimally protected with a CSU stipulation. Three of the five areas with the most potential for oil and gas development are within occupied grizzly bear habitat (Sleeping Giant and Livingston) and approximately 4,000 acres would have the CSU stipulation. Unlike Alternatives B and C, Alternatives D and A would not fully ensure that grizzly bears are free from disturbance or habitat loss from oil and gas exploration and development.

Fish

The effects described under “Effects Common to All Alternatives” and “Effects of Alternative D” in the general Fish section would be the same for special status fish species.

As with Alternative A, riparian areas would only be protected by SMZs under Alternative D. The SMZ would generally be 50 feet on both sides of the centerline of the stream. This SMZ would provide some protection to special status fish and would have the same effects as described under “Effects Common to All Alternatives” and “Effects of Alternative A” in the general Fish section. Since the width of the SMZs would be smaller than under Alternatives B and C and the management emphasis would not explicitly be to meet riparian goals and objectives, Alternatives A and D could detrimentally affect special status fish by allowing riparian and aquatic habitats to become degraded.

Under Alternative D, there would be an emphasis on maintain and restoring habitat for genetically pure and slightly hybridized (up to 10 percent) populations of westslope cutthroat trout. Alternative D would emphasize less protection and restoration of westslope cutthroat populations compared to Alternatives B and C but more than Alternative A.

Like Alternative A, this alternative would not emphasize the removal of brook trout and other non-native species that out-compete or breed with westslope cutthroat trout. Alternatives A and D would potentially allow more populations of westslope cutthroat trout to be lost from competition or hybridization compared to Alternatives B and C.

Alternative D would contain 2.7 miles of habitat for special status fish species in ACECs. This would be 46 percent less than under Alternatives B and C.

All alternatives would have five stipulations to lessen the effects of oil and gas development on special status fish (stipulations that effect fish are described under “Fish”) (**Table 4-13**). Under Alternative D, these stipulations would include: NSO adjacent to 99-100 percent genetically pure westslope cutthroat trout streams and bull trout streams; and CSU adjacent to Arctic grayling and westslope (90-99 percent pure) and Yellowstone cutthroat trout streams.

The five areas with the most potential for oil and gas development in the Decision Area are located near the southern Deerlodge Valley, Sleeping Giant, Canyon Ferry, Bozeman, and Livingston. In the southern Deerlodge Valley area, there is no habitat for Yellowstone cutthroat trout and Arctic grayling and no known habitat for 90-100 percent genetically pure westslope cutthroat trout. Lost Creek, a bull trout stream, flows outside of the southern Deerlodge Valley area but when a 0.5 mile NSO buffer is applied, approximately 32 acres adjacent to this stream in subsurface ownership would be protected from loss of habitat. This would be the same level of protection as under Alternative B, less protection than Alternative C and more than Alternative A.

In the Sleeping Giant area, there is no habitat for Yellowstone cutthroat trout, Arctic grayling, or bull trout and there is no known habitat for 90-99 percent genetically pure westslope cutthroat trout. However, there are approximately 700 acres adjacent to 99-100 percent genetically pure westslope cutthroat trout streams in this area that would be protected with a 0.5 mile NSO on either side of the stream (same as Alternative B). This would provide greater protection from loss of habitat compared to Alternative A.

In the Canyon Ferry area, there is no habitat for Yellowstone cutthroat trout, Arctic grayling, or bull trout and there is no known habitat for 90-100 percent genetically pure westslope cutthroat trout.

In the Bozeman area, there is no habitat for Arctic grayling, bull trout, or habitat for 90-100 percent genetically pure westslope cutthroat trout. There would be approximately 30 acres adjacent to streams with Yellowstone cutthroat trout that would be protected with a 0.5 mile CSU on either side of the streams. Alternative D would not ensure complete protection of Yellowstone cutthroat trout streams from loss of riparian habitat. Alternative D could also negatively impact upslope habitat that could affect riparian and aquatic functions to Yellowstone cutthroat streams. This alternative would provide the least amount of protection to Yellowstone cutthroat trout than the other alternatives because exploration and development would be allowed under a CSU stipulation. However, under a CSU stipulation, activity associated with oil and gas development could be relocated, require special design, or require on or off site mitigation measures to prevent impacts to Yellowstone cutthroat trout. This could provide some amount of protection to riparian and aquatic habitats as well as to water quality.

In the Livingston area, there is no habitat for Arctic grayling, bull trout, or habitat for 90-100 percent genetically pure westslope cutthroat trout. There would be approximately 900 acres adjacent to streams with Yellowstone cutthroat trout that would be protected with a 0.5 mile CSU stipulation. Alternative D would not ensure complete protection of Yellowstone cutthroat trout streams from loss of riparian habitat. Alternative D could also negatively impact upslope habitat that could affect riparian and aquatic functions to Yellowstone cutthroat streams. This alternative would provide the least amount of protection to Yellowstone cutthroat trout compared to the other alternatives because exploration and development would be allowed under a CSU stipulation.

Decision Area-wide, there would be 27,400 acres adjacent to streams with Arctic grayling that would have limited protection with a CSU stipulation under Alternative D (0.5 mile from either side of stream). None of the five areas with the most potential for oil and gas development have habitat for Arctic grayling. Habitat for Arctic grayling would have the least amount of protection under Alternative D because some exploration and development would be allowed within 0.5 mile of grayling streams. The effects from a CSU stipulation under Alternative D to fish and other aquatic species could range from minor to major and could have both short-term and long-term effects. Oil and gas operations can disrupt surface and groundwater flow patterns and have the potential to release pollutants to surface and groundwater, contaminating aquatic habitats. Both water and soil contamination may be harmful to riparian and wetland vegetation. Oil and gas development and associated activities could also lead to increased sedimentation and loss of riparian vegetation which could result in a loss of aquatic habitat for the Arctic grayling.

Across the Decision Area, there would be 2,200 acres adjacent to streams with 90-99 percent genetically pure westslope cutthroat trout that would have limited protection with a CSU stipulation under Alternative D (0.5 mile from either side of stream). None of the five areas with the most potential for oil and gas development have habitat for 90-99 percent genetically pure westslope cutthroat trout. Habitat for 90-99 percent genetically pure westslope cutthroat trout would have the least amount of protection under Alternative D because some exploration and development would be allowed within 0.5 mile of cutthroat trout streams. The effects from a CSU stipulation under Alternative D to fish and other aquatic species could range from minor to major and could have both short-term and long-term effects. Oil and gas operations can disrupt surface and groundwater flow patterns and have the potential to release pollutants to surface and groundwater, contaminating aquatic habitats. Oil and gas development and associated activities could also lead to increased sedimentation and loss of riparian vegetation which could result in a loss of aquatic habitat for the westslope cutthroat trout.

Decision Area-wide, there would be 11,000 acres adjacent to streams with 99-100 percent genetically pure westslope cutthroat trout that would have a NSO stipulation under Alternative D (0.5 mile from either side of stream). This would be the same as under Alternative B, less protection than Alternative C, but more protection than Alternative A. One of the five areas with the most potential for oil and gas development (Sleeping Giant) has habitat for 99-100 percent genetically pure westslope cutthroat trout and approximately 700 acres adjacent to these streams would be protected with a NSO stipulation (Table 4-13).

Across the Decision Area, there would be 7,100 acres adjacent to streams with Yellowstone cutthroat trout that would have limited protection with a CSU stipulation under Alternative D (0.5 mile from either side of stream). Two of the five areas with the most potential for oil and gas development (Bozeman and Livingston) have habitat for Yellowstone cutthroat trout and approximately 930 acres adjacent to these streams would be protected with the CSU stipulation. Habitat for Yellowstone cutthroat trout would have the least amount of protection under Alternative D because some exploration and development would be allowed within 0.5 mile of cutthroat trout streams.

Across the Decision Area, there would be 4,000 acres adjacent to streams with bull trout that would be protected with a NSO stipulation under Alternative D (0.5 mile from either side of stream). One of the five areas with the most potential for oil and gas development (southern Deerlodge Valley) has habitat for bull trout and approximately 32 acres adjacent to these streams would be protected with the NSO stipulation. Alternative D would provide more protection to bull trout than Alternative A, the same protection as Alternative B, and less protection than Alternative C.

Alternative D would provide the least amount of protection to Arctic grayling, westslope cutthroat trout, and Yellowstone cutthroat trout through the implementation of a CSU stipulation. Under a CSU stipulation, exploration and development could occur adjacent to streams although restrictions could be placed on the type and extent of development. Some protection would be provided under a CSU by restricting exploration and development along streams with special status fish species. Alternative D would have the greatest risks of increased sedimentation to streams, loss of riparian vegetation as well as a greater risk to an alteration of surface and subsurface flows compared to all other alternatives. The effects to bull trout would be the same as under Alternative B.

Under Alternatives A, B and D, westslope cutthroat trout would not be protected in the Muskrat and Nursery Creek drainages by a 180 acre mineral withdrawal in riparian areas. Muskrat Creek has importance to westslope cutthroat trout restoration beyond the local level because after a ten year, \$50,000 restoration effort,

its population is now used as a donor source to re-establish westslope cutthroat trout populations in a number of different locations throughout Montana. Without the withdrawal, the genetically pure westslope cutthroat trout population in Muskrat Creek could be threatened by the loss of riparian vegetation, streambed and bank destabilization, erosion and sedimentation, loss of floodplain vegetation, alteration of floodplain morphology, and alteration of stream channel morphology that could occur in association with locatable minerals activities, particularly placer mining. Another key impact that placer mining could have on westslope cutthroat trout is excavation, crushing, or disturbance of streambed gravels during the critical period of 6/1 to 8/31 when westslope cutthroat trout are spawning and eggs are incubating/hatching in redds in the streambed. If extensive mining impacts occurred in Muskrat Creek, it would likely not be possible to reclaim the stream adequately to re-establish the current population level of westslope cutthroat trout.

MFWP, BLM, USFS, and other entities are currently making efforts to restore westslope cutthroat trout (a sensitive species) populations in a portion of their historic, but currently unoccupied habitat in the Upper Missouri River basin. One goal of these efforts is to prevent a federal listing of this species under the Endangered Species Act. The Muskrat Creek westslope cutthroat trout population is used by MFWP as a donor source of fish to re-establish populations in other streams within and beyond the Planning Area boundaries. In this sense, the Muskrat Creek population is disproportionately important to westslope cutthroat trout restoration throughout the Upper Missouri River basin. If mining operations cause a decline in this population, the population may no longer be able to function as a donor source and efforts to restore other populations and prevent a federal listing of this species may be impeded.

Plants

Assuming that the low end of the range of proposed weed treatments is implemented under any alternative, under Alternative D the second lowest amount of noxious weed spread is forecast of all alternatives (47,000 acres), therefore the threat of special status plant habitat loss to noxious weed invasion could be less than the other action alternatives. The protections afforded by SMZs for the forested riparian species Idaho sedge and small yellow lady's slipper would be less than the buffers proposed by Alternatives B and C. Dry forest, shrub and grass treatments (44,050 acres per decade) to maintain or restore habitat of Lemhi penstemon, sapphire rockcress and lesser rushy milkvetch would be the highest under this alternative.

Oil and gas leasing NSO restrictions of known plant populations would protect the population but would provide limited protection of habitat with no set disturbance buffer.

WILDLAND FIRE MANAGEMENT

Effects Common to All Alternatives

Proposed management of the following resources, resource uses, and programs would have no or negligible anticipated impacts on fire management: Recreation (except Travel Management), Wilderness Study Areas, Energy and Minerals, Social and Economics, Farmlands, Environmental Justice, and Tribal Treaty Rights.

Treating forests and woodlands to reduce pest and disease risk would generally lead to a reduction in fuels and possibly a change in fire regime condition class (FRCC) by moving condition class toward Class 1 or 2. Reducing fuels would improve suppression effectiveness and firefighter safety. These treatments would be particularly important in the wildland urban interface (WUI). Removing forest products following wildland fire would have the same effect.

Treatments that mimic pre-fire suppression conditions would change FRCC at the stand level, by moving conditions class toward Class 1 or 2 in dry forest types, and consequently reduce fire intensity and improve wildland firefighter safety. All treatments specified (timber harvesting, small-diameter thinning, prescribed burning) would reduce understory fuels and reduce the incidence of stand-replacing fires. Treatments in the WUI would have the same effect, improving wildland fire suppression effectiveness and making it safer for firefighters to suppress wildland fires.

Treatments to reduce stem densities would change FRCC at the stand level, by moving condition class toward Class 1 or 2 and would reduce fuels in the cool moist forest types.

Conifer encroachment would be reduced through treatments, which would move toward changing the condition class in grasslands and shrublands to historic conditions.

Promoting the development of late successional riparian vegetation and reducing conifer encroachment would improve FRCC because conditions would become more like historic conditions in these areas.

Prescribed burning and livestock grazing (including Land Health Standards) would reduce fine fuels, which increase fire spread; and reduce ladder fuels, which facilitate stand replacing fires. Leasing currently unleased allotments or vacant available lands could reduce fine fuels, but could contribute to an increase in FRCC if conifer encroachment also occurs.

Noxious weed treatments would reduce noxious weed infestations, which could change FRCC in areas where cheatgrass or knapweed are contributing to the departure from historic fire regimes.

Reducing the invasion and establishment of undesirable or invasive vegetation species would change FRCC or

maintain it at current levels. In some instances, such as with cheatgrass, extreme fire behavior would be reduced, which would reduce fuels and the risk to firefighters.

Fuels management treatments would reduce fuel loadings which would reduce the intensity and severity of wildland and prescribed fires. Reductions in severity of wildland fire would help prevent adverse affects on soil integrity and stability, root systems, and recovery of post-fire vegetation.

Maintaining or moving toward historic fire regimes and Condition Classes would reduce or maintain FRCC. In the dry conifer type, this would improve firefighter safety and reduce the hazard associated with wildland fire risk in the WUI. Prescribed fire, timber harvest and other mechanical methods, used to create a mosaic of successional stages for the benefit of special status species, would change Condition Class and reduce fuels and fire behavior which would improve firefighter safety. Where these treatments occur in the WUI, the risk to the WUI would benefit from the change in FRCC in grassland and dry conifer sites. Treatments in the WUI would be designed to reduce risks and hazards of wildland fire, and would not necessarily be designed to reduce FRCC (particularly in shrubland and cool, moist conifer types), or provide other resource benefits, although changes in FRCC and resource benefits could be a by-product.

Mitigations to protect some species could reduce the extent of treatment or result in methods used that are not as effective in fuel reduction or restoration. For example, even-aged management might be the most effective way to restore FRCC, but the presence of a special status species could require the size of the treatment to be reduced, patches to be left undisturbed or require more cover, which would reduce the effectiveness of the treatment.

Managing areas as Wilderness Areas or Wilderness Study Areas limits activities which would modify FRCC or fuels, however, access would be limited which could reduce the number of human-caused fires, as well as the spread of noxious weeds, which could increase FRCC. Fire suppression would be minimal in these areas.

Mitigating short-term impacts on visual resources could reduce the extent or effectiveness of treatments to reduce FRCC or fuels by limiting areas treated and types of treatment in order to meet visual goals.

Use of prescribed natural fire in ACECs could change FRCC and fuel loadings, as would controlling noxious weeds.

Restrictions applied to wildland fire management actions or wildland fire suppression for air quality protection or to minimize air quality degradation could reduce the effectiveness of treatments or suppression by eliminating some types of treatments (prescribed burning, logging).

For soil resources, mitigation or seasonal restrictions applied to wildland fire management actions or wildland fire suppression in areas already compacted or eroding could reduce the effectiveness of treatments or suppression by eliminating some types of treatments (prescribed burning, logging).

Using Land Health Standards to ensure water quality could also promote changes in FRCC and fuels. However, mitigation to avoid impacts on water quality could influence the location and extent of some fuel reduction treatments or wildland fire suppression, which could result in less effective treatments or direct suppression by reducing the acres treated or switching to a less effective suppression tactic.

Designing wildland fire management projects, including suppression and fuel reduction to avoid disturbance of historic properties could reduce their effectiveness in some instances.

Granting right-of-way, road use agreements, permits, and leases on public lands could increase access or use by the public, which could result in more human-caused fire ignitions.

Disposal of lands which are difficult or uneconomical to manage would promote efficiency in BLM's fire management program, including reduction of FRCC and fire suppression. Overall fire suppression access would be improved if these lands were disposed of. These tracts are often within the WUI, so disposal would reduce the BLM's responsibility for WUI lands.

Access management for lands and realty would promote gaining additional access, including acquiring additional lands. Additional access would provide better access for fire suppression, but also may improve public access, which could lead to additional human caused fires. Acquiring additional acres could increase the acres of WUI, or lead to additional acres with a higher FRCC.

Effects of Alternative A

Vegetation management actions (including salvage, timber harvesting, prescribed burning, small-diameter thinning, and thinning) would reduce densities of seedlings, saplings, and pole-sized trees and remove ladder fuels and other fuels to reduce the intensity of fires and to prevent wildland fires from spreading to the crowns of larger trees.

Fire suppression strategies under this alternative would allow for some flexibility to manage wildland fires, but a large percentage of fires could be controlled while still small in size.

Most BLM land in the Butte Field Office (258,200 acres, 85 percent) would be managed as Fire Management Category C. Fire and non-fire fuels treatments may be utilized to ensure constraints are met and to reduce undesirable effects of unplanned fires. Fuels reduction actions, including mechanical treatments and prescribed

fire, would result in reduced wildland fire intensity and less potential for unwanted fires.

Alternative A would treat up to 12,780 acres per decade to reduce fire intensity and behavior, improve wildland fire fighter safety, and change FRCC. Compared to the rest of the alternatives, only Alternative C treats fewer acres.

In Alternative A Recreation Opportunity Spectrum (ROS) would be determined on a case by case basis. This would provide for the most flexibility for designing and planning fuels projects.

Alternative A has the second fewest acres designated in VRM Class I and II. This would provide for more flexibility for designing, planning, and implementation of fuels projects as compared to Alternatives B and C.

Sleeping Giant ACEC (11,679) management to protect naturalness and primitive recreation, along with no fire-wood removal of down dead and down material would affect fire management, particularly mechanical fuel reduction. Prescribed burning however could be used to reduce fuels and FRCC.

There are no seasonal timing restrictions for prescribed fire or mechanical treatments in this alternative. This would provide for the most flexibility for implementation of fuels treatments.

Effects Common to Action Alternatives

Wildland urban interface would be the top priority for hazardous fuels treatments. Those areas outside of WUI would be prioritized for treatment based on the historical fire regime and current condition classes. Funding for treatments within WUI and other fire dependent ecosystems would remain constant, and project level collaboration and coordination would continue with other agencies.

Fuels reduction in the WUI would result in removal of trees and shrubs to reduce the hazards associated with high intensity and severity wildland fires. Fuels reduction would decrease the density of trees and ground fuels and would result in reduced fire intensity and resistance to control.

Management to maintain fire-dependent ecosystems with fire regimes consistent with pre-suppression conditions would help maintain lower fuel levels and a reduced potential for high-severity fires.

Prescribed burning, mechanical treatments, and other appropriate methods would move toward restoring FRCC in grassland communities to historic conditions.

Meeting Land Health Standards equates to reducing or maintaining FRCC levels.

Emphasizing old forest structure (snag/down wood components and large diameter trees) could reduce the effectiveness of fire management actions, particularly in

the WUI where goals to retain old forest structure and fuel reduction goals may be in conflict.

Using FRCC to determine levels of fuel treatment outside the WUI would ensure that treatments maintain or move toward changing FRCC levels. In dry conifer and grassland types this would result in less intensive fire behavior. In cool, moist forest and riparian types, they could reduce fire behavior, but not necessarily.

Seasonal timing restrictions for big game winter and spring range, big game calving and grizzly spring and summer range could complicate the spring and early summer prescribed burning season and require additional mitigation.

Effects of Alternative B

Effects of fire management activities in Alternative B would be the similar to those described under Alternative A. However, no Fire Management Units (FMUs) would have any Category A designated lands, so prescribed fire could be used throughout the Decision Area (given other resource constraints).

Fire suppression under this alternative would be similar to Alternative A except it would allow for more flexibility to manage fires with no FMU Category A designations.

Relative to the rest of the alternatives, Alternative B would treat the second most acres (up to 34,650 acres per decade) to reduce fire intensity and behavior, improve wildland fire fighter safety, and maintain or move toward historic FRCC levels.

In Alternative B Recreation Opportunity Spectrum (ROS) would place 36,800 acres in Semi-primitive non-motorized. This could limit the flexibility for designing and planning fuels projects and implementing fire suppression. This may limit the opportunities and effectiveness of to reduce fire intensity and behavior, improve wildland firefighter safety, and change FRCC.

Alternative B would have the 75,100 designated in VRM Class I and II. This could limit the effectiveness and flexibility for designing, planning, and implementation fuels projects on those acres. This may limit the opportunities and effectiveness to reduce fire intensity and behavior, improve wildland fire fighter safety, and change FRCC, especially in areas of wildland urban interface.

There are seasonal timing restrictions for prescribed fire in this alternative. This may cause delays, increase costs, and possibly decrease effectiveness in reducing fire intensity and behavior, improving wildland fire fighter safety, and changing FRCC.

Effects of Alternative C

Alternative C would treat the fewest acres (up to 8,200 acres per decade) relative to the rest of the alternatives and therefore would do the least to reduce fire intensity

and behavior, improve wildland fire fighter safety, and change FRCC.

Based on the acres of anticipated treatment and the percentage of the FMUs in Category A, it is estimated that a maximum of 100 acres per decade of treatments using fire could be eliminated in the Central Missouri FMU. The majority of these treatments would have occurred in dry forest and grassland types. The Missouri FMU includes approximately 37,000 acres of the 147,000-acre Missouri watershed. In Alternative C a maximum of 4,425 acres of treatment would occur in this watershed, indicating there would be no impact on the overall treatment planned because all fire treatments could occur in the remainder of the watershed designated as Category B or C. The Blackfoot (1,000 acres) and Gallatin (2,000 acres) FMUs are also designated as Category A, but in Alternative C, no treatments would occur in these watersheds.

Most BLM land in the Butte Field Office (approximately 243,000 acres, 79 percent) would be managed as Fire Management Category C. These areas would receive lower suppression priority in multiple wildland fire situations. Fire and non-fire fuels treatments may be utilized to ensure constraints are met and to reduce hazardous effects of unplanned fires. Fuels reduction actions, including mechanical treatments and prescribed fire, would result in more open forests, dominated by larger trees, with less potential for unwanted ignitions of intense wildland fires.

In Category A and B areas, fire suppression is a high priority to prevent unacceptable resource damage or to prevent losses of life or property.

Fire suppression strategies under this alternative would allow for the least amount of flexibility to manage fires, but more fires could be controlled at smaller sizes.

The flexibility of fire management strategies in Wilderness Study Areas under Alternative C would allow opportunities to manage larger fires for resource benefits.

In Alternative C Recreation Opportunity Spectrum (ROS) would place 63,700 acres in Semi-primitive non-motorized; the most acres of all the alternatives. This could limit the flexibility for designing and planning fuels projects and implementing fire suppression. This may limit the opportunities and effectiveness to reduce fire intensity and behavior, improve wildland fire fighter safety, and change FRCC.

Alternative C has the most VRM Class II lands (62,300 acres) of any alternative, which may affect the extent of some fire management actions and fuel treatments.

This may limit the opportunities and effectiveness to reduce fire intensity and behavior, improve wildland fire fighter safety, and change FRCC especially in areas of wildland urban interface.

This alternative has the greatest level of seasonal timing restrictions for prescribed fire and mechanical treatments. This may cause delays, increase costs, and possibly decrease effectiveness in reducing fire intensity and behavior, improving wildland fire fighter safety, and changing FRCC.

Effects of Alternative D

Alternative D would treat the most acres (up to 50,850 acres per decade) relative to the rest of the alternatives and therefore would do the most to reduce fire intensity and behavior, improve wildland fire fighter safety, and move toward historic FRCC levels.

Most BLM land in the Butte Field Office (approximately 265,000 acres, 86 percent) would be managed as Fire Management Category C or D, which are areas where fire is desired to manage ecosystems. These areas would receive lower suppression priority in multiple wildland fire situations. Fire and non-fire fuels treatments may be utilized to ensure constraints are met and to reduce hazardous effects of unplanned fires.

Fire suppression strategies under this alternative would allow for the most flexibility to manage fires with a smaller percentage of fires controlled at smaller sizes.

Flexibility in fire management strategies in Wilderness Study Areas would allow opportunities to manage larger fires for resource benefits.

Alternative D has the least VRM Class II lands (13,000 acres) of any alternative, which may affect the extent of some fire management actions and fuel treatments.

In Alternative D Recreation Opportunity Spectrum (ROS) would place 30,000 acres in Semi-primitive non-motorized. This could limit the flexibility for designing and planning fuels projects and implementing fire suppression. This may limit the opportunities and effectiveness of efforts to reduce fire intensity and behavior, improve wildland fire fighter safety, and change FRCC.

There are no seasonal timing restrictions for prescribed fire or mechanical treatments in this alternative. This would provide the most flexibility for implementation of fuels treatments.

CULTURAL AND PALEONTOLOGICAL RESOURCES

Effects Common to All Alternatives

Since most resource uses/programs are discretionary, management measures under all alternatives include inventories to identify cultural and paleontological resources to allow for avoidance or mitigation of impacts. The greatest risk of damage or destruction of cultural resources across all alternatives results from non-discretionary development, casual, unauthorized activities (such as dispersed recreational activity, OHV use, and vandalism) and natural processes (natural decay,

deterioration, or erosion). Under all alternatives, unquantified indirect impacts would occur. Cultural resources would continue to deteriorate through natural agents, unauthorized public use, and vandalism.

Achieving the Desired Future Condition for vegetation in riparian/wetland areas would be positive for cultural resources. Protection of cultural resources that occur in these fragile environments increases proportionately with the increase in the percent improvement towards DFC of riparian/wetland habitats.

Archeological sites in the same locations as livestock congregation areas are vulnerable to trampling. Historic buildings and sometimes rock art sites are vulnerable to livestock entry and rubbing. Grazing management which meets established Standards for Rangeland Health and Guidelines for Livestock Grazing should reduce the amount and extent of impacts or damage to cultural resources resulting from grazing on public lands.

All classes of cultural resources are vulnerable to impacts from timber harvest activity due to ground disturbance. The Butte Field Office has more sites recorded in the dry forest class than any other vegetation type. Sites located in cool forest types, grasslands and riparian areas are less vulnerable because of fewer proposed management actions. Activity in sagebrush areas fall in between the dry forest regimes and other vegetation classes. Inventories performed at the activity planning level would insure avoidance of known sites and localities from timber harvest and fuel management activities.

Threats to all classes of cultural resources from prescribed fires can be reduced with the proper use of protective measures. Sites vulnerable to fire damage will receive an evaluation prior to lighting, and if determined eligible, will receive protective measures as described in the burn plan for each project. In order to maximize the potential for locating vulnerable sites, BLM will focus on-the-ground inventory in both low and high-potential areas and also in areas where cabins and campsites are more frequently found. Survey will additionally be directed toward areas that contain historic mining properties. Based on the information recovered from these inventories, appropriate protective measures will be employed to reduce the potential risk from prescribed fire to vulnerable sites.

In some instances, cultural or historic sites would be damaged or destroyed by wildfire suppression efforts critical to protect human life or property. Under standard protocols, impacts to known cultural resources would be considered and mitigated. Rehabilitation efforts would generally increase the protection of cultural deposits that may have remained unaffected from wildland fire by preventing or reducing erosion and encouraging rapid revegetation of denuded surfaces. Potential impacts from rehabilitation activities (such as mechanical reseeding) would be mitigated under standard procedures.

The issuance of rights-of-way, leases and permits that result in ground disturbing activities have the potential to directly or indirectly impact cultural resources but impacts would be mitigated under standard avoidance or recovery procedures.

Acquisition of new land parcels would have a mixed effect on cultural and paleontological resources. On the one hand, more sites under the protection of federal preservation laws may be acquired. However, increasing access to public lands could have an indirect effect of exposing cultural resources to increased damage from illegal collection of artifacts and vandalism.

Impacts from dispersed recreational activity (camping, hiking, horseback riding, mountain biking, OHV use, rock climbing, etc.) are difficult to assess, particularly as such activities may impact cultural resources that have yet to be identified and recorded. Increased visitation and recreational use can lead to the illegal collection of artifacts and vandalism. Providing recreational or public interpretation of cultural and historic resources, such as those on the Lewis and Clark National Historic Trail, may enhance appreciation and understanding of the fragile and finite nature of cultural resources. Similarly, promoting the adaptive reuse of historic buildings and structures for recreational purposes would help preserve and protect significant historic properties, helping fulfill the requirements of Section 110 of the NHPA.

Under all alternatives, wheeled, motorized travel would be restricted to designated roads and trails throughout the majority of the Decision Area, thus reducing the potential for impacts caused by unregulated off-road travel. The potential for impacts to cultural resources is proportional to the number of miles open for travel in the Decision Area. Unimproved two-track roads and trails designated for use cut through sites, scattering and breaking artifacts and causing erosion problems. The noise level and presence of people can impact the use of traditional cultural properties by Native Americans in some instances.

Cultural resources would benefit directly from BMPs for visual resource management. Limiting visual intrusions preserves the setting of sites, which is especially important for cultural properties of religious importance to Indian tribes. SRMAs also provide intangible protection for sites with religious importance by providing enhanced visibility and solitude, as well as quieter environments.

Developing new, or upgrading existing, transportation facilities could result in the permanent mitigated loss of cultural resources. Again, increased accessibility to resources could lead to vandalism and unauthorized collection of artifacts, but conversely, could also facilitate the use of traditional locations by Native Americans.

The number of roads open or closed presents a mixed impact to cultural or paleontological resources. The maintenance and upgrades of those roads do present the

potential for adverse effects to the sites and localities located in the area of disturbance; however less use on closed roads would halt current damage, and reduce the threat of future damage to sites.

Construction of new travel routes, or diking/ripping of decommissioned routes, threaten buried cultural deposits. However, regardless of the alternative, the first priority of planning is to preserve known sites by avoidance; therefore all proposed new travel routes, or routes that need to be diked or ripped for any reason, would be inspected first. This would enable travel plans to incorporate design alternatives and avoid disturbance to cultural resources.

Abandoned Mine Lands (AML) reclamation and remediation would have a direct impact to historic mining features and properties that may be mitigated by a number of methods. Remediation of open mines for safety purposes could have less impact using light construction that leaves most of the feature intact. In more comprehensive project areas, construction may be more intensive and require additional, more intensive data recovery.

Permitting for locatable minerals is non-discretionary and can result in total loss of cultural resources in the Area of Potential Effect. Inventory and planning can help save some properties, but remaining eligible properties would require some form of data recovery, depending on the use category assigned to the site.

Surface disturbing activities associated with leasable mineral sales and energy exploration and development could result in mitigated impacts to cultural resources. In addition, the potential for indirect and inadvertent impacts would increase proportionally to the amount of land available for mineral leasing and development.

No Surface Occupancy stipulations for oil and gas leasing and field development would help protect eligible cultural resources, traditional cultural properties and paleontological localities in the area.

Land use authorizations and land exchanges place resources at risk from development and also from loss of federal protections when those properties leave federal ownership.

Paleontological Resources

Management measures common to all alternatives would preserve and protect paleontological resources for present and future generations. The protective measures outlined for cultural resources would also be applied to any paleontological localities located during planning inventories, as per BLM Manual (8720). Unavoidable adverse effects would be mitigated through specimen recovery and analysis by permitted paleontologists in keeping with the significance of the locality.

Effects of Alternative A

Vegetation treatments under Alternative A would have a moderate impact on cultural resources, because this alternative would not reflect the high-end acreages proposed for vegetation treatments. Sites known to be in project areas, and those recorded in project areas during inventories, would be avoided during implementation.

The number of acres under VRM Class I would remain the same throughout all alternatives, but the number of acres in Class II in Alternative A would be much lower than Alternatives B and C. Since Classes III and IV would be managed on a case-by-case basis, it is not possible to determine if this alternative is more protective of visual resources than the others. Many more traditional cultural properties may or may not be adversely affected by this alternative, since the restrictions cannot be anticipated.

Alternative A would have the highest number of open roads and the lowest number of closed roads. More resources, both cultural and paleontological, would be impacted from increased access by motorized vehicles than with the other alternatives.

Effects Common to Action Alternatives

Increasing the number of acres of forest treatments would place more cultural resource sites and paleontological localities at risk.

The effects of designating varying fire use polygons cannot be directly measured, since suppression efforts can both help and harm cultural resources. Variable fire use polygons would have mixed effects on cultural resources. For example, traditional fire suppression efforts may damage buried cultural deposits in the process of protecting historic buildings with dozer lines. Since suppression efforts would be eliminated in Category D polygons, proactive inventories would help limit the potential for adverse effects on historic properties during wildfire events by altering suppression plans. Buried sites are less vulnerable than sites exposed on the ground surface, but high fire temperatures may still cause various physical alterations to artifacts and natural remains.

Development of recreation sites may have an adverse effect on cultural and paleontological resources. Those adverse effects would be mitigated by avoidance through redesigning the project, or data recovery if the site or locality could not be avoided.

Road closures would have a beneficial effect on cultural and paleontological resources from reduced compaction, reducing exposure of resource deposits from the unrestricted development of two-track roads, and reduced chances of vandalism from access to remote areas with vehicles.

Designating the Humbug Spires, Sleeping Giant, Sheep Creek, and Elkhorns Tack-on WSAs as ACECs under all action alternatives would protect cultural and paleonto-

logical resources in these areas, due to greater restrictions placed on ground-disturbing activity.

Since the value of many traditional cultural properties is based on a high level of air quality and a natural appearance to the landscape, dropping the Black Sage and Yellowstone Island VRM Classes from I to II (in the event Congress eliminates them from wilderness consideration) would present an adverse effect to traditional cultural properties in the viewsheds of these two areas. Increasing the amount of Class IV acreages would be detrimental to traditional cultural properties in those viewsheds.

Public education is enhanced from interpretive efforts planning for the Elkhorns ACEC.

Disposal of the approximately 8,901 acres identified for disposal under all action alternatives could place approximately 24 cultural resources at risk, as per the site dispersal average for the Decision Area. Inventory and evaluation on a case-by-case basis would alleviate that risk.

The two energy corridors that would be designated under all action alternatives received considerable mitigation measures prior to construction. Adding utilities to these corridors would not impact cultural or paleontological resources.

Oil and gas leasing and resource development does not differ significantly enough between alternatives. This activity would put both cultural and paleontological resources at risk and would require site-specific mitigation. This would be done through project redesign and avoidance where possible, and if the resources cannot be avoided, data recovery would be used. Stipulations attached at the time of leasing, and again prior to development as part of the overall NEPA process, would protect prehistoric sites, traditional cultural properties, and paleontological localities.

Effects of Alternative B

Increasing the amount of decadal vegetation treatments in both the dry forest and shrubland types may affect a proportional number of sites. However, inventories performed ahead of project implementation would mitigate the impacts to cultural resources. Increasing the number of acres managed at VRM Class II would improve the visual quality of traditional cultural properties in those viewsheds.

Protecting soils would protect valuable deposits of both paleontological and cultural resources. More cultural and paleontological resources would be threatened under Alternative B than under Alternative C from higher levels of ground disturbing activities. This would also be the case for travel management under Alternative B where decommissioned roads that may require ripping or additional blade work.

Effects of Alternative C

Under Alternative C, upper-end acreages of proposed dry forest treatment acres would put fewer cultural and paleontological resources at risk than in any other alternative due to the significantly lower amount of ground disturbance from treatment activity. Visual resource management in this alternative would be the most beneficial to traditional cultural properties where the viewshed is an integral component of the value of the site. While Alternative C would not increase the acreage managed under VRM Class I, it would provide for the greatest increase in acres managed under Class II and Class III, and the fewest acres managed under Class IV; and as such, would allow the fewest intrusions into the natural viewsheds remaining in the Decision Area.

Traditional cultural properties would benefit most from the lowered development/disturbance scenario in Alternative C. Less activity would result in less noise and visual impacts, as well as disturbance from other public land users. Alternative C would also result in the fewest consultations with Native American tribal governments. Alternative C would create the least risk overall to cultural and paleontological resources due to its lowest proposed amount of development and soil disturbance.

Effects of Alternative D

Under Alternative D, upper-end increases in proposed forest treatment acres would put more cultural and paleontological resources at risk than under the other three alternatives.

Visual resources managed under Alternative D would undergo more impacts than under either Alternative B or C, especially from a substantial drop in VRM Class II lands. The acres managed as VRM Class IV under Alternative D would be much higher than this acreage under Alternative C, but not much higher than under Alternative B. The Alternative D pattern of visual resource classes would have a more negative impact on traditional cultural properties that depend on the quality of the viewshed compared to Alternatives B and C.

Cultural and paleontological resources would be most vulnerable under Alternative D because of the increased risk of disturbing subsurface deposits. However, since avoidance of known sites is BLM policy, it does not necessarily follow that development would result in an increased amount of damage to cultural resources, paleontological localities, and traditional cultural properties. Because both resources are at greatest risk under alternative D than any other alternatives, more project-level planning and/or mitigation would be required with this alternative than with any of the other alternatives.

VISUAL RESOURCES

Effects Common to All Alternatives

Timber cutting and thinning could reduce the visual quality temporarily with regard to apparent modifications in color, line, and texture especially in sensitive viewing areas; however, projects would be designed to meet VRM classification objectives. Management in dry forest types would present the most potential for impacts on VRM objectives, as treatment acres would be the most extensive for this type.

Management in cool moist forests would generally be aimed at maintaining a diversity of age-classes (uneven-aged management). Generally, visual resource values could be maintained while selective cutting treatments are accomplished. An exception is lodgepole pine stands, which would require more even-aged management or clearcuts and therefore a higher potential for noticeability. Treatments that have long-term impacts on visual quality would be designed or mitigated to meet VRM objectives. Some treatments may be precluded if they are proposed in VRM Class I and II areas.

There may be some short or mid-term reductions in overall visual quality due to vegetation management actions in VRM III and IV areas. Because VRM would be considered during project planning, the overall VRM would be met over the long-term, but some activities (cutting or burning) may be visible during the short-term.

Protection and enhancement of riparian conditions would generally improve visual resources over the mid to long-term due to greater color and texture diversities and overall healthier appearances.

Limiting the spread of noxious weeds would be beneficial as the natural appearance of landscapes would be enhanced.

Wildland fire suppression and management actions for fire (wildland fire use, prescribed fire, and fuel reduction) may result in a short-term reduction in visual quality, however, these actions would promote long-term benefits as fewer acres would burn in an uncharacteristically large or severe manner. In addition to reducing the potential for severe wildland fires, these actions could also benefit visual resources by creating open vistas and more diverse landscapes with park openings and interspersed shrubs and trees. Due to fire suppression priorities and vegetative treatments, areas outside of the Wildland Urban Interface (WUI) would see more visual effects from wildland fire than those within the WUI.

Protection of Wilderness Study Areas, eligible Wild and Scenic River segments, ACECs, and National Trails would maintain visual resources and meet VRM objectives barring large-scale wildland fire events, substantial outbreaks of insect/disease occurrences to trees, or other natural alterations.

Following BLM Handbook H-8341-1 and mitigating short- and long-term visual impacts would help protect visual quality.

VRM I and II classifications would do the most to protect visual quality in the Decision Area and reduce the risk of visual quality impacts compared to other VRM classes. Alternatives with the most acres in VRM I and II would be the most protective of visual quality. VRM III and IV classifications would have the most potential to put visual resources at risk.

Minimizing or preventing air quality degradation would benefit visual quality by reducing the risk of degraded air quality (smoke obstructing viewpoints, etc.).

Depending on where land exchanges, ownership adjustment, or disposal occur, visual quality could be improved or negatively impacted. Negative impacts could occur where open, undeveloped tracts of land are disposed of and later developed.

Although VRM would be considered in land use authorization and access decisions, there is the potential for rights-of-way allocations to impact visual quality due to related disturbances with road building, vegetative removal, and new improvements.

Project proposals for mineral and energy exploration and development would be managed to prevent unnecessary and undue degradation; however, these activities could affect visual resources within the Planning Area. Mineral development outside special management areas could result in undesirable visual effects. These effects may be long-term. However, reclamation plans would consider visual restoration, so effects may not be permanent.

Restoring abandoned mines would improve visual quality in the areas where these disturbed sites are reclaimed and vegetated.

Effects of Alternative A

Approximately 5,250 acres per decade of vegetation treatment activities in grasslands and shrublands would continue to pose potential impacts to visual resources due to modifications in color, texture, and form. Some vegetation management actions could cause short-term negative impacts while long-term effects would be enhanced due to improved vegetation conditions and reduced wildfire risks.

Timber harvesting and salvage would be designed to meet established VRM objectives, so there would be minimal effects on visual resources except in limited situations where such actions were noticeable.

Although prescribed fire would be designed to meet VRM objectives, there would be potential for short to mid-term impacts on visual quality. These actions would ultimately lower the long-term risk for large-scale wildland fires. Wildland fire is considered a natural event (not human-caused fires) but it also changes the current

condition of the visible landscape; therefore, wildland fire in VRM Class I and II areas could adversely impact visual resources to the greatest extent.

Discouraging timber cutting immediately adjacent to clearcuts, as required in elk management guidelines, would discourage the softening of edges that could be used to mitigate visual impacts created by clearcuts in noticeable areas. Conversely, this stipulation would benefit visuals in that additional adjoining clearcuts with large-scale modifications to the landscape would be prevented.

Continued management of six WSAs under Interim Management Guidelines would result in approximately 31,500 acres managed as VRM Class I.

Protective management on the Missouri River and Moose Creek eligible Wild and Scenic River segments would provide long-term visual resource protection and is important given that one of their outstanding remarkable values is Scenic. Current management of the major river corridors including the four eligible WSR segments would result in about 25,400 acres protected as VRM Class II. This classification would ensure that these sensitive viewsheds and their visual values would be retained. Since the Headwaters RMP did not distinguish between VRM Class III and IV areas, project-specific distinction would create increased workloads for visual management during project level planning.

Because Recreation Opportunity Spectrum (ROS) class has a component of VRM, not classifying ROS under Alternative A puts maintaining VRM to meet public preferences at a higher risk in the undesignated Class III and IV areas.

Management classes assigned to specific areas determine the amount of mitigation necessary to protect visual resources, which would allow at least partial modification of the landscape in nearly 81 percent of the BLM surface acres (VRM Class III and IV areas).

Areas withdrawn from mineral entry (6,300 acres) would continue to protect visual resources from locatable mineral actions. Impacts from salable mineral actions could potentially impact visual resources over the short and mid-term until reclaimed due to vegetative removal and excavation contrasts. The Controlled Surface Use oil and gas leasing stipulation for mapped VRM Class II, III, and IV areas would minimize visual impacts on 248,849 acres under Alternative B. However, of these 248,849 acres, approximately 66,962 acres would be even more protected from visual impacts due to being overlapped by other NSO stipulations or No Lease areas.

Effects Common to Action Alternatives

There may be some short or mid-term reductions in overall visual quality due to grassland and shrubland treatments in VRM Class II and III areas. Because VRM objectives would be considered during project planning,

the overall VRM class objectives would be met, but some activities may be visible.

Maintaining residual stands that survive large-scale disturbance events would maintain visual quality.

Prevention of noxious weed invasion would maintain visual quality along roads, trails, urban interface areas, and recreation sites.

Thinning adjacent to clearcuts would not be discouraged, leaving open the opportunity to mitigate existing and future “hard edges” created by clearcuts if needed to improve visual quality and meet VRM objectives.

Meeting Land Health Standards on existing or future developed recreation sites would improve visual quality.

Continuing to manage the Sleeping Giant area as an ACEC would result in 11,679 acres of VRM Class II protection.

WSAs removed from wilderness consideration by Congress and not designated as ACECs (Black Sage and Yellowstone River Island) would see a reduced level of protection for visual quality. These lands are currently in VRM Class I, and in the future would be managed as VRM Class II.

Reseeding disturbed areas would maintain or improve visual quality.

Effects of Alternative B

Effects from the management of dry forests described above under “Effects Common to All Alternatives” would occur on up to 14,750 acres per decade in this alternative.

Treatment of up to 15,450 acres per decade of grassland and shrubland habitat could create short to mid-term impacts to visual quality due to changes in color and texture. Short to mid-term impacts would promote long-term visual benefits due to the reduced potential for large-scale wildland fires resulting from these treatments.

Designating approximately one third of the Decision Area lands as ROS semi-primitive non-motorized, and semi-primitive motorized would provide additional management direction for protection of visual resources since new developments would not be compatible with these settings and a management emphasis would be made to retain the natural character of these areas.

Effects from potential mining activity on visual resources would be similar to those described for Alternative A. Actions lowering potential impacts under Alternative B compared to Alternative A, are that open road mileage would be reduced, 198 additional acres would be recommended for withdrawal from locatable mineral entry, and 13,968 fewer acres would be open to oil and gas leasing subject only to standard lease terms. However, Alternative B would still have 18,404 more acres

open to oil and gas leasing than Alternative A. The Controlled Surface Use oil and gas leasing stipulation for mapped VRM Class II, III, and IV areas would minimize visual impacts on 248,849 acres under Alternative B. However, of these 248,849 acres, approximately 87,765 acres (20,803 more acres than under Alternative A) would be even more protected from visual impacts due to being overlapped by other NSO stipulations or No Lease areas. This would be more protective than Alternatives A and D (where standard lease terms would apply), but less protective than Alternative C.

An additional 23,500 acres would be classified as VRM Class II (compared to Alternative A) due to adjustments made for sensitive visual areas primarily along major rivers. This classification would prevent basic element changes to the landscapes that are evident. Acres by VRM Class are displayed in **Table 4-14**.

VRM Class	Alternative A	Alternative B
I	31,500	31,500
II	25,400	48,900
III	250,400*	125,200
IV	N/A	101,700

* VRM III and IV are combined in Alternative A

Effects of Alternative C

Effects from management of dry forests would be the same as described under “Effects Common to All Alternatives” on up to 4,800 acres per decade, the least of any alternative.

Effects from management of cool, moist forests would be the same as described under “Effects Common to All Alternatives” on up to 550 acres per decade, the least of the alternatives.

Up to approximately 2,750 acres of grassland and shrubland vegetation treatment would be proposed in Alternative C. Effects on visual quality would be the same as described under Alternatives A and B although to a lesser extent. Alternative C would provide for the lowest number of grassland and shrubland treatment acres of any alternative.

The quantity of forest products removed and new roads constructed to support management for forest products would be the lowest of any alternative and therefore visual resources would be least impacted by these activities of any alternative.

Alternative C would provide for the highest acreages (125,300) to be managed as semi-primitive non-motorized and motorized ROS classes and therefore would provide greater protection for visual resources than any other alternative.

Effects from WSA and ACEC management would be similar to those of Alternative B. However the recommendation that all four eligible Wild and Scenic River segments be found suitable in Alternative C would potentially provide the greatest protection of visual resources of all alternatives in these areas since visual disturbances would be minimized.

Under Alternative C, adverse effects of energy and mineral exploration and development on visual resources would be the least of all alternatives. Supporting roads could not be constructed within riparian areas. Approximately 580,382 acres (approximately 89 percent of Decision Area total) would not be open to oil and gas leasing. The Controlled Surface Use oil and gas leasing stipulation for mapped VRM Class II, III, and IV areas would apply to 246,118 acres. However, of these acres, approximately 224,294 acres would be even more protected from visual impacts due to being overlapped by other NSO stipulations or No Lease areas. This would be the most protective of all alternatives. Salable mineral uses would be limited to existing community pits unless needed by the state or counties. Approximately 378 acres would be recommended for locatable mineral withdrawal.

Overall Alternative C provides the most protection to visual quality (Table 4-15) of all the alternatives.

VRM Class	Alternative A	Alternative C
I	31,500	31,500
II	25,400	67,600
III	250,400*	151,800
IV	N/A	56,500

* VRM III and IV are combined in Alternative A

Effects of Alternative D

This alternative would entail the greatest amount of vegetative treatments and therefore would have the greatest potential impacts to visual resources due to short and mid-term changes in colorations and texture. Effects of dry forest management would be the same as described under “Effects Common to All Alternatives” on up to 18,200 acres per decade, the most of any alternative.

Effects of cool, moist forest management would be the same as described under “Effects Common to All Alternatives” on up to 5,050 acres per decade, also the most of any alternative.

Alternative D would provide for up to 25,900 acres of vegetative treatment in grasslands and shrublands that could impact visual quality, the most of any alternative. Types of effects would be the same as described under Alternative A.

Potential effects from forest products removal, including timber salvage would be the highest under this alternative given the increases in projected potential timber harvest.

Black Sage and Yellowstone River Island WSAs would be subject to increased visual impacts from mineral activities if Congress releases these areas from wilderness consideration.

This alternative would have the fewest acres designated in the relatively protective VRM Class II lands than the other alternatives and therefore visual resources would be subject to more impacts than in the other alternatives.

No Wild and Scenic River segments would be recommended as suitable and no interim protective measures would be imposed for Wild and Scenic Rivers. As a result, visual resources within these segments would be prone to more impacts than with any alternative.

Alternative D would open the highest acreage (54,079 acres) to oil and gas leasing subject to standard lease terms and would not include the Controlled Surface Use stipulation on VRM Class II, III, and IV lands. Therefore Alternative D would present the highest potential for impacts to visual resources due to oil and gas development of any alternative. Effects from other energy and minerals activities would be similar to those described for Alternative A.

Alternative D would provide the least protection for preserving visual quality (Table 4-16). Alternative D has the fewest acres in ROS classes of semi-primitive non-motorized and semi-primitive motorized of any action alternative and therefore would have the highest risk that visual quality would not be protected. However, because Alternative A does not establish ROS, this alternative would have more protection for visual quality than Alternative A.

VRM Class	Alternative A	Alternative D
I	31,500	31,500
II	25,400	6,600
III	250,400*	142,900
IV	N/A	126,300

* VRM III and IV are combined in Alternative A.

EFFECTS ON RESOURCE USES

FORESTRY AND WOODLAND PRODUCTS

Effects Common to All Alternatives

There would be no effects to forestry and woodland products from proposed management associated with livestock grazing, noxious weeds, cultural resources,

paleontological resources, energy and minerals, abandoned mine lands, hazardous materials management, farm lands, environmental justice, or tribal treaty rights.

Under all alternatives, management of any forest type that involves forest product removal would result in a contribution to the achievement of the PSQ. Types of products, size, and acres treated vary across the alternatives. Management actions would partially meet the public demand for wood products by providing sawtimber, posts and poles, and biomass, while improving forest health.

Vegetation treatments in grasslands, shrublands and riparian areas to remove conifer encroachment would provide some forest products, including posts, poles, biomass, and a limited amount of sawtimber. There are approximately 147,715 acres of land in the Decision Area (over 10 percent canopy closure and not in VRM Class I or WSA) from which commercial forest products and biomass could be produced through mechanical treatments. Prescribed burning could possibly remove some potential forest products, although effects would be limited as most of the material burned would be non-merchantable. In the long-term, prescribed burning and mechanical treatments could increase the value of forest products by increasing their quality (better growth form) and size (due to increased availability of nutrients and water).

Treating areas to reduce the risk of developing epidemic levels of forest insect or disease would provide forest products as a by-product of the treatment. However, preventing mortality from these sources could reduce the amount of salvage volume available in the future. In many cases however, treatments would reduce the severity of wildland fire, which could, in the long-term lead to increased quantities of forest products being available in the future.

Maintaining adequate access for forest/woodland management programs would help to maintain the economic feasibility of some treatments. The necessity to build roads (even temporary roads) can be cost-prohibitive particularly with smaller projects.

Management actions are expected to include design and BMP provisions for the protection of forest health, natural resources, water quality, and soils, which can limit the size and location of treatments and the removal of forest products. Streamside management zones would affect the methods used and outcome of forest products in those portions of riparian areas that are regulated under state law.

Providing small sale opportunities would help to meet local public demand for vegetative resources, including house logs, posts and poles, vegetative cuttings, conifer boughs, wildlings and ornamentals, grape stakes and juniper products, specialty cuttings, and wildflowers.

Limiting tractor logging to slopes averaging less than 40 percent would require that alternative methods of logging would be used. These alternative methods are generally more expensive than traditional ground based logging however; this is a common practice that the market is adapting to.

Slash disposal, site preparation and natural or artificial revegetation would promote re-establishment of the forest following treatment, which would lead to additional forest products in the future.

Enhancing riparian and wetland resources could result in some removal of forest products, because of the conifer removal component present in many prescriptions for these areas.

In the short term, fire suppression under all alternatives would maintain the availability of live forest products, and reduce the amount of salvage products. In the long-term however, fire suppression is likely to result in more uncharacteristically large and severe wildland fires that exceed suppression capabilities and result in an overall loss of forest products through fire consumption. An additional long-term effect could be future timber salvage opportunities if wildland fire size increases, along with vegetative type conversion from forest to grass or shrublands in severely affected areas that eliminate local sources of conifer seed.

Wildland fire use (allowing wildland fires to burn) and restoration of historic fire regimes would improve forest health in the long-term. Wildland fire use could produce salvage opportunities in the short term.

Fuels treatments to reduce wildland fire hazards would produce forest products in cases where by-products can be removed and used.

Management measures to protect special status species and priority species would affect the timing, location, or extent of most forest products removal projects. These effects would vary from minor to prohibitive. Management measures could also affect the economic viability of projects by limiting the intensity of management, the amount and type of products removed, the tools used, and the timing of activities. Timber removal may also be used as a tool to improve/restore special status species habitat, so activities to improve habitat for these species could, in some cases, produce forest products.

Forest product removal would be allowed under any of the Recreation Opportunity Spectrum classes established in the Planning Area. However, the more restrictive classes make management for overall forest products more difficult or expensive by restricting the level of disturbance or access to the management areas. Economically, this combination can be prohibitive, particularly where treatment prescriptions restrict removal of high value materials, specialized equipment is required, access is in need of considerable development, or the landing sites are inaccessible from the treatment site. In

particular, areas classified as Semi-primitive non-motorized would require inconspicuous treatments. Semi-primitive motorized areas could also be considered restrictive on a case-by-case basis.

Wilderness Study Areas would not have any forest product removal.

For all alternatives, the effects of Wild and Scenic River designations would be related to the subsequent river management plans and associated VRM and ROS classes.

VRM Class I areas are already set aside as Wilderness Study Areas, so there would be no additional effect beyond those described for WSAs. For VRM Class II areas, large-scale removal of sawtimber would be prohibited in most cases, which would restrict silvicultural management of those areas for forest products. Many activities that produce forest products could occur. However, economic efficiency would often be reduced due to less intensive activities, the need to leave more trees, and the need for non-intrusive road access. Most activities that produce forest products would be compatible with VRM Class III. VRM Class IV areas would have no effect on forest product activities.

Management of the Sleeping Giant ACEC (11,679 acres) to protect naturalness and primitive recreation, along with not allowing firewood removal of dead and down material, would minimize forest product removal from this area, although it would remain in the commercial forest category.

Requirements to comply with local, state, and federal requirements and mitigations for air quality may restrict slash disposal using prescribed burning related to some forest products removal actions, but this would not be expected to affect the overall achievement of PSQ, economic value, or meeting demand.

Implementing BMPs and mitigations for soil may affect logging and slash disposal related to the practices and timing used for some forest products removal actions,

but would not be expected to affect the overall achievement of PSQ or meeting public demand. Measures to protect steep slopes, water quality or limit soil erosion could increase the cost of forest products removal by limiting operating periods, access, equipment types, or requiring aerial logging methods.

Implementing BMPs and mitigations for water quality may affect logging and slash disposal related to some forest products removal actions, but would not be expected to affect the overall achievement of PSQ or meeting public demand. Measures to comply with the Montana Streamside Management Zone (SMZ) Law and state water quality rules could reduce the amount of timber that could be removed and increase the cost of forest products removal by limiting operating periods and access or requiring aerial logging methods. Forest management costs may also increase as state consultation and approval is required if alternate practices are needed to complete a timber removal project within an SMZ.

Providing rights-of-way, road use agreements, permits and leases could improve access for forest products management activities, which could increase economic viability.

Land tenure adjustments would result in more efficient management of forest products, which would improve economic viability and could improve BLM’s ability to meet forest product demand.

Acquiring permanent access easements where needed would improve forest product removal efficiency and help meet public demand for forest products. Improved efficiency would result in better economic viability by providing assured access for later treatments and smaller scale activities and sales.

Effects of Alternative A

Table 4-17 displays the predicted output of forest products for Alternative A, given the resource protections detailed in the alternative description.

Product	Amount
Dry Forest	3,600 acres of timber and 1,000 acres of small-diameter thin
Cool Moist Forest	2,350 acres of timber and 50 acres of small-diameter thin
New Permanent Road Construction	55 miles
PSQ	12 to 27 MMBF
	40,000 to 97,000 CCF
Estimated Number of Permits Issued for Forest Products	350 Permits
Christmas Trees	4,500 Trees
Cords of Firewood	750 Cords
Small Timber Sales (Included in with PSQ)	1,650 MBF Sawtimber
Post, poles, Biomass, other woody materials	55 CCF
Timber Salvage	No Limit

Under Alternative A, mechanical treatment of vegetation in riparian areas could produce a few forest products from 30 acres per decade.

Compliance with SMZ Law would allow for forest product removal in SMZ areas solely for the economic purposes without meeting any riparian or other resource management objectives discussed in Alternatives B and C. Alternatives A and D also allow for a more aggressive approach to forest product removal in the riparian areas outside of the SMZs than the other alternatives.

Fire suppression within the first burning period of wildland fires would limit the loss of forest products to fire. Wildland fire use and prescribed burning could cause a loss of forest products, but could also create salvage opportunities in the short run while increasing the amount of products available in the future through improvement of forest health.

Alternative A has 240,000 acres in fire management Category C, which creates the potential for salvage opportunities on most of the DA.

In addition to the effects from special status and priority species management described under “Management Common to All Alternatives”, guidelines in the Montana Cooperative Elk Logging Study would limit the extent and timing of some forest products removal projects.

Under Alternative A, the recreational (ROS) and visual values (VRM) and opportunities could be considered on a case by case basis and may affect product removal dependant on individual analysis of impacts for each project. This is not expected to affect overall product removal levels nor support of the PSQ under Alternative A.

In addition to the effects described under “Effects Common to All Alternatives” for the Sleeping Giant ACEC, vegetation management in the Humbug Spires ACEC could result in limited forest products, although

trying to meet primitive recreation goals would preclude removal of sawtimber or construction of roads for access, adversely affecting the economic viability of forest products projects.

Effects of Alternative B

Table 4-18 displays the predicted output of forest products for Alternative B, given the resource protections detailed in the alternative description.

Timber salvage would produce sawlogs and other timber products, although Alternative B limits salvage compared to Alternative A.

Riparian treatments could produce a limited number of forest products, as riparian management objectives would dictate treatment type and level of forest change needed to meet objectives in the Riparian Management Zones (RMZs). Assuming a site-potential tree height of 80 feet, RMZs would limit the location and access to forest product removal projects in corridors defined as 160 feet on either side of fish-bearing streams and amounting to 38 acres per mile of stream, 80 feet on either side of non-fish bearing streams and amounting to 19 acres per mile of stream, and 50 feet on either side of intermittent streams which amounts to 12 acres per mile of stream. In these areas under Alternative B, treatment method, heavy equipment use, and vehicular access would be restricted to meet riparian objectives or prevent riparian impacts, thus reducing product removal efficiency and increasing cost. Under Alternative B, product removal would be allowed, while it would be prohibited under Alternative C. Alternatives A and D would allow for greater flexibility of product removal, because SMZ widths would be narrower than the RMZ widths.

Fire suppression within the first burning period (first day of a wildland fire) would limit the loss of forest products to fire. Wildland fire use and prescribed burning could

Table 4-18
Alternative B – Decadal Forest Products Output

Product	Amount
Dry Forest	4,150 to 14,750 acres of timber and 300 to 1,000 acres of small-diameter thin
Cool Moist Forest	450 to 3,750 acres of timber and 100 to 400 acres of small-diameter thin
New Permanent Road Construction	Kept to a minimum, closed to public
PSQ	9 to 25 MMBF
	33,000 to 91,000 CCF
Estimated Number of Permits Issued for Forest Products	450 Permits
Christmas Trees	5,500 Trees
Cords of Firewood	1,000 Cords
Small Timber Sales (Included in with PSQ)	2,100 MBF
Post, Poles, Biomass, other woody materials	77 CCF
Timber Salvage	Variable, selective prescriptions considering the event size and associated wildlife values.

cause a loss of forest products, but could also create salvage opportunities. Alternative B is similar to Alternative A with 262,000 acres in fire management Category C, slightly higher than Alternative A at 258,200 acres. Management actions to reduce fuels in the Wildland Urban Interface and restore historic fire regimes in forested types could also produce forest products.

Timing restrictions for migratory birds prohibiting management-ignited prescribed fire from May 1st through August 30th would not reduce the availability of forest products for consumption. Disposal of slash and site preparation activities by burning may be restricted in higher elevation and north slope timber sale sites in the spring after May 1st, thereby increasing the cost and reducing the effectiveness of such activities.

Allowing no net increase in permanent roads in big game winter/calving range and grizzly bear distribution zone areas with low road density (defined as 1 mi/mi² or less in Alternative B) would reduce product removal efficiency in active forest management areas. Construction of more temporary roads would be necessary with most projects implemented. This also would limit the public's ability to use forest product permits in those areas.

Forest and woodland stands designated as ROS Semi-primitive non-motorized (18,554 acres), and Semi-primitive motorized (26,283 acres) under Alternative B amount to 41 percent of the forest and woodland available for product removal in the Decision Area. Forest product removal treatments and access development in these areas would be required to have relatively inconspicuous impacts on landscape character. This requirement could lead to increased costs due to a need for: more careful project design, more restrictions to protect recreation settings, and specialized equipment for implementation. Quantities of forest products removed may also decrease. Some commercial projects that would be feasible under Alternative A would not be feasible under Alternative B in these areas. Public use of the non-motorized designated areas for forest products, such as firewood and Christmas trees, would fall to very low

levels, as the harvested materials would have to be hand carried to vehicles and would probably only occur on the periphery of these non-motorized areas.

Forest and woodland stands designated as VRM Class II under Alternative B (16,902 acres) amount to 15 percent of the forest and woodland available for product removal in the Decision Area and are stands mainly found in areas designated as ROS Semi-primitive non-motorized. Forest product removal treatments would be restricted because treatments could not attract the attention of the casual observer in these areas. This would substantially reduce the level of product removal compared to Alternative A in VRM Class II areas.

In addition to the effects described under "Effects Common to All Alternatives" for the Sleeping Giant ACEC, vegetation management in the Humbug Spires ACEC could result in limited forest products removal, although trying to meet primitive recreation goals would preclude removal of sawtimber or construction of roads for access, adversely affecting the economic viability of forest products projects.

The Ringing Rock ACEC (160 acres) could produce forest products as long as VRM II could be met. Vegetation management in the Elkhorns ACEC (50,431 acres) would produce forest products and contribute to meeting public demand, except for the 3,575 acres of the Elkhorn Tack-on Wilderness Study Area, where forest products removal would be prohibited.

Timber salvage would be unlikely in any ACEC and would be prohibited in the Elkhorns ACEC, except when needed to provide for public safety.

Effects of Alternative C

Table 4-19 displays the predicted output of forest products for Alternative C, given the resource protections detailed in the alternative description.

Maintaining and promoting old forest structure and condition may produce a limited amount of small forest products.

Product	Amount
Dry Forest	2,050 to 4,800 acres of timber and 55 to 250 acres of small-diameter thin
Cool Moist Forest	50 to 550 of timber and up to 50 acres of small-diameter thin
New Permanent Road Construction	No new permanent roads
PSQ	5 to 12 MMBF
	19,000 to 41,000 CCF
Estimated Number of Permits Issued for Forest Products	150 Permits
Christmas Trees	4,500
Cords of Firewood	50 Cords
Small Timber Sales (Included in with PSQ)	500 MBF
Post, Poles, Biomass, other woody materials	55 CCF
Timber Salvage	50 percent of affected area must be retained.

Timber salvage would produce sawlogs and other timber products; however Alternative C limits salvage more than the other alternatives. Salvage projects under Alternative C would be smaller and occur less often than the other alternatives due to higher large tree retention requirements and the areas where timber salvage would be prohibited (50 percent of contiguous areas of 1,000 acres or larger).

Requiring firewood to be live trees would eliminate the current agreement with the Forest Service for firewood permits and increase administration and enforcement cost. Green tree removal could result in fewer firewood permits overall because green trees are not desirable for firewood. Alternative C would not contribute to meeting public demand as well as the other alternatives would. No commercial forest products would be removed from RMZs under Alternative C, making Alternative C the most impactful alternative to commercial forest products from a riparian management standpoint. Under Alternative C Riparian Management Zones would be defined as 300 feet on either side of fish bearing streams and amounting to 73 acres per mile of stream; 150 feet on either side of non-fish bearing streams and amounting to 36 acres per mile of stream; and 50 feet on either side of intermittent streams which amounts to 12 acres per mile of stream.

Fire suppression within the first burning period (first day of a wildland fire) would limit the loss of forest products to fire. Wildland fire use and prescribed burning could cause a loss of forest products, but could also create salvage opportunities. The potential opportunity for timber salvage after fire events under Alternative C is similar to Alternative A, with 240,000 acres in fire management Category C compared to 258,200 acres in Alternative A. Management actions to reduce fuels in the Wildland Urban Interface and restore historic fire regimes in forested types could also produce forest products.

Under Alternative C, timing restrictions to protect migratory birds would prohibit vegetation treatments from May 1st through August 30th (unless breeding bird surveys document low potential for impact). This restriction would tend to push mechanical vegetation treatment, product removal, slash disposal and site preparation activities into the fall and winter under Alternative C. As this restriction is geared toward widespread disturbance of vegetation and potential nesting sites, it is not expected to affect the timing of more focused treatment support activities such as road maintenance or temporary construction which could be conducted during the restriction period. This should not reduce the availability of forest products for consumption, but this may increase the cost due to work being conducted during adverse winter conditions and when snow plowing may be required for anticipated heavy truck traffic to landings.

Under Alternative C, effects from special status and priority species management would generally be similar to Alternative B. However, allowing no net increase in permanent roads in big game winter/calving range and grizzly bear distribution zone areas with low road density (defined as 1.5 mi/mi² or less in Alternative C) would affect more areas, the most of any alternative. Additionally, maintaining blocks of at least 500 acres as unroaded or having closed roads during the hunting season may limit public access for forest products permits and access for management actions.

Forest and woodland stands designated as ROS Semi-primitive non-motorized (23,895 acres), and Semi-primitive motorized (31,583 acres) under Alternative C amount to 50 percent of the forest and woodland available for product removal in the Decision Area. Effects from area designations of ROS Semi-primitive classes would be similar to those described for Alternative B.

Forest and woodland stands designated as VRM Class II under Alternative C (27,259 acres) amount to 25 percent of the forest and woodland available for product removal in the decision area. Effects from area designations of VRM Class II would be similar to those described for Alternative B.

Effects from ACEC management would be the same as under Alternative B.

Effects of Alternative D

Table 4-20 (page 446) displays the predicted output of forest products for Alternative D, given the resource protections detailed in the alternative description.

Maintaining and promoting old forest structure and condition may produce a limited amount of small forest products.

Timber salvage would produce sawlogs and other timber products, although Alternative D limits salvage compared to Alternative A. Salvage projects under Alternative D would probably be larger and occur more often than under Alternatives B and C.

Alternative D would be most effective at meeting public demand for small sale products of all alternatives.

Fire suppression within the first burning period (first day of a wildland fire) would limit the loss of forest products to fire. Wildland fire use and prescribed burning could cause a loss of forest products, but could also create salvage opportunities. Because Alternative D has the most acres in Category D (180,000 acres compared to none in the other alternatives), it has the greatest potential to result in salvage opportunities, although it is only slightly higher than the 262,000 acres in Category C in Alternative B. Management actions to reduce fuels in the Wildland urban interface and restore historic fire regimes in forested types could also produce forest products.

Product	Amount
Dry Forest	7,300 to 18,200 acres of timber and 1,000 to 3,000 acres of small-diameter thin.
Cool Moist Forest	1,000 to 5,000 acres of timber and 400 to 1,200 acres of small-diameter thin.
New Permanent Road Construction	Kept to a minimum, some left open to public.
PSQ	10 to 30 MMBF 36,000 to 107,000 CCF
Estimated Number of Permits Issued for Forest Products	600 Permits
Christmas Trees	9,000 Trees
Cords of Firewood	1,500 Cords
Small Timber Sales (Included with PSQ)	5,200 MBF
Post, Poles, Biomass, other woody materials	105 CCF
Timber Salvage	30 percent of affected area must be retained.

Effects from special status and priority species would generally be similar to Alternative B, except allowing no net increase in permanent roads in big game winter/calving range areas with low road density (defined as 0.5 mi/mi² or less in Alternative D) would affect fewer areas. Effects associated with limiting net increases in permanent roads in the grizzly bear distribution zone would be the same as under Alternative B.

Forest and woodland stands designated as ROS Semi-primitive non-motorized (18,029 acres) and Semi-primitive motorized (13,823 acres) under Alternative D amounts to 29 percent of the forest and woodland available for product removal in the Decision Area. Effects from area designations of ROS Semi-primitive classes would be similar to those described for Alternative B.

Very few forest and woodland stands were designated as VRM Class II under Alternative D (173 acres). This amounts to one tenth of one percent of the forest and woodland available for product removal in the Decision Area. There would be little, if any, effect on forest products and support of PSQ from area designations of VRM Class II, similar to effects under Alternative A.

In addition to the effects described under “Effects Common to All Alternatives” for the Sleeping Giant ACEC, vegetation management in the Humbug Spires ACEC (8,374 acres) could result in limited forest products although trying to meet primitive recreation goals would preclude removal of sawtimber or construction or roads for access, adversely affecting the economic viability of forest products projects. Vegetation management in the Elkhorns ACEC (3,575 acres) would not produce forest products due to the Wilderness Study Area designation.

Effects from ACEC management would be the same as under Alternative B.

LIVESTOCK GRAZING

Effects Common to All Alternatives

There would be no effect from management of Lands and Realty-Land Use Authorizations, Energy and Minerals, Abandoned Mine Lands, Hazardous Materials Management, Environmental Justice or Tribal Treaty Rights.

Management actions to restore and improve riparian areas may require adjustments in grazing management such as adjusting numbers, rest, deferment, or maintaining existing livestock enclosures along streams, wetlands, and riparian areas in order to meet Proper Functioning Condition goals and the Western Montana Standards for Rangeland Health.

Maintaining or restoring the health and integrity of grasslands, sagebrush and shrublands, could change the amount of livestock grazing, or alter timing and utilization.

Wildland fire management activities (including prescribed fire and chemical and mechanical vegetation treatments) aimed at meeting or moving toward Land Health Standards would provide long-term benefits for vegetation and livestock by improving the forage base and availability.

Management actions to maintain cultural and paleontological resources may require adjustments in grazing management such as adjusting numbers, rest, deferment, or exclusion.

Effects of Alternative A

Treatment of grasslands to remove conifer encroachment would improve long-term forage quality and quantity. Some short-term but negligible effects would occur where deferment and temporary removal of livestock is required before and after vegetation treatments. Alterna-

tive A differs from the action alternatives in that the action alternatives would result in improved forage quantity and quality on shrublands in addition to grasslands.

Livestock grazing would be allowed on three percent more acres than Alternatives B and C and the same as Alternative D. (See **Table 4-21** for a summary of acres and AUMs by alternative.)

Alternative A would limit the tools available for improving land health in the Medicine Rock (Northeast Helena) riparian area by excluding prescription livestock grazing from availability in that area. Specifically, grazing of sheep or goats could not be used as a tool to treat weeds.

Management of noxious weeds would control and contain the proliferation of invasive weed species and would reduce established populations to acceptable levels, thereby maintaining long-term forage production, diversity, and vigor in the treatment areas. Livestock management flexibility would be reduced over the long-term in untreated areas because of the presence of invasive weeds and the reduction of usable forage. Alternative A would impact the amount of forage available the least, because noxious weed spread would be the least—43,000 acres (assuming implementation of the low end of the range of proposed weed treatment acres under the action alternatives).

Management actions such as designating open access to vehicles would increase recreational use, public awareness of livestock grazing, and access (that is, roads and gates). These travel management actions often result in conflicts with the livestock grazing program. Alternative A would leave more acres open to wheeled vehicles (4,367 acres or one percent of the Decision Area) and snowmobiles (144,750 acres or 49 percent of the Decision Area) than the action alternatives, which would designate 283 acres (0.1 percent of the Decision Area) open to wheeled vehicles and 140,033 acres (48 percent of the Decision Area) as open to snowmobiles. Therefore, compared to the other alternatives, management actions for travel management and actions under Alternative A would have the greatest potential for conflicts with livestock grazing.

Effects Common to Action Alternatives

In contrast to Alternative A, resource objectives on allotments without site-specific management objectives

would be met, in part, by imposing grazing utilization level limits. On such allotments, the utilization level as measured at the end of the grazing season would not exceed 55 percent on non-native seedlings and 45 percent on native herbaceous forage plants, on a pasture average basis, except where lower use levels may be necessary to prevent detrimental effects on vegetation and other resources. Higher utilization objectives may be acceptable when set through an interdisciplinary planning or NEPA process to achieve resource objectives.

Compared to Alternative A, forage conditions on small allotments would be improved or maintained by prohibiting livestock conversions from sheep or cattle to horses on existing allotments smaller than 160 acres and horse permits or leases on available vacant parcels on all areas less than 160 acres. These restrictions would minimize overgrazing by horses on small allotments.

Prescription livestock grazing would be allowed as a management technique to maintain or improve habitat conditions for special status plant species and animal species.

Management of crucial and important wildlife habitat, especially on winter range, may require adjustments to livestock grazing.

Under the action alternatives, fewer acres of open access for vehicles would be designated than under Alternative A and conflicts with livestock grazing from these actions would be reduced. Alternative A would leave more acres open to wheeled vehicles (4,367 acres or 1 percent of the Decision Area) and snowmobiles (144,750 acres or 49 percent of the Decision Area) than the action alternatives, which would designate 283 acres (0.1 percent of the Decision Area) open to wheeled vehicles and 140,033 acres (48 percent of the Decision Area) as open to snowmobiles.

Effects of Alternative B

Treatment of grasslands and shrublands to improve desired ecological conditions would improve long-term livestock forage quality and quantity. Areas identified for prescribed burning would be rested from livestock grazing up to one year prior to treatment and treatment areas would be rested at a minimum of two full years following treatment resulting in short-term impacts on livestock grazing. Alternative B would treat three percent more acres of grasslands and shrublands (of Decision Area total) than Alternative C, one percent more

Table 4-21
Summary of Acres Available for Grazing by Alternative

	Alternatives			
	A	B	C	D
Acres available for grazing	278,000	270,000	262,000	278,000
Acres not available for grazing	29,000	37,000	45,000	29,000
Permitted AUMs	25,677	24,710	24,710	25,677
Forage reserve, temporary non-renewable AUMs	0	1,312	936	0

than Alternative A and two percent fewer than Alternative D.

Livestock grazing would be allowed on three percent fewer public land acres than Alternatives A and D, and one percent more than Alternative C. (See **Table 4-21** for a summary of acres and AUMS by alternative.)

More acres would be managed as forage reserve than under any of the other alternatives. Forage reserve allotments (1,312 AUMs) would be managed to meet, or move toward meeting, Land Health Standards. Forage reserve allotments would provide opportunities for qualified applicants to rest allotments when required and would facilitate management actions or relieve resource problems. Management as forage reserve, as opposed to normally permitted allotments, is more costly to administer. Thus, the cost of administering forage reserves would increase the most when compared to the other alternatives. However, the number of AUMs managed as forage reserve is small (five percent) relative to the total number of AUMs under Alternative B, so the impact would be minor.

Alternative B would allow for greater flexibility, compared to Alternatives A and C, in the tools available for improving land health in the Centennial Gulch (Ward Ranch) allotment and the Medicine Rock (Northeast Helena) riparian area by allowing prescription livestock grazing in those areas.

The impacts from management of noxious weeds would be similar to those discussed under Alternative A; however the amount of noxious weed spread could be higher under this alternative—48,000 acres—than under Alternative A, thus reducing the amount of forage available (assuming implementation of the low end of the range of proposed weed treatment acres for Alternative B).

Fence modification costs to remove or reconstruct fences identified as wildlife barriers would be less than Alternative C, but more than D because the alternative B prescription has some flexibility.

Effects of Alternative C

Compared to the other alternatives, management action in grasslands and shrublands in Alternative C would improve long-term livestock forage quality and quantity the least. Alternative C would treat two percent fewer acres than Alternative A (at Decision Area scale), three percent fewer than Alternative B and five percent fewer than Alternative D.

Six percent fewer public land acres would be available for livestock grazing than Alternatives A and D and 3 percent fewer than Alternative B (See **Table 4-21** for a summary of acres and AUMS by alternative.) Managing the McMaster Hills and Spokane Hills allotments as forage reserve allotments, as described under Alternative B, would increase the costs to administer those lands.

Alternative C would limit the tools available for improving land health in the Centennial Gulch (Ward Ranch) allotment and Medicine Rock (Northeast Helena) riparian area by excluding prescription livestock grazing from availability in those areas.

The impacts from management of noxious weeds would be similar to those previously discussed except the impacts to the livestock forage base could be highest because the amount of noxious weed spread would be highest under this alternative (assuming implementation of the low end of the range of proposed weed treatment acres for Alternative C).

Fence reconstruction costs to remove and replace fences identified as barriers to wildlife movement would be highest under this alternative because of the stringent management mandate.

Effects of Alternative D

Compared to the other alternatives, management of grasslands and shrublands in Alternative D would result in the greatest improvement in long-term livestock forage quality and quantity from vegetation treatments on grasslands and shrublands. Alternative D would treat two percent more acres than Alternative B (at the Decision Area scale), three percent more than Alternative A, and five percent more than Alternative C.

Livestock grazing on public land would be allowed on the same amount of acres as Alternative A, two percent more than Alternative B, and three percent greater than Alternative C. (See **Table 4-21** for a summary of acres and AUMS by alternative.)

Compared to the other alternatives, noxious weed management in Alternative D could result in 47,000 acres of spread (assuming implementation of the low end of the range of proposed weed treatment acres for the action alternatives). Consequently more livestock forage could be maintained than under Alternatives B and C, but less than under Alternative A.

As with Alternative A, under Alternative D, the existing Instruction Memorandum 98-140 (1998) would be followed which would impose restrictions on new goat and sheep allotments as well as those allotments with conversions from cattle to sheep and goats in order to minimize physical contact between domestic and wild sheep.

Fences identified as barriers to wildlife movement would be considered for removal or reconstruction on a case by case basis, to follow BLM fence specifications for wildlife.

Designation of two new ACECs totaling 11,949 acres would require management activities to protect or enhance ACEC values. Management activities may include restrictions on livestock grazing, requirements to maintain/build boundary fences and cattle guards, and closely monitor livestock trailing.

ENERGY AND MINERALS

Effects Common to All Alternatives

Energy and Minerals

Approximately 6,300 acres would remain withdrawn or not available for mineral entry (leasable, locatable, and salable). Approximately 6,000 acres along the Missouri River Chain of Lakes would continue to be withdrawn in Power Site Reserve and Power Project withdrawals. The effect on mineral leasing would be negligible as the area represented is small and in scattered small parcels when compared with the overall area available to leasing in the Planning Area.

Leasable Solid Minerals

There are no known potentially economic deposits of leasable solid minerals such as sodium, potash, sulphur, oil shale, native asphalt, and solid and semi-solid bituminous rock in the Planning Area. If any were discovered on lands administered by the federal government, the decision to lease them would be made by the BLM on a case-by-case basis.

Leasable Geothermal Resources

Geothermal resource leasing activity is not anticipated, so there would be no effects.

Leasable Fluid Minerals

Stipulations applied to various areas with respect to occupancy, timing limitation, and control of surface use would have the greatest effects on oil and gas exploration and development. Some areas would be deemed unavailable for oil and gas leasing as a result of existing non-discretionary closures for Wilderness Study Areas. Others may be determined unavailable as a result of the discretionary decisions of this RMP. These lease stipulations and the availability of the federal mineral estate for fluid mineral leasing varies by alternative.

No Surface Occupancy stipulations may decrease some lease values, increase operating costs, and to a lesser extent (given the RFD) require relocation of well sites and modification of field development. Leases issued with moderate constraints (Timing Limitation and Controlled Surface Use stipulations) may result in similar impacts, and delays in operations and uncertainty on the part of operators regarding restrictions.

Locatable Minerals

Because the Planning Area is considered to be highly prospective for base and precious metal deposits, it is likely that there would be multiple applicants for exploration and that one or more mining companies would submit a proposed Plan of Operations to develop a new large scale metal mine at some point in the next 20 years.

Mineral exploration activities would include construction of exploration drill roads, drilling pads, and equipment staging areas. Activities would be conducted under a notice or an approved Plan of Operations and require bonding for reclamation and closure.

Large-scale mines, mine expansions, and small-scale mining operations are likely to result in disturbances from access road construction, increased traffic, surface disturbance (i.e. underground portals; mine pits; waste rock dumps; ore processing, tailing facilities, administration and maintenance facilities; and storm water run-off control ponds and diversions structures). Virtually all mineral activity also requires state permits.

Placer operations would affect streambeds or terrace deposits adjacent to streams, by excavating and processing sand and gravel deposits for the recovery of gold. These operations would have mitigation measures in place to protect riparian areas and other natural resources. Site reclamation work would be bonded by the BLM and the state to insure completion of reclamation following mining.

BLM anticipates that there would be four to ten placer mining operations per year on Decision Area lands, with the actual number depending on the price of gold.

BLM would develop and implement measures to prevent unnecessary or undue degradation from exploration, mining, and reclamation activities. In some areas, such as ACECs, these requirements could result in additional expenditures to protect resources and prevent unnecessary or undue degradation.

BLM or other agency authorization of rights-of-way for facilities such as roads, highways, and power lines could provide access and infrastructure for exploration of locatable minerals and mining operations. Alternatively, denial of rights-of-way could result in negative impacts on operations.

Land ownership changes could result in acquisition or disposal of lands with mineral value, and either increase or decrease opportunities for mineral development. Acquisition of legal access across private or other lands could result in increased opportunities to explore and develop areas not accessible by another route.

The following 31,349 acres of land in the Decision Area are currently WSAs:

- Sleeping Giant (6,666 acres),
- Sheep Creek (3,801 acres),
- Elkhorn's Tack-on (3,575 acres),
- Black Sage (5,917 acres),
- Humbug Spires (11,320 acres), and
- Yellowstone Island (69 acres)

These lands are managed under the Interim Management Policy (H-8550-1) and mineral development activities

are thus restricted. Once a final Congressional determination is made on wilderness consideration, these lands would either become wilderness areas or be released and managed according to this plan.

An approved Plan of Operations is required in designated ACECs for all surface disturbing activities exceeding the casual use level. Activities which could normally proceed after the filing of a Notice would require an approved Plan of Operations in an ACEC. The increased environmental review, mandatory public comment period, and application of management prescriptions needed to protect ACEC-values, would result in timing delays or increased costs for mineral operators.

Fire management activities could temporarily result in restricted access to a mining project during implementation of prescribed burning, or during wildland fire suppression.

Rehabilitation and closure of abandoned mine land sites and associated features would result in the removal or obscuring of information contained in waste dumps, excavations, adits, and shafts used by exploration companies to sample and map mineral deposits.

Salable Minerals

Extraction of salable material by excavation or mining would result in a mine or quarried pit. Effects from access roads and pit construction would be minor or moderate depending on the scale of the quarrying operations (size and ability to reclaim the ultimate pit). Existing requirements for topsoil salvage and reclamation would minimize impacts from mining.

Stipulated requirements and BMPs designed to avoid or minimize adverse effects on riparian zones from structures, support facilities, and roads could result in additional expenditures and a longer approval time for the developer. BLM’s discretionary sale approval policy could avoid sale of materials from riparian areas.

Mitigation measures to eliminate or reduce impacts resulting from exploration or mining operations could also result in additional expenditures and a longer permitting timeframe for the developer.

BLM or other agency authorization of rights-of-way for facilities such as roads, highways, and power lines could provide access and infrastructure. Alternatively, denial of rights-of-way could negatively affect operations.

Effects of Alternative A

Energy and Minerals

Approximately 287,457 acres of BLM lands would be available for locatable mineral entry and consideration for other mineral disposals. Energy and minerals permits would allow for development of the mineral resources to provide for the resource needs of society.

Leasable Fluid Minerals

Continuation of current management would result in the availability of approximately 597,384 acres for fluid mineral leasing across the entire Planning Area. Approximately eight percent (54,810 acres) of BLM subsurface ownership would be unavailable (Table 4-22), including Sleeping Giant, Sheep Creek, Elkhorn’s Tack-on, Black Sage, Humbug Spires, and Yellowstone Island WSAs.

Other areas unavailable for oil and gas leasing would include core areas of state wildlife management areas and lands recently acquired with LWCF funds. The remainder of federal mineral estate lands would be available for leasing, subject to the stipulations specified in Chapter 2 or under Standard Lease Terms.

Table 4-23 displays areas affected by no surface occupancy, timing limitations, and controlled surface use oil and gas stipulations.

The RFD scenario prepared for this RMP identified five areas in the Planning Area where it was the most reasonable to forecast conventional oil and gas or coal bed methane exploration and development based on existing information. These areas are described and defined in both Chapter 3 and Appendix M. The total Federal mineral estate in these five areas is approximately 116,295 acres.

Classification	Acres
No Surface Occupancy ¹	251,779
Timing Limitations ¹	285,993
Controlled Surface Use ¹	27,701
Standard Lease Terms ¹	31,911
Acres Available for Oil and Gas Leasing	597,384
Non-discretionary (unavailable)	28,774
Discretionary (unavailable)	26,036
Acres Unavailable for Oil and Gas Leasing	54,810

¹Acres by stipulation subcategory were calculated such that the subcategories add up to the total available acres for leasing based on the following general concepts where multiple stipulations overlapped: No Surface Occupancy stipulations override and are more restrictive than Timing Limitations, Controlled Surface Use, and Standard Lease Terms. Timing Limitation stipulations override and are more restrictive than Controlled Surface Use and Standard Lease Terms. Controlled Surface Use stipulations override and are more restrictive than Standard Lease Terms. Non-overlapping individual stipulation-specific acreages are displayed by alternative in Tables 4-23, 4-27, 4-30, and 4-33.

Table 4-23 Alternative A Acres Affected by Oil and Gas Stipulations					
Type of Stipulation	Stipulation	Development Potential			Total Acres Stipulated ¹
		Moderate	Low	Very Low	
No Surface Occupancy					
Arctic Grayling Habitat	NSO ¼	202	10,459	2,694	13,355
Bald Eagle Nest Sites	NSO ½	1,089	1,068	419	2,576
Class 1 Fisheries	NSO 1000	1,012	6,876	2,139	10,027
Continental Divide Trail	NSO 300	0	0	180	180
Developed Recreation Sites	NSO 300	12	61	134	208
Ferruginous Hawk Breeding Territories ²	NSO ¼	0	0	0	0
Known Special Status Plant Populations	NSO ¼	783	2,705	4,183	7,671
National Register of Historic Places Eligible	NSO 300	74	143	1,438	1,654
Peregrine Falcon Nest Sites/Breeding Habitat	NSO ¼	39	88	117	244
Prairie Dog Towns ²	NSO ¼	0	0	0	0
Raptor Breeding Territories	NSO ¼	639	749	856	2,245
Rivers Suitable for WSR Designation	NSO 1000	276	522	1,584	2,382
Sage Grouse Strutting Grounds (leks) ²	NSO 500	0	0	0	0
Westslope Cutthroat Habitat (90-99%)	NSO ¼	0	62	765	827
Westslope Cutthroat Habitat (99-100%)	NSO ¼	27	2,087	2,741	4,855
Wetlands, Floodplains and Riparian Areas	NSO 500, 1000	39,395	88,753	101,151	229,299
Wildlife Management Areas	NSO	2,971	34,971	28,050	65,992
Yellowstone Cutthroat Trout Habitat	NSO ¼	256	1,668	683	2,607
Timing Limitations					
Bald Eagle Breeding Habitat	TL 12/1 - 8/31	4,179	4,129	1,230	9,538
Big Game Winter/Spring Range	TL 12/1 - 5/15	102,198	187,180	209,595	498,973
Bighorn Sheep Core Areas	TL 12/1 - 5/15	24,012	13,781	32,822	70,615
Bighorn Sheep Yearlong Range	TL 12/1 - 5/15	30,109	26,067	75,103	131,279
Elk Calving/Big Game Birthing Areas	TL 5/1 - 6/30	1,150	8,033	11,124	20,307
Sage Grouse Breeding Habitat	TL 3/1 - 6/30 ½	0	0	0	0
Sage Grouse Winter/Spring Range	TL 12/1 - 5/15	538	46,768	19,517	66,824
Controlled Surface Use					
Controlled Surface Use stipulations for TES Species, Cultural and Paleontological Resource Inventory, and Special Status Plant Habitats would apply across the entire Decision Area so acreages were not calculated separately.					
Bull Trout Habitat	CSU ½	26	1,210	2,758	3,994
Gray Wolf Dens – Former Recovery Area	CSU	14,142	8,487	72,071	94,700
Grizzly Bear – Distribution Zone	CSU	34	29,008	24,905	53,947
Grizzly Bear – Recovery Zone	CSU	0	1,651	5,731	7,382
Restricted Soils	CSU	40,927	78,990	129,220	249,137
VRM Class II, III and IV Areas	CSU	65,962	77,938	104,949	248,849

¹Total acres affected by each stipulation are based on individual, independent, stipulation-specific GIS mapping and have not been overlapped with any other stipulations. Figures are provided here to display which stipulations for which resources are relatively dominant in the Decision Area.

²Total values of “0” indicate that there are currently no known sites or acres associated with this particular resource. Stipulation would apply to any newly detected sites or acres in the future.

An analysis was completed for each alternative to review the impact of constraints in the form of oil and gas lease stipulations imposed on oil and gas exploration and development within the boundaries of these five areas based on the belief that this would further quantify the effects of management under the various alternatives as these are the areas that the BLM believes have the most potential (low to moderate potential overall) for exploration and development (see **Table 4-24**).

Classification	Acres
No Lease	9,849
No Surface Occupancy	43,136
Timing Limitation	53,649
Controlled Surface Use	1,638
Standard Lease Terms	8,024
Total Available for Oil and Gas Leasing	106,447

Under Alternative A the analysis shows that approximately 8.5 percent of these five areas would not be available for oil and gas leasing. Approximately 37 percent of the areas would be subject to leasing subject to major constraints (no surface occupancy). Approximately 48 percent would be leased subject to moderate constraints. Approximately seven percent would be leased subject to standard terms and conditions. Alternative A is similar in its level of constraints to Alternative B. Both subject approximately 35 to 37 percent of the federal minerals to major constraints and approximately 48 to 55 percent to moderate constraints. Due to the level of major constraints, Alternatives A and B are somewhat more restrictive than Alternative D but much less restrictive than Alternative C.

Locatable Minerals

Locatable minerals activities would be regulated to prevent unnecessary or undue degradation as required by regulations (43 CFR 3809). Under Alternative A, 239,138 acres would remain open to mineral entry and consideration for salable mineral disposals without restrictions, 48,319 would be open to mineral entry with restrictions and 17,522 acres would be closed (**Table 4-25**).

Salable Minerals

Access roads and mine development for salable minerals would usually be located near municipalities or small rural communities. Impacts on natural resources and local residents would be avoided where possible or mitigated.

Mineral Potential	Restricted Acres	Closed Acres	Open Acres	Totals
Alternative A				
High	11,344	3,675	103,541	118,560
Medium	6,495	3,952	24,505	34,952
Low-None	30,479	9,894	111,092	151,466
Totals	48,319	17,522	239,138	304,978
Alternative B				
High	37,495	3,675	77,390	118,560
Medium	9,586	3,952	21,414	34,952
Low-None	41,647	9,919	99,899	151,466
Totals	88,728	17,547	198,704	304,978
Alternative C				
High	43,456	3,746	71,359	118,560
Medium	13,527	3,952	17,473	34,952
Low-None	54,248	10,022	87,196	151,466
Totals	111,230	17,720	176,028	304,978
Alternative D				
High	11,344	3,675	103,541	118,560
Medium	6,495	3,952	24,505	34,952
Low-None	29,768	9,849	111,804	151,466
Totals	47,607	17,522	239,850	304,978

Acres analyzed excludes approximately 2,300 acres not covered by the MBMG Mineral Potential reviews and about 347,000 acres of federal subsurface minerals.

Restricted Areas include WSAs, ACECs, WSRs, and T&E habitat (grizzly bear, bald eagle, and bull trout).

Closed areas include Withdrawals, proposed withdrawals, and LWCF Lands (11,246 acres), Lands in Public Water Reserves, Power site Reserves, Protective withdrawals and WCF lands are static and do not change from one alternative to another).

Open areas are all other areas.

Travel Plan road designations not included in analysis.

Effects of Alternative B

Energy and Minerals

Approximately 287,456 acres of BLM lands would be available for locatable mineral entry and consideration or other mineral disposals. Energy and minerals permits would allow for development of the mineral resources to provide for the resource needs of society. Additional lands would be available from core areas of state wildlife management areas for oil and gas leasing compared to Alternative A.

Approximately 623,420 acres would be available for fluid mineral leasing under Alternative B. Four percent (approximately 28,774 acres) of BLM-administered federal mineral estate lands would not be available for oil and gas leasing (Table 4-26) including WSAs. The remainder of federal mineral estate lands in the Planning Area would be available for leasing, subject to the stipulations specified in Chapter 2 or to Standard Lease Terms.

Table 4-27 displays acres affected by no surface occupancy, timing limitations, and controlled surface use oil and gas stipulations. Additional lands would be available from core areas of state wildlife management areas (about 20,200 acres) for oil and gas leasing compared to Alternative A. The effects would be similar to Alternative A with respect to overall percent of acres available for leasing, 92 percent for Alternative A, and 94 percent for Alternative B.

Classification	Acres
No Surface Occupancy ¹	280,312
Timing Limitations ¹	286,800
Controlled Surface Use ¹	38,365
Standard Lease Terms ¹	17,943
Acres Available for Oil and Gas Leasing	623,420
Non-discretionary (unavailable)	28,774
Discretionary (unavailable)	0
Acres Unavailable for Oil and Gas Leasing	28,774

¹ Acres by stipulation subcategory were calculated such that the subcategories add up to the total available acres for leasing based on the following general concepts where multiple stipulations overlapped: No Surface Occupancy stipulations override and are more restrictive than Timing Limitations, Controlled Surface Use, and Standard Lease Terms. Timing Limitation stipulations override and are more restrictive than Controlled Surface Use and Standard Lease Terms. Controlled Surface Use stipulations override and are more restrictive than Standard Lease Terms. Non-overlapping individual stipulation-specific acreages are displayed by alternative in Tables 4-23, 4-27, 4-30, and 4-33.

Type of Stipulation	Stipulation	Development Potential			Total Acres Stipulated ¹
		Moderate	Low	Very Low	
No Surface Occupancy					
Bald Eagle Nest Sites	NSO ½	1,089	1,068	419	2,576
Bighorn Sheep Core Areas	NSO	24,012	13,781	32,822	70,615
Bull Trout Habitat	NSO ½	26	1,210	2,758	3,994
Class 1 Fisheries (Blue Ribbon)	NSO ½	3,300	20,297	6,874	30,470
Continental Divide Nat'l Scenic Trail (Marysville)	NSO ½	0	0	1,574	1,574
Developed Recreation Sites	NSO ¼	207	981	1,877	3,064
Ferruginous Hawk Breeding Territories	NSO ½	0	0	0	0
Fluvial/Adfluvial Arctic Grayling Habitat	NSO ½	390	20,944	6,068	27,401
Grizzly Bear – Recovery Zone	NSO	0	1,651	5,731	7,382
Known or Discovered Special Status Plants or Populations	NSO ¼	784	2,705	4,183	7,671
Lewis & Clark National Historic Trail	NSO ½	4,671	4,547	2,610	11,828
Municipal Watersheds	NSO	13,083	86,169	47,224	146,477
National Register of Historic Places Eligible Properties/Districts and Paleontological Localities	NSO 300	74	143	1,438	1,654
Peregrine Falcon Nest Sites/Breeding Habitat	NSO 1	579	1,744	1,485	3,808

Table 4-27
Alternative B Acres Affected by Oil and Gas Stipulations

Type of Stipulation	Stipulation	Development Potential			Total Acres Stipulated ¹
		Moderate	Low	Very Low	
Prairie Dog Towns ²	NSO	0	0	0	0
R&PPs and 2920 Authorizations	NSO	0	0	816	816
Rivers Suitable for WSR Designation	NSO ½	928	62	1,525	2,515
Sage Grouse Strutting Grounds (leks) ²	NSO ¼	0	0	0	0
Traditional Cultural Properties ²	NSO ½	0	0	0	0
Westslope Cutthroat Trout Habitat (90-99% pure)	NSO ½	0	255	1,939	2,194
Westslope Cutthroat Trout Habitat (99-100% pure)	NSO ½	84	4,775	6,099	10,958
Streams with High Restoration Potential – Native Fish ²	NSO ½	0	0	0	0
Wetlands, Floodplains and Riparian Areas	NSO	1,965	4,522	4,959	11,445
Wildlife Management Areas	NSO	2,971	34,971	28,050	65,992
Yellowstone Cutthroat Trout Habitat	NSO ½	599	5,050	1,462	7,111
Lands Acquired with LWCF funds	NSO	2,718	3,652	1,308	7,677
Timing Limitations					
Bald Eagle Breeding Habitat	TL 2/1-8/31 1	4,179	4,129	1,230	9,538
Big Game Winter/Spring Range	TL 12/1-5/15	102,198	187,180	209,595	498,973
Bighorn Sheep Yearlong Range	TL 11/1-6/30	30,109	26,067	75,103	131,279
Elk Calving/Big Game Birthing Areas	TL 4/1-6/30	1,150	8,033	11,124	20,307
Gray Wolf Dens – Former NW MT Recovery Area	TL 4/15-6/30 1	0	0	698	698
Grizzly Bear – Denning Habitat (Distribution Zone)	TL 4/1-6/30, 9/15-10/15	34	29,008	24,905	53,947
Raptor Breeding Territories (Golden eagle, Prairie falcon, Swainson’s Hawk)	TL 3/1-7/31 ½	2,108	2,528	2,782	7,419
Sage Grouse Breeding Habitat	TL 3/1-6/30 3	0	2,751	0	2,751
Sage Grouse Winter/Spring Range	TL 12/1-5/15	538	46,768	19,517	66,824
Controlled Surface Use					
<i>Controlled Surface Use stipulations for TES Species, Cultural and Paleontological Resource Inventory, and Special Status Plant Habitats would apply across the entire Decision Area so acreages were not calculated separately.</i>					
Soils are either areas of mass wasting, unstable land areas; Non-Boulder Batholith with Slopes >30%; or Boulder Batholith with slopes >20%	CSU	40,927	78,990	129,220	249,137
Special Recreation Management Areas	CSU	15,965	47,439	34,657	98,061
VRM Class II, III & IV Areas	CSU	65,962	77,938	104,949	248,849

¹Total acres affected by each stipulation are based on individual, independent, stipulation-specific GIS mapping and have not been overlapped with any other stipulations. Figures are provided here to display which stipulations for which resources are relatively dominant in the Decision Area.

²Total values of “0” indicate that there are currently no known sites or acres associated with this particular resource. Stipulation would apply to any newly detected sites or acres in the future.

Leasable Minerals

The timing limitation stipulation for sage grouse breeding habitats would be applied to 2,751 acres of the Decision Area, with limitations on surface access restricted seasonally for geophysical, drilling, and field develop-

ment activities from March 1 to June 30 added to the total acres affected by Alternative B compared to Alternative A.

An analysis of the five areas in the Planning Area considered to be the most prospective for oil and gas explora-

tion and development was completed for Alternative B. Under this alternative, approximately six percent of these areas would not be available for oil and gas leasing. Approximately 35 percent of the areas would be subject to leasing, subject to major constraints (no surface occupancy). Approximately 55 percent could be leased, subject to moderate constraints. Approximately 1.4 percent could be leased, subject to standard terms and conditions. Alternative B is similar in its level of constraints to Alternative A (Table 4-28).

Classification	Acres
No Lease	9,821
No Surface Occupancy	41,115
Timing Limitation	59,498
Controlled Surface Use	4,182
Standard Lease Terms	1,678
Total Available for Oil and Gas Leasing	106,474

Locatable Minerals

Approximately 198 acres would be recommended for withdrawal from mineral entry in developed recreation sites. These acres would not be open to future mineral entry.

Under Alternative B, 287,431 acres of federal surface/minerals would remain open to mineral entry and consideration for salable mineral disposals. A total of 47,081 acres of moderate and high potential would be restricted (Table 4-25). Alternative B would have more impact on access to mineralized areas than Alternatives A and D, but less than Alternative C. Impacts to areas with low mineral potential would not be substantial to mineral production.

Effects of Alternative C

Energy and Minerals

Like in Alternative B, approximately 287,258 acres of BLM lands would be available for locatable mineral entry and consideration for other mineral disposals under Alternative C. Approximately 56,982 acres of high and medium potential would be restricted under this alternative (Table 4-25).

Alternative C could result in additional expenditures for the mineral developer and, in some cases, could affect the ability to proceed with a project should access to water or the streambed be a critical part of the proposed operations. Existing roads and facilities would be closed and the landscape and rehabilitated when no longer required for mineral or land management activities.

Leasable Minerals

Under Alternative C, 89 percent (580,382 acres) of the Decision Area would not be available for oil and gas leasing (Table 4-29).

Classification	Acres
No Surface Occupancy ¹	23,903
Timing Limitations ¹	0
Controlled Surface Use ¹	30,893
Standard Lease Terms ¹	17,016
Acres Available for Oil and Gas Leasing	71,812
Non-discretionary (unavailable)	28,774
Discretionary (unavailable)	551,608
Acres Unavailable for Oil and Gas Leasing	580,382

¹Acres by stipulation subcategory were calculated such that the subcategories add up to the total available acres for leasing based on the following general concepts where multiple stipulations overlapped: No Surface Occupancy stipulations override and are more restrictive than Timing Limitations, Controlled Surface Use, and Standard Lease Terms. Timing Limitation stipulations override and are more restrictive than Controlled Surface Use and Standard Lease Terms. Controlled Surface Use stipulations override and are more restrictive than Standard Lease Terms. Non-overlapping individual stipulation-specific acreages are displayed by alternative in Tables 4-23, 4-27, 4-30, and 4-33.

This includes the Wilderness Study Areas identified in Alternative B, plus lands in these additional locations:

- Prairie Dog Towns
- Sage Grouse Winter/Spring Range
- Lands within 0.5 miles of Sage Grouse Strutting Grounds (leks)
- State Wildlife Management Areas
- Big Game Winter/Spring Range Elk Calving/Big Game Birthing Areas
- Bighorn Sheep Yearlong habitat
- Lands within 1 mile of Bald Eagle Nesting/Breeding areas
- Lands within 0.5 mile of Raptor Breeding Areas
- Lands within 1 mile of peregrine falcon breeding territories
- Lands within 0.5 mile of Raptor Breeding Areas
- Lands within 1 mile of peregrine falcon breeding territories
- Lands within 0.5 mile of ferruginous hawk breeding territories

- Lands within 1 mile of 99 to 100 percent pure west-slope cutthroat trout habitats
- Yellowstone Cutthroat Habitat
- Municipal Watersheds
- Lands recently acquired with LWCF funds.

The remainder of mineral estate in the Planning Area (71,812 acres) would be available for leasing, subject to the stipulations specified in Chapter 2 or to Standard Lease Terms.

Table 4-30 displays acres affected by no surface occupancy, timing limitations, and controlled surface use oil and gas stipulations. Alternative C would eliminate most of the Decision Area for oil and gas leasing activity, deny access for oil and gas exploration on most Decision Area lands, and greatly reduce the area available for the potential discovery and development of new oil and gas resources.

Table 4-30					
Alternative C Acres Affected by Oil and Gas Stipulations					
Type of Stipulation	Stipulation	Development Potential			Total Acres Stipulated ¹
		Moderate	Low	Very Low	
No Surface Occupancy					
Bull Trout Habitat	NSO 1	414	3,641	5,121	9,175
Class 1 Fisheries (Blue Ribbon)	NSO 1	8,287	40,242	13,362	61,892
Continental Divide National Scenic Trail (Marysville)	NSO ½	0	0	1,574	1,574
Developed Recreation Sites	NSO ½	975	3,740	6,081	10,796
Fluvial/Adfluvial Arctic Grayling Habitat	NSO ½	390	20,944	6,068	27,401
Gray Wolf Dens – Former NW MT Recovery Area	NSO 1	0	0	698	698
Grizzly Bear – Denning Habitat (Distribution Zone)	NSO	34	29,008	24,905	53,947
Grizzly Bear – Recovery Zone	NSO	0	1,651	5,731	7,382
Known or Discovered Special Status Plants or Populations	NSO ½	1,953	5,856	9,092	16,902
Lewis & Clark National Historic Trail	NSO 1	10,336	10,223	4,510	25,070
National Register of Historic Places Eligible Properties/ Districts and Paleontological Localities	NSO 300	74	143	1,438	1,654
R&PPs and 2920 Authorizations	NSO	0	0	816	816
Rivers Suitable for WSR Designation	NSO 1	2,175	3,721	8,530	14,426
Sage Grouse Breeding Habitat	NSO 3	0	2,751	0	2,751
Special Recreation Management Areas	NSO	15,965	47,439	34,657	98,061
Traditional Cultural Properties ²	NSO ½	0	0	0	0
Westslope Cutthroat Trout Habitat (90-99% pure)	NSO ½	0	255	1,939	2,194
Wetlands, Floodplains and Riparian Areas	NSO	1,965	4,522	4,959	11,445
Timing Limitations					
Ferruginous Hawk Breeding Territories ²	NL ½ + TL 3/1-8/31 1	0	0	0	0
Controlled Surface Use					
<i>Controlled Surface Use stipulations for TES Species, Cultural and Paleontological Resource Inventory, and Special Status Plant Habitats would apply across the entire Decision Area so acreages were not calculated separately.</i>					
Soils are either areas of mass wasting, unstable land areas; Non-Boulder Batholith with Slopes >30%; or Boulder Batholith with slopes >20%	CSU	40,927	78,990	129,220	249,137
VRM Class II, III & IV Areas	CSU	63,231	77,938	104,949	246,118

¹Total acres affected by each stipulation are based on individual, independent, stipulation-specific GIS mapping and have not been overlapped with any other stipulations. Figures are provided here to display which stipulations for which resources are relatively dominant in the Decision Area.

²Total values of “0” indicate that there are currently no known sites or acres associated with this particular resource. Stipulation would apply to any newly detected sites or acres.

An analysis of the five areas in the Planning Area considered to be the most prospective for oil and gas exploration and development was completed for Alternative C. Under this alternative approximately 93 percent of these areas would not be available oil and gas leasing (**Table 4-31**).

Classification	Acres
No Lease	108,784
No Surface Occupancy	2,185
Timing Limitation	0
Controlled Surface Use	3,898
Standard Lease Terms	1,428
Total Available for Oil and Gas Leasing	7,511

Approximately two percent of the areas would be leasable, subject to major constraints (no surface occupancy). Approximately three percent would be leased subject to moderate constraints. Approximately two percent would be leased subject to standard terms and conditions. Based on this level of constraints it can be assumed that it is not reasonable to foresee any federal oil and gas development under this alternative.

Locatable Minerals

Effects to area availability for locatable mineral operations would be slightly greater than under Alternative B, with an additional 9,901 acres of high and medium potential lands being restricted. Impacts to areas with low mineral potential would not be substantial to mineral production.

Salable Minerals

The BLM would not allow the purchase of salable minerals (common varieties of sand, stone, gravel, pumice, cinders, clay and petrified wood), unless desired by the state or counties, or within existing community pits.

Alternative C would have the same effects on mining as Alternative A; however, Alternative C would eliminate private citizens and municipal applications for new sites because county and state governments would be the agencies that have to initiate the request. Private citizens and municipalities would have to purchase their mineral materials from commercial sources and pay higher costs for transportation.

Effects of Alternative D

Energy and Minerals

Like in Alternative A, approximately 287,456 acres of BLM lands would be available for locatable mineral entry and consideration for other mineral disposals (**Table 4-25**).

Roads could be built in riparian areas, however, avoidance, mitigations, and BMPs would result in effects being the same as Alternatives A and B. Roads and facilities no longer required for mineral, or land management activities would be reclaimed to the extent possible.

Leasable Minerals

Under Alternative D approximately 615,788 acres would be available for fluid mineral leasing. Six percent (36,406 acres) of federal mineral estate lands would not be available for oil and gas leasing, including the Wilderness Study Areas and lands recently acquired with LWCF funds (**Table 4-32**).

Classification	Acres
No Surface Occupancy ¹	93,288
Timing Limitations ¹	436,410
Controlled Surface Use ¹	32,011
Standard Lease Terms ¹	54,079
Acres Available for Oil and Gas Leasing	615,788
Non-discretionary (unavailable)	28,774
Discretionary (unavailable)	7,632
Acres Unavailable for Oil and Gas Leasing	36,406

¹Acres by stipulation subcategory were calculated such that the subcategories add up to the total available acres for leasing based on the following general concepts where multiple stipulations overlapped: No Surface Occupancy stipulations override and are more restrictive than Timing Limitations, Controlled Surface Use, and Standard Lease Terms. Timing Limitation stipulations override and are more restrictive than Controlled Surface Use and Standard Lease Terms. Controlled Surface Use stipulations override and are more restrictive than Standard Lease Terms. Non-overlapping individual stipulation-specific acreages are displayed by alternative in Tables 4-23, 4-27, 4-30, and 4-33.

The remainder of mineral estate in the Decision Area would be available for leasing, subject to the stipulations specified in Chapter 2 or to Standard Lease Terms.

Effects would be similar to Alternative B with respect to overall acres of BLM administered land available for leasing and not available for leasing (compare **Table 4-26** and **Table 4-33**). However, Alternative D would apply the same stipulations to different acres. For example, there are fewer acres of land under No Surface Occupancy and Controlled Surface Use stipulations and a much larger number of acres under Timing Limitations and Standard Lease Terms stipulations under Alternative D, than Alternative A (**Table 4-22** and **Table 4-33**). As a result Alternative D would be less stringent in the application of stipulations for leasing of essentially the same amount of land as Alternative A. The amount of

actual land disturbance from these less stringent leasing stipulations should be relatively minor because the amount of drilling would be driven by exploration potential, which is generally low throughout federal mineral estate lands.

Table 4-33 displays acres affected by no surface occupancy, timing limitations, and controlled surface use oil and gas stipulations under Alternative D.

Table 4-33 Alternative D Acres Affected by Oil and Gas Stipulations					
Type of Stipulation	Stipulation	Development Potential			Total Acres Stipulated ¹
		Moderate	Low	Very Low	
No Surface Occupancy					
Bald Eagle Nest Sites	NSO ½	1,089	1,068	419	2,576
Bull Trout Habitat	NSO ½	26	1,210	2,758	3,994
Known or Discovered Special Status Plants or Populations	NSO	54	672	299	1,025
National Register of Historic Places Eligible Properties/ Districts and Paleontological Localities	NSO 300	74	143	1,438	1,654
Peregrine Falcon Nest Sites/Breeding Habitat	NSO 1	579	1,744	1,485	3,808
Prairie Dog Towns ²	NSO	0	0	0	0
R&PPs and 2920 Authorizations	NSO	0	0	816	816
Sage Grouse Strutting Grounds (leks) ²	NSO ¼	0	0	0	0
Traditional Cultural Properties ²	NSO ½	0	0	0	0
Westslope Cutthroat Trout Habitat (99-100% pure)	NSO ½	84	4,775	6,099	10,958
Wetlands, Floodplains and Riparian Areas	NSO	1,965	4,522	4,959	11,445
Wildlife Management Areas	NSO	2,971	34,971	28,050	65,992
Timing Limitations					
Bald Eagle Breeding Habitat	TL 2/1-8/31 1	4,179	4,129	1,230	9,538
Big Game Winter/Spring Range	TL 12/1-5/15	102,198	187,180	209,595	498,973
Bighorn Sheep Yearlong Range	TL 11/1-6/30	30,109	26,067	75,103	131,279
Ferruginous Hawk Breeding Territories ²	TL 3/1-7/31 ½	0	0	0	0
Sage Grouse Breeding Habitat	TL 3/1-6/30 3	0	2,751	0	2,751
Sage Grouse Winter/Spring Range	TL 12/1-5/15	538	46,768	19,517	66,824
Controlled Surface Use					
Controlled Surface Use stipulations for TES Species, Cultural and Paleontological Resource Inventory, and Special Status Plant Habitats would apply across the entire Decision Area so acreages were not calculated separately.					
Class 1 Fisheries (Blue Ribbon)	CSU ½	3,300	20,297	6,874	30,470
Developed Recreation Sites	CSU ¼	207	981	1,877	3,064
Gray Wolf Dens – Former Recovery Area	CSU	14,142	8,487	72,071	94,700
Grizzly Bear – Denning Habitat (Distribution Zone)	CSU	34	29,008	24,905	53,947
Grizzly Bear – Recovery Zone	CSU	0	1,651	5,731	7,382
Fluvial/Adfluvial Arctic Grayling Habitat	CSU ½	390	20,944	6,068	27,401
Municipal Watersheds	CSU	13,083	86,169	47,224	146,477
Westslope Cutthroat Trout Habitat (90-99% pure)	CSU ½	0	255	1,939	2,194
Yellowstone Cutthroat Trout Habitat	CSU ½	599	5,050	1,462	7,111

¹Total acres affected by each stipulation are based on individual, independent, stipulation-specific GIS mapping and have not been overlapped with any other stipulations. Figures are provided here to display which stipulations for which resources are relatively dominant in the Decision Area.

²Total values of “0” indicate that there are currently no known sites or acres associated with this particular resource. Stipulation would apply to any newly detected sites or acres.

An analysis of the five areas in the Planning Area considered to be the most prospective for oil and gas exploration and development was completed for Alternative D. Under this alternative approximately eight percent of federal mineral estate in these areas would not be available for oil and gas leasing. Approximately seven percent of the areas would be subject to leasing subject to major constraints (no surface occupancy). Approximately 87 percent would be leased subject to moderate constraints. Approximately five percent would be leased subject to standard terms and conditions. Based on this analysis Alternative D would be the least restrictive of the four alternatives for oil and gas development (Table 4-34).

Classification	Acres
No Lease	9,821
No Surface Occupancy	7,981
Timing Limitation	86,286
Controlled Surface Use	6,235
Standard Lease Terms	5,972
Total Available for Oil and Gas Leasing	106,474

Locatable Minerals

Effects on lands available for locatable mineral entry would be largely the same as Alternatives B and C. Alternative D has less of an impact than Alternatives B and C and more of an impact on access to mineralized areas than Alternative A (Table 4-25).

Salable Minerals

Effects from mining would be the same as Alternative A. Although mitigations for natural resources are not specifically stated in Alternative D, the BLM would apply mitigations, BMPs, and other restrictions on quarrying operations and plans for ultimate reclamation and closure to minimize the impacts on natural resources.

RECREATION

Effects Common to All Alternatives

Vegetative treatments would potentially affect Recreation Opportunity Spectrum (ROS) classes, natural settings, and user experience levels due to changes in apparent naturalness, screening quality and user distribution patterns, and social conflicts.

Prescribed burning could occur more frequently in the Special Recreation Management Areas (SRMAs) outside of the urban interface, which could negatively alter the recreation experiences due to smoke and poor air quality. These impacts would be temporary and could be

mitigated or minimized with respect to timing, location, and methods used. Reducing the potential for future large-scale wildland fires would benefit recreation opportunities and experience levels over the long-term.

Managing riparian areas to restore and improve natural functioning conditions would benefit recreation users seeking opportunities for scenic viewing, fishing, bird-watching, hunting, and hiking. Development of new recreation sites and expansion of existing recreation facilities would need to minimize adverse impacts to riparian areas, which could limit site development opportunities and access concentration points to dispersed recreation use areas.

Allowing no new grazing permits on river islands would result in an improvement in water-based recreation experiences for boaters, anglers, nature observers, picnickers, and tent campers in these areas. Managing livestock numbers and practices in a manner that is responsive to all resource needs, combined with interdisciplinary reviews will maintain or enhance recreation experiences over the long-term.

Habitat improvement projects for special status and priority species would have an impact on recreation uses, especially those seeking opportunities for wildlife viewing and hunting. Creating blocks of hiding and security for elk could improve the number of elk and other big game for viewing and hunting.

Minimizing human activities that disrupt habitat during sensitive seasons (breeding periods or during winter) would limit the time and type of recreation uses and travel within these sensitive areas.

Recreation restrictions for aquatic habitat protection may impact water-based recreation and shoreline uses during months of breeding or migrating. Management to enhance or rehabilitate aquatic and riparian habitat would positively impact the angling recreation use in areas where there are nationally recognized sport fishing opportunities, such as the Madison, Big Hole, Jefferson, Missouri, and Yellowstone Rivers.

Developing comprehensive and collaborative travel management plans throughout the Decision Area that are responsive to environmental values and social needs would have varying effects on motorized and non-motorized recreation users. Although the limited travel designation restricts all motorized public travel to designated routes, variances for appropriate uses would be considered and the 300-foot rule exception for dispersed camping, firewood gathering, and game retrieval varies among the 13 Travel Planning Areas in the Decision Area. The 300-foot rule allows dispersed camping in the nine areas where travel plans have not been completed and as per indicated in previously completed site-specific travel plans. Although this rule limits opportunities for recreational firewood gathering and impacts game retrieval, it would enhance ROS classes, travel management, and non-motorized experiences. The 300-

foot rule exception for dispersed camping would allow greater opportunities for motorized camping in primarily rural or motorized semi-primitive recreation settings. The transportation system would continue to provide access to a variety of recreation opportunities and experiences. Conducting scheduled recreation site and route condition assessments and maintaining these facilities in accordance with BLM standards would promote public safety, and enhance recreation opportunities and visitor expectations.

All existing recreation sites would continue to be managed for public use and enjoyment. The more developed fee sites where visitation is highest would be given priority for funding to ensure that user expectations are met.

Limiting camping stays to 7 days at recreation sites in areas regularly exceeding capacities during fee-use seasons would allow more equitable opportunities for visitors to obtain and enjoy a camping site.

Management of special recreation use permits for commercial, competitive, and special events would continue to be considered on a case-by-case basis with priority given to existing permittees as new permits would not be issued that conflict with existing permit uses.

The recreational management emphases would be prioritized within designated Special Recreation Management Areas to ensure quality recreation opportunities and experiences are provided. Intensive management in these priority areas would be dedicated to providing quality settings and experiences for recreation opportunities in response to identified market demands.

Management of the six WSAs would continue to provide primitive and unconfined recreation opportunities and solitude experiences in a natural setting. If Congress releases a WSA from further consideration, then the resource protection under the IMP guidelines would not continue and these areas would be managed as specified under each alternative. The Sleeping Giant WSA and the Sheep Creek WSA would be protected as ACECs under each alternative.

BLM would continue to manage recreational resources in a cooperative manner with other agencies, which would promote comprehensive management for a wide diversity of both water and land based opportunities in the Decision Area.

Proposed VRM management would continue to provide for mitigating visual disturbances. This would have a positive impact on recreation resources and experiences by creating a landscape compatible with the recreation settings and SRMA management.

The Sleeping Giant ACEC is the only area that would be managed as an ACEC under all alternatives. Management actions would continue to preserve a natural setting for recreation uses within Sleeping Giant. This management would benefit solitude experiences and opportuni-

ties for non-motorized and unconfined forms of recreation.

Motorized recreation uses could be temporarily, seasonally, or permanently restricted in areas with significant soil erosion or soil compaction. This could reduce motorized recreation opportunities to a minor degree on a case-by-case basis.

Management actions to enhance access to BLM lands would positively affect recreation users, because the public would have additional opportunities to enjoy recreation activities on public land.

Solid and fluid mineral actions (road building, exploration, excavation/extraction, and removal) could impact recreation uses due to associated noise, smoke and visible human disturbances. Project-level environmental analyses would consider and mitigate these impacts on recreation use before authorizations are granted.

Effects of Alternative A

Vegetative treatments for grasslands (up to 5,250 acres/decade), forest types (up 7,500 acres/decade) and forest product sales (up to 27 MMBF/decade) would create the second lowest potential of all alternatives for impacts on recreation settings and dispersed recreation uses due to associated disturbances.

Riparian actions would impact dispersed recreation experiences the most and developed site management the least, given that riparian management measures would be less restrictive than with Alternatives B and C.

Assuming implementation of the high end of the proposed ranges of noxious weed treatment acres under the action alternatives, proposed noxious weed treatments under Alternative A (up to 20,000 acres/decade) would be the lowest of all alternatives and therefore impacts on recreationists seeking natural settings could be affected by this alternative the most.

Road management would generally allow existing roads to remain open for public use. This would benefit motorized vehicle users and potentially impact non-motorized recreationists to the greatest degree.

Recreationists seeking organized, motorized events would be affected the least under this alternative since 10 of the 13 Travel Planning Areas would remain available for consideration. Snowmobilers would continue to have the greatest opportunities under this alternative since fewer restrictions would be imposed as 143,206 acres would remain open to cross-country use, and 137,038 acres would be available but limited to established routes.

Motorized opportunities for wheeled vehicle travel would also be the greatest under this alternative as 4,367 acres would be open to cross-country travel and approximately 684 miles of routes (roads and trails) would be available (yearlong or seasonally). Conversely, oppor-

tunities for non-motorized recreationists to enjoy areas free of the sights and sounds of motorized activities would be affected the most.

No outfitter and guide fees would be charged for the commercial fishing and floating use of BLM river and lake access sites. Extensions to the 14-day camping limit would continue to be considered for hunters and other users subject to stipulations. Outfitter and guide permit issuance would continue to be considered for both day-use and overnight camping.

This alternative does not allocate ROS classifications. As a result, no ROS allocation system would be established to help recreation managers communicate and provide appropriate settings for a diverse range of opportunities and experiences. Recreation use could be negatively affected as recreation opportunities would continue to be managed in a manner that is reactive rather than proactive. Planning efforts, recreation opportunities, and management would continue to be prioritized primarily within the five SRMAs. The SRMAs represent over 66,000 acres with recreation management focus, which is more than in Alternative D, but less than in Alternatives B and C (Table 4-35).

Motorized and non-motorized recreational uses would continue to be allowed 24 hours a day in the Scratchgravel Hills area. With no change in management, the impacts of this action would be continued violations of

travel management restrictions, social conflicts, human caused fires, and illegal activities.

All six WSAs would continue to be managed as WSAs, which would result in no change to the availability of primitive recreation opportunities and experiences provided in WSAs.

Although the Wild and Scenic River suitability study for the four eligible rivers would not be completed, the recreation values associated with these segments would be protected under WSR interim management.

Approximately 56,900 acres would be managed as VRM Class I and II areas and therefore recreation settings governed by these classes would remain primarily natural in character. This alternative would protect the second lowest acreage under these classes compared to other alternatives and includes WSAs and major river frontage lands.

Recreation sites would not be recommended for withdrawal from mineral entry and therefore these sites and the visitor experiences associated with them could be affected by mineral related activities.

This alternative imposes the second lowest amount of restrictive stipulations on solid and fluid mineral activities and therefore related impacts would have a relatively high probability for affecting recreation settings and visitor experiences.

Name	SRMAs Included in the Alternative = X			
	A	B	C	D
Hauser Lake		X	X	X
Lower Holter Lake/Missouri River		X	X	X
Holter Lake/Sleeping Giant ¹	X			
Humbug Spires	X	X	X	
Lewis & Clark National Trail	X			
Pipestone		X	X	X
Scratchgravel Hills	X	X	X	
Sheep Mountain		X	X	X
Sleeping Giant/Missouri River		X	X	
Uppermost Missouri River		X	X	X
Upper Big Hole River	X	X	X	X

Source: BLM Butte Field Office, RMP Alternatives Description, 2005.

¹ The action alternatives split this SRMA into Holter Lake/ Missouri River and Sleeping Giant SRMA.

Effects Common to Action Alternatives

All action alternatives would establish ROS classifications (**Appendix H, Table 4-36**) which would facilitate management of desired recreation opportunities, experience levels, facility developments, and other resource uses.

The majority of the potential SRMAs would target the Community Recreation Tourism Market (RTM). This emphasis would impact recreation management in that a marketing focus would be adopted. This emphasis would be to attract and provide opportunities/services for visitors from nearby communities or from communities dependant on recreation-based tourism.

Upper Big Hole River SRMA would be managed as a Destination RTM and would attract national or regional recreation-tourism visitors and others who value public lands as recreation-tourism destinations.

SRMAs managed for Undeveloped RTM would be Sleeping Giant/Missouri River and Humbug Spires. This management emphasis would attract national, regional, or local visitors who value public lands for the distinctive kinds of dispersed recreation produced by the vast size and largely open, undeveloped character of the recreation setting.

Providing forested, security cover (250-acre, minimum blocks) for big-game would benefit non-motorized recreation uses compared to Alternative A.

Monitoring roads during hunting season could reduce the number of violations and misdeeds, and therefore provide a more enjoyable recreation experience for visitors.

Semi-primitive non-motorized would be the primary ROS classification on BLM lands in the Sleeping Giant/Missouri River (ACEC and eligible WSR portions), Humbug Spires, and Sheep Mountain (northern portion) potential SRMAs. The semi-primitive motorized ROS class would be emphasized in the Sleeping Giant (outside the ACEC). The remaining potential SRMAs would emphasize either the roaded natural or rural ROS class, where human influences are noticeable and interaction with others is typical.

Establishing specific guidance for managing designated boat-in camp sites along the shoreline of Holter Lake and Hauser Lake shoreline (if needed) would address the relationship between resource impact concerns and boat-in dispersed camping opportunities.

Issuing fees through recreation permits to commercial fishing and floating outfitters using developed sites to access state waterways could increase client fees and possibly deter some outfitters from providing fishing and floating experiences to visitors on some water segments.

Additional mitigations on new special recreation permits would potentially affect new permittees more than in Alternative A.

Extending commercial outfitting permits from 5 to 10 years for permittees that demonstrate satisfactory performance standards would improve management efficiency and potentially act as an incentive that could improve outfitter performance standards.

BLM would coordinate with MFWP to manage appropriate uses at BLM launch sites as necessary to ensure quality recreation opportunities and reduce social conflicts on streams and lakes.

Given budgetary constraints, new sites that have partnership support would be given first priority for development. This policy would minimize funding shortfalls at existing sites where investments and traditional uses are established.

Subjecting recreation sites to Land Health Standards could increase mitigation costs at existing sites and potentially limit opportunities for new sites. Conversely, this stipulation would enhance the natural setting of recreation sites as well as associated visitor experiences.

Implementing management guidance for SRMAs and Recreation Management Zones would enhance targeted opportunities, visitor experiences, appropriate facility levels, and settings. Implementing land management consistent with surrounding lands and prescriptions would protect WSA values if released from further consideration as wilderness.

Sleeping Giant, Sheep Creek, Humbug Spires, and Elkhorns Tack-on WSAs would be managed as ACECs

ROS Class	Alt A	Alt B		Alt C		Alt D	
		Acres	% of DA	Acres	% of DA	Acres	% of DA
Semi-primitive Non-motorized	NA	36,800	12%	63,700	21%	30,000	10%
Semi-primitive Motorized	NA	71,800	23%	66,900	22%	37,600	12%
Roaded Natural	NA	171,100	56%	158,100	51%	186,100	61%
Roaded Modified	NA	16,600	5%	15,900	5%	19,600	6%
Rural	NA	11,000	4%	2,700	1%	34,000	11%

Source: BLM Butte Field Office, GIS data, 2005.

which would promote administrative protection of the existing recreation values and opportunities. These areas would continue to offer natural settings and user experiences subject to fewer restrictions governing mineral activities if Congress should remove them from further wilderness consideration.

The action alternatives would require that the two National Trails be managed to consider the adopted ROS classification, VRM classes, travel plans, and oil and gas stipulations. Re-routing the Continental Divide Trail would increase the recreation opportunities for the non-motorized user because the trail segment would traverse through more natural settings and less privately owned property. Recreation experiences for the non-motorized users would improve because the re-route would be closed to motorized uses, which would reduce user conflicts.

ACEC designations for Sleeping Giant (11,679 acres), Humbug Spires (8,400 acres), and the Elkhorns Tack-on (3,575 acres) would continue to be managed for semi-primitive, non-motorized recreation opportunities.

Retaining 298,408 acres in BLM ownership and establishing a high priority for land acquisitions to enhance special management designations and recreation sites would benefit long-term recreation opportunities especially, for non-motorized users.

Managing mineral activities to meet Land Health Standards would benefit natural settings and associated recreation experiences. Providing accessibility to mineralized areas for exploration and development would impact the naturalness of ROS classes and the recreation experiences associated with them. The restoration of abandoned mine lands and hazardous material areas would enhance public safety, ROS classes, and the quality of opportunities across BLM lands.

Effects of Alternative B

Proposed vegetative treatments for grasslands (up to 11,800 acres/decade), shrublands (up to 3,650 acres/decade), forest types (up 18,500 acres/decade) and forest product sales (up to 25 MMBF/decade), although mitigated, would create the second highest potential for impacts on dispersed recreation uses due to associated disturbances. The construction of new permanent roads, although minimized due to resource and travel planning constraints, could impact ROS classes while enhancing motorized travel and access opportunities.

Actions to restore riparian areas would improve dispersed recreation experiences and could affect developed site management the second most of all alternatives, given that Riparian Management Zones would be larger than in either Alternative A or D.

Proposed noxious weed treatments (up to 50,000 acres/decade) would be the second highest and therefore recreationists seeking natural setting experiences could

be benefited to the second greatest extent of all alternatives.

Restrictions on prescribed burning would coincide with the peak recreation use season. Although these actions would create some short and mid-term impacts on ROS, long-term benefits should be realized due to a lower likelihood for large scale fire events.

Under Alternative B, where road densities exceed 1 mi/mi² in big game winter range and calving areas, there would be no net increase in permanent roads. This prescription would affect motorized users the second most of the action alternatives (more than Alternative D but less than Alternative C), primarily in the four pending travel plan areas for which site-specific travel planning would be done after finalization of this RMP (Missouri Foothills, Broadwater, Jefferson and Park/Gallatin).

Recreationists seeking organized, motorized events would be affected the second most under this alternative as only the Pipestone area would be considered for competitive as well as non-competitive events.

Snowmobile riding opportunities would be reduced to the second greatest extent of the alternatives as 112,682 acres would be open to cross-country use and on 139,921 acres use would be limited to established routes.

Implementing a flat annual Special Recreation Use Permit fee with the long-term goal of developing a coordinated, interagency fee system with MFWP and other agencies would promote fair value revenues from outfitters using waterway access sites for commercial fishing and floating. This alternative would be more efficient than Alternative C for both the customer as well as BLM since there would be less required paperwork and the annual fee would cover all access sites. Preference for granting extensions to the 14-day camping limit during the hunting season would focus on developed recreation campgrounds after the high use fee season. This prescription would better protect resource values while camping opportunities (primarily for hunters) beyond 14 days would be reduced. Restricting special recreation permit camping authorizations during the hunting season to hardened campgrounds and not allowing such uses in developed recreation sites from Memorial to Labor Day weekends would reduce conflicts with public hunters and campers. Impacts to hunting outfitters would be minimal given that no camping permits exist and demands are negligible.

The effects of closing the Scratchgravel Hills area to motorized vehicle uses would reduce use violations, risks of human caused fires, conflicts with proximity residents and law enforcement incidents.

Limiting all BLM boat-in camping opportunities along Holter and Hauser Lake shorelines to designated sites would reduce the number of dispersed recreation sites available along the shoreline.

This alternative would allocate ROS classifications as follows: SPNM-36,800, SPM-71,800, RN-171,100, RM-16,600, and R-11,000. These designations represent a more evenly balanced approach for managing recreation settings, opportunities and experiences for a more diversified representation of settings and experiences as compared to Alternatives C and D. Opportunities for both motorized and non-motorized opportunities within the range of varying settings would be provided most evenly. Approximately 56 percent of the Decision Area would be in the roaded natural ROS (Table 4-36).

In addition to the Sleeping Giant area, a large portion of the Elkhorns, Humbug Spires, and Ringing Rocks would be designated as ACECs. ACEC designation would provide long-term protection of each area's ROS values and recreation opportunities. Alternative B provides the second greatest amount of protection associated with proposed ACEC designations of any of the alternatives.

Nine SRMAs totaling 78,700 acres would be designated for priority recreation management, four more than in Alternatives A and D (Table 4-35). These SRMAs include areas along major waterways (rivers and lakes), highly natural areas, and OHV riding areas where management demands are the greatest. Pipestone and Sheep Mountain would be newly managed as SRMAs. The majority of these areas would be managed as ROS-Roaded Natural (46 percent) and ROS-Semi-primitive Non-motorized (31 percent).

Recommending Muskrat Creek (2.6 miles) as suitable, and the Upper Missouri River (3.1 miles) as preliminarily suitable as National Wild and Scenic Rivers could provide long-term protection for the associated recreation values (natural viewing, hiking, fishing, and hunting) if designated by Congress. Conversely, no additional protection would be established for the recreation values associated with the Upper Big Hole River and Moose Creek segments since they would not be recommended in this alternative.

Across the Field Office, approximately 80,400 acres would be managed as VRM Class I and II areas and therefore recreation settings governed by these classes would be managed for natural character retention. The remaining 226,900 acres would be managed as VRM Class III and IV which would allow more landscape alterations such as roads which would increase motorized access and travel opportunities. This alternative would have the second highest acreage under Classes I and II and the second lowest acreage under Classes III and IV of all the alternatives.

Under Alternative B, 198 acres in eight recreation sites would be recommended for withdrawal from mineral entry. This would protect these recreation facility investments as well as site opportunities and experiences better than in Alternatives A and D, which propose no new withdrawals for developed recreation sites.

This alternative imposes the second highest amount of restrictive stipulations of all alternatives on solid and fluid mineral activities and therefore related impacts would have a lower probability for impacting recreation settings and visitor experiences than in Alternatives A and D.

Effects of Alternative C

Proposed vegetative treatments for grasslands (up to 2,000 acres/decade), shrublands (up to 750 acres/decade), forest types (up to 8,500 acres per decade), and forest product sales (up to 12 MMBF/decade) would create the lowest potential for impacts on recreation settings and dispersed uses due to associated disturbances from these actions.

Unlike the other alternatives, Alternative C would prohibit new permanent roads associated with forest harvests and timber sales. This prescription would benefit natural recreation settings and limit additional access for motorized-based recreation activities.

Actions to restore riparian areas would improve dispersed recreation experiences and affect developed site management the most of any alternatives, given that Riparian Management Zones would be the most extensive of any alternative.

Impacts from the timing of prescribed fires would be the same as described for Alternative B.

Proposed noxious weed treatments (up to 38,000 acres/decade) would be the second lowest of any alternative and therefore recreationists seeking natural setting experiences would be potentially affected to the second greatest extent due to a relatively small amount of proposed treatments.

Under Alternative C, where road densities exceed 0.5 mi/mi² in big game winter range and calving areas, there would be no net increase in permanent roads. This prescription would impact motorized riders the most of all alternatives, primarily in the four pending travel plan areas for which site-specific travel plans would be developed after finalization of this RMP (Missouri Foothills, Broadwater, Jefferson, and Park/Gallatin).

Recreationists seeking organized, motorized events would be affected the most under this alternative since none of these activities would be authorized within the Decision Area. Under this alternative, conflicts with other motorized and non-motorized users would be reduced and groups seeking such events would need to find other non-BLM areas.

Snowmobile riding opportunities would be reduced to the greatest extent of all the alternatives. Designated open areas (to cross-country use) would be reduced to 26,148 acres; closed areas would be increased to 65,270 acres; and limited areas would be increased to 215,891 acres.

Implementing Special Recreation Use Permits and established fees would increase costs to outfitters using BLM sites to access state waterways the most of any of the alternatives. This prescription would displace some outfitter fishing and floating use to non-BLM site segments and it would not be as customer friendly as Alternative B or D due to the need for additional permits and actual use statements. In addition, BLM would incur higher management demands than from any other alternatives due to the large number of permits and required process procedures.

The effects of eliminating variances to the 14-day camping limit would best protect recreation settings while camping opportunities (primarily for hunters) beyond 14 days would be reduced the most compared to the other alternatives. Impacts of restricting commercial camping uses would be similar to Alternative B.

Although closing the entire Scratchgravel Hills area to both motorized and non-motorized recreational uses after dark (dusk to dawn) yearlong would best protect the area from violations, management and law enforcement demands would increase compared to Alternatives A, B, and D. Impacts on legitimate public users would be negligible as their use of the area after dark is minimal.

Closing the entire BLM shoreline on Holter and Hauser Lake to boat-in camping except at developed sites would eliminate opportunities for dispersed camping and best protect the natural conditions within these recreation settings.

This alternative maximizes the acreage designated under ROS as semi-primitive non-motorized at 63,700 acres which is about twice that of Alternatives B and D (Table 4-36). The effects of this increase would enhance opportunities for hiking, walk-in hunting, mountain biking, horseback riding and other forms of non-motorized uses. Conversely, motorized uses would be eliminated within these areas.

Alternative C would designate the same nine SRMAs as Alternative B (Table 4-35); however, most of the SRMAs would be within the semi-primitive, non-motorized ROS, 46 percent, with the roaded natural ROS encompassing approximately 31 percent (Table 4-36).

Recommending all four river segments (12 miles) as suitable National Wild and Scenic Rivers would provide the greatest long-term protection of any of the alternatives for the associated values if designated by Congress.

Alternative C would manage the most areas and acres under ACECs. Impacts on recreation from the Sleeping Giant and Humbug Spires ACECs would be the same as that described in "Effects Common to Action Alternatives". Impacts on recreation from the Ringing Rocks ACEC would be the same as that described for Alternative B.

Management of the Elkhorn ACEC and the addition of Spokane Creek (14 acres) would have similar impacts on recreation uses as described for Alternative B, except Alternative C would emphasize more opportunities for non-motorized recreation.

At the Field Office scale, this alternative would designate 99,100 acres under VRM Class I and II areas. The natural character of the recreation settings within these classes would be best protected from disturbances than in any other alternative. The remaining 208,200 acres would be managed as VRM Class III and IV which would allow more landscape alterations such as roads and would increase motorized access and travel opportunities. This alternative has the highest acreage under Classes I and II and the lowest acreage under Classes III and IV of all alternatives.

As with Alternative B, recommending 198 acres in eight recreation sites for withdrawal from mineral entry would protect these recreation facility investments as well as site opportunities and experiences better than in Alternatives A and D that do not propose these withdrawals.

This alternative would impose the highest amount of restrictive stipulations on solid and fluid mineral activities of all alternatives and therefore related activities would have a lower probability for impacting recreation settings and visitor experiences than with any other alternative.

Effects of Alternative D

Proposed vegetative treatments for grasslands (up to 3,500 acres/decade), shrublands (up to 6,800 acres/decade), forest types (up to 23,250 acres/decade) and forest product sales (up to 30 MMBF/decade) would create the highest potential of any alternative for impacts on recreation settings and dispersed uses due to associated disturbances from these actions.

Effects of riparian, forest product roads and re-issuance of grazing permit actions would be similar to Alternative A.

Proposed noxious weed treatments (up to 61,000 acres/decade) would be the highest of any alternative and therefore impacts on recreationists seeking natural setting with fewer invasive weeds could be benefited by this alternative the most.

Under Alternative D, where road densities exceed 1.5 mi/mi² in big game winter range and calving areas, there would be no net increase in permanent roads. This prescription would have the second lowest impacts on motorized riders in the four pending travel plan areas for which site-specific travel plans would be developed after finalization of this RMP (Missouri Foothills, Broadwater, Jefferson, and Park/Gallatin) since road densities would be more restrictive under Alternatives B and C.

Groups seeking organized motorized activities would be affected less than under Alternative C as the Pipestone

Area would remain available for **competitive and** non-competitive, motorized events. Areas open to snowmobiles and effects on users would be similar to Alternative B.

Special recreation use permits would not be required for commercial fishing and floating outfitters that use BLM river and lake access sites, until a multi-agency state-wide fee system is established. Of all alternatives, Alternative D would be the most customer-friendly and management-efficient method of obtaining fair value returns from commercial users should the state and other agencies decide to participate.

The effects of managing variances to the 14-day camping limit; access within the Scratchgravel Hills; commercial camping permits; and boat-in camping along Hauser and Holter Lakes would be the same as with Alternative A as no changes in current management would occur in Alternative D.

With regard to ROS designations, Alternative D would be similar to Alternative A in that about 90 percent of the total Decision Area would be managed under ROS designations that allow motorized activity (**Table 4-36**).

Planning efforts, recreation opportunities, and management would continue to be prioritized within five SRMAs, as in Alternative A (**Table 4-35**). These SRMAs represent the highest visitor use areas where facility infrastructure and improvements are the greatest.

None of the four eligible river segments would be recommended as suitable for National Wild and Scenic River designation by Congress. Consequently, the ROS and primitive forms of recreation would be subjected to additional resource uses and associated impacts.

Impacts on recreation from management of the Humbug Spires and Sleeping Giant ACECs would be the same as described in Alternative B. The Elkhorns ACEC would be limited to the existing WSA boundary, about 3,575 acres. This designation would ensure that semi-primitive non-motorized recreation opportunities would continue to be provided and emphasized, if the WSA were to be removed from Congressional wilderness consideration. Not designating Spokane Creek and Ringing Rocks could potentially subject these natural settings to increased impacts associated with other resource uses.

This alternative would be the least protective of recreational opportunities and experiences that are dependent on high quality visual resources since the lowest acreage (**38,100** acres) would be managed as VRM Classes I and II.

Mineral entry withdrawal recommendations and their effects would be the same as Alternative A.

This alternative imposes the lowest amount of restrictive stipulations on solid and fluid mineral activities of the action alternatives and therefore related impacts would

have a higher probability for affecting recreation settings and visitor experiences than Alternative B or C.

TRAVEL MANAGEMENT AND ACCESS

Effects Common to All Alternatives

Travel Management – Field Office Level

Restrictions on surface-disturbing activities associated with recreation management, special designations, vegetation management, water quality, watershed and soils management, and wildlife and fisheries management could modify the locations and routes of proposed roads and road realignments.

Access developed for mineral extraction and timber harvesting could enhance travel and access opportunities. Restrictions on road development in areas with important resource values could limit the degree of increased access and travel opportunities.

Vegetation management could affect transportation by providing more roads that could be considered for designation under the travel management system. Additionally, during an active vegetation project, temporary closure of existing roads could be required for safety reasons. The potential for, and degree of these impacts would depend largely on the acres treated and miles affected.

Enhancing and protecting riparian and wetland vegetation could directly affect travel management through the temporary or permanent closure of roads and trails. Effects would be short or long-term, depending on temporary or permanent restrictions. Closures for resource protection could result in an overall net decrease of available routes in the Decision Area. Activities within riparian areas to maintain and restore riparian habitat could lead to roads and trails being relocated outside of riparian areas.

Route restrictions and closures could occur during wildland fire management activities, directly affecting travel management. Short-term effects could include an increase of fire management equipment traffic on BLM-administered routes, and an increase of motorized vehicle traffic on routes that remain accessible until fire management activities stop. Managing invasive species and noxious weeds could potentially cause short-term impacts on travel by temporarily displacing users from closed or restricted treatment areas.

Implementing recovery programs, mitigation activities, or projects to avoid impacts or to enhance riparian and wetland resources or listed plants could affect travel management if travel routes need to be relocated or closed. Effects would be short or long-term depending on the timeframe (temporary or permanent) of the restriction.

Travel management prescriptions and activities in all alternatives would designate areas as either “Open”,

“Closed” or “Limited”, and routes as Open Yearlong, Open with Restrictions, Closed Yearlong, Decommissioned, and Game Retrieval. Four existing travel management plans designate areas as Limited, with a few exceptions in Elkhorn Mountains and Whitetail-Pipestone. There is a direct correlation between area/route management decisions and the level (and quality) of recreational opportunities available to either motorized or non-motorized users. For motorized users, a reduction in the availability of motorized areas and designated routes means relatively fewer motorized opportunities. Simply stated, there would be fewer areas and miles of designated roads or motorized trail available for full sized or OHV vehicles to travel upon, either for recreational driving, or for access. Conversely, for non-motorized users, fewer motorized areas and designated routes means more area and miles of closed roads or trails available for quiet, non-motorized (hiking, biking, horseback riding) recreation use.

Likewise, there is a direct correlation between travel management decisions and the level of conflict between motorized and non-motorized users. Travel management decisions that create separate use areas reduce conflict between motorized and non-motorized recreation users. Conversely, travel management designations that mix motorized and non-motorized recreation use lead to increased conflict.

Additionally, dispersing use activity within areas primarily managed for either motorized or non-motorized use would provide a higher quality of recreational experience. Simply stated, regardless of the type of recreation activity (motorized, non-motorized, etc.) dispersing users over a larger area would result in fewer encounters, improving road/trail safety and providing a higher quality of recreational experience.

Conversion of temporary area closures to permanent area closures would reduce motorized access. New easement agreements with private landowners could increase accessibility for motorized and non-motorized travel into BLM lands. Agreements for interagency travel management could lead to improved trail accessibility, which could increase route connectivity.

Establishing and maintaining information kiosks would enhance user compliance, public safety, and enjoyment.

Under the existing Sleeping Giant travel management plan, motorized wheeled vehicle access would remain restricted to designated routes only. No snowmobile use would be allowed, including travel on designated routes. The Sleeping Giant area would not be available for organized, motorized events.

Any expansion to the Lewis and Clark National Trail system would be related to the day-use activities or lake access for water-based recreation opportunities.

Road and trail access in the Scratchgravel Hills area could increase with expanded hiking, mountain biking, horseback riding, hunting, and other recreation activities.

Under the existing Clancy-Unionville travel management plan, motorized wheeled vehicle access in the Sheep Mountain area would remain restricted to designated routes only. Cross-country snowmobile travel would continue to be permitted south of the Jackson Creek county road during the season of use (December 2-May 15), snow conditions permitting. Under the existing Whitetail-Pipestone travel management plan, motorized wheeled vehicle access would remain restricted to designated routes only. Cross-country snowmobile travel would continue to be permitted (on designated routes as well) during the season of use (12/2-5/15), snow conditions permitting. Travel management would continue to be exclusively non-motorized in the Wilderness Study Areas and would be maintained at current levels. No transportation or access impacts would be expected.

VRM classifications would limit the type, location, and density of roads in the Decision Area. Visually sensitive areas would be more restrictive on transportation system expansion.

Management within ACECs could affect transportation and travel management. Routes determined to be affecting values for which the designations were established could be relocated, reconstructed, or decommissioned.

Under the existing Sleeping Giant travel management plan, the non-WSA portion of the Sleeping Giant ACEC would continue to be managed as primarily non-motorized, with no impact.

Management of soil-disturbing activities could decrease the number of roads and trails available for motorized use for all or part of a year. Management actions would target highly traveled recreation areas for sediment reduction, which would limit access to certain recreation places.

Activities and projects to protect or maintain watersheds could result in seasonal route restrictions or permanent road closures, reducing motorized travel opportunities. Protective measures for cultural resources could affect travel management at specific sites. Restrictions on roads could result in an overall reduction in available routes.

Land acquisitions and easements could improve public access, expanding both motorized and non-motorized opportunities. Lands identified for disposal could decrease public access

Minerals management, including heavy equipment and truck traffic could affect public access, although, most effects would be short term and would only occur during development activities. New permanent routes established for mineral development could increase public access.

Minerals activities in areas with special-status or priority species would be designed to mitigate impacts, which could prohibit or restrict public access to roads.

Activities related to cleanup, remediation, and closure of contaminated or abandoned mine sites could result in the closure of system roads as well as trails to prohibit public access to these hazardous sites.

Remediation of hazardous materials to protect public health and safety could cause temporary or permanent closure, decommissioning, or restriction of some access roads to motorized and non-motorized travel.

Effects of Alternative A

Travel Management – Field Office Level

This alternative would continue to allow all existing travel plans, including sub-planning and emergency area closures, to be brought forward and remain in effect.

New route construction (up to 5.5 miles per year) could occur during forest product management activities. This could increase road density for both motorized and non-motorized users. New road construction allowed under Alternative A would be more than the action alternatives.

In the Elkhorn Wildlife Management Area, new road construction would be kept to a minimum and all new roads would be closed to the public.

Wheeled travel management would continue in accordance with the 2003 Statewide OHV ROD and Plan Amendment. The ROD did not address snowmobile management. Under Alternative A, existing snowmobile management would be brought forward along with alternative proposals for the five activity level travel plans being developed with this RMP revision, and area designations for four travel plan areas for which activity level plans will be developed in the future. Availability of areas for snowmobiling would be greater than under any other alternative.

Under Alternative A, BLM would continue to allow recreational activities including motorized vehicle uses within the Scratchgravel Hills 24 hours a day. This would lead to continued illegal activities (underage drinking, vandalism, dumping) as described under the Activity Level Plans for the Helena TPA.

Effects Common to Action Alternatives

Travel Management – Field Office Level

Seasonal wildlife closures would create short term impacts on travel and access to these areas. Maintaining core blocks of 250 acres of unroaded or closed roads during hunting season for big game protection under the action alternatives would affect existing routes by concentrating use on fewer roads than under Alternative A.

Relocating/aligning roads to reduce sedimentation, identifying and removing unnatural barriers, eliminating fish passage barriers, and restoring or maintaining riparian vegetation would have no effect on the transportation system as long as routes are not restricted or closed. Under all action alternatives, the effects of management for fish on transportation and travel management would be greater than under Alternative A.

Closure, decommissioning, or re-routing segments of the existing transportation system could result from the route-by-route evaluations within each Travel Planning Area. Social and environmental considerations would be made when evaluating individual TPAs.

All action alternatives would allocate the same acres of Open, Limited, and Closed Area Designations for wheeled motorized use (Table 4-37). The alternatives differ in their selection of Open Yearlong, Open with Restrictions, and Closed route designations.

Indicator	Alt A	Alt B	Alt C	Alt D
Wheeled Vehicles				
Open	4,367	283	283	283
Limited	271,442	275,526	275,526	275,526
Closed	31,500	31,500	31,500	31,500
Total	307,309	307,309	307,309	307,309
Snowmobiles				
Open	143,206	112,682	26,148	139,138
Limited	137,038	139,921	215,891	136,889
Closed	27,065	54,706	65,270	31,282

Source: BLM Butte Field Office transportation GIS database, 2005.

Under the action alternatives, motorized wheeled cross-country travel would be allowed during any military, fire, search and rescue, or law enforcement emergency.

The 2003 OHV ROD did not address snowmobile management. Under the action alternatives, existing snowmobile management would be brought forward along with alternative proposals for the five activity level travel plans being developed with this RMP revision, and area designations for four travel plan areas for which activity level plans will be developed in the future. Alternatives B and C would provide for less snowmobile use (both area and designated route availability) than Alternatives A and D. Alternatives B and C would help reduce conflicts between non-motorized users (cross-country skiers, snowshoers) and snowmobilers, providing separate areas of use. Alternative C would provide

the highest level of opportunities for non-motorized winter recreationists, and the lowest level of conflicts between motorized and non-motorized winter recreationists of all alternatives.

A feasibility study would be conducted to determine if a motorized section of the Continental Divide National Trail could be re-routed to enhance the non-motorized experience and reduce user conflicts. This action would be done in cooperation and coordination with the Forest Service.

The Humbug Spires potential ACEC would be closed yearlong to all motorized travel in order to protect natural and scenic values. No new roads or motorized trails would be authorized.

Effects of Alternative B

Travel Management – Field Office Level

Under Alternative B, road density levels in big game winter and calving ranges (1 mi/mi²) would result in a net decrease of available motorized routes. This effect would be less than under Alternative C, but more than under Alternatives A and D.

Prohibiting competitive motorized events would result in long-term effects on users who prefer these activities.

Placing restrictions on cross-county snowmobile travel in some areas would create long-term effects on users who prefer to recreate in this manner.

Acquiring easements to access popular travel routes could result in an increase in the overall route network and expand both motorized and non-motorized opportunities.

The signing and long-term monitoring required under Alternative B would result in an increase in BLM travel management costs compared to Alternatives A and D.

With the exception of a few routes needed for residential access, public access would be restricted to non-motorized trailheads. As a result, illegal activities (underage drinking, vandalism, dumping) in the Scratchgravel Hills would be substantially reduced. Travel management costs would increase for signage and user compliance monitoring under Alternative B. See Activity Level Planning for Helena TPA.

Managing special designations in a way that would restrict certain motorized and non-motorized activities from jeopardizing resource values special to the area would potentially alter the transportation network or by restricting access.

Route closures and prohibitions on new construction in the Spokane Creek and Elkhorns potential ACECs could directly affect visitors by restricting access to some sites and would result in an overall reduction in routes available to motorized users. Non-motorized opportunities in this area would increase.

Motorized route closures would be maintained in accordance with the Pipestone Travel Plan for the Ringing Rocks Potential ACEC.

Effects of Alternative C

Field Office Travel Management

Impacts to travel management from forest treatments would be greater under Alternative C than the other alternatives. Forest treatments would occur in areas already accessible by the current transportation system under Alternative C. No new permanent roads would be constructed and temporary road construction would be kept to a minimum. Temporary roads would be decommissioned within one year of project completion.

Impacts from the management of special status and priority species would be similar to Alternative B, except this alternative would have more strict resource protection.

Disallowing competitive and organized motorized events under Alternative C would result in long-term effects on users who engage in these types of activities.

Restrictions placed on snowmobile travel would create long-term effects on users who prefer cross-country snowmobile use.

Seeking public access easements for all locations where BLM routes are accessed either from or cross private property could increase the overall route network and expand both motorized and non-motorized opportunities.

Closing the entire Scratchgravel Hills area to motorized and non-motorized recreational uses after dark yearlong would decrease illegal activities but would increase travel management costs for signage and user compliance monitoring. See Activity Level Planning for Helena TPA.

Managing special designations to restrict certain motorized and non-motorized activities that may jeopardize resource values would result in route restrictions. This could directly affect visitors by limiting accessibility to some sites and could result in an overall reduction in routes available to access public lands. Alternative C is more restrictive than the other action alternatives.

Managing recreation settings and opportunities in accordance with Alternative C ROS classifications would result in the greatest amount of non-motorized recreation and least motorized recreation under Alternative C compared to the other alternatives.

Route closures and prohibitions on new construction in the Spokane Creek and Elkhorns potential ACECs could directly affect visitors by restricting access to some sites and would result in an overall reduction in routes available to motorized users. Non-motorized opportunities in this area would increase.

Unlike Alternatives B and D, this alternative would not allow new or existing mineral operations to construct access roads within Riparian Management Zones for mineral development.

Effects of Alternative D

Field Office Travel Management

Effects of forest management would be similar to those identified under Alternative A. Under Alternative D, some new roads may be built for long-term management of areas where multiple entries would be necessary to meet objectives but new and temporary road construction would be kept to a minimum. Some new permanent roads could be “Open Yearlong” to the public if travel plan objectives for the area are met. The degree of new road construction under Alternative D would be less than Alternative A, but more than would be allowed under Alternative B.

Alternative D is less restrictive on management actions that affect travel management than the other action alternatives and could result in more routes in the transportation system.

Allowing no net increase in permanent open road mileage in areas where open road densities are 0.5 mi/mi² or less in big game winter and calving ranges and reducing open road densities in big game winter and calving ranges where they currently exceed 1.5 mi/mi² would result in an overall net decrease of available motorized routes but to a lesser extent than under Alternatives B and C. Opportunities for walk-in hunters and other non-motorized enthusiasts would also be less than the other action alternatives.

With some exceptions (see activity level plan alternatives), cross-country snowmobile use would be allowed, as well as travel on all existing routes during the season of use (12/2-5/15), snow conditions permitting. Conflicts between non-motorized users (cross-country skiers, snowshoers) and snowmobilers would be expected to continue or increase as a result.

Evaluating competitive and non-competitive motorized events on a case by case basis for the Pipestone area could result in more opportunities for these types of events than under the other action alternatives.

Seeking public access easements for all locations where BLM routes are accessed either from or cross private property would result in an increase in the overall route network, expand both motorized and non-motorized opportunities, and enhance connectivity.

There would be a moderate increase in travel management costs due to initial implementation efforts (signing), and long-term monitoring (trail ranger patrols). This effect would be similar to Alternative B, but less than Alternative C.

Allowing motorized and non-motorized recreational uses 24 hours per day in the Scratchgravel Hills would lead to continued illegal activities, similar to current conditions. See Activity Level Planning for Helena TPA.

Managing special designations in a way that would restrict certain motorized and non-motorized activities that could jeopardize resource values special to the area could result in direct effects on the transportation management system.

Managing recreation settings and opportunities in accordance with Alternative D ROS classifications would result in the greatest amount of motorized recreation and the least amount of non-motorized recreation than any of the alternatives.

TRANSPORTATION FACILITIES

Effects associated with RMP management are discussed below. Effects associated with the five site-specific travel plans at the scale of each TPA as well as at the Field Office scale are discussed in the “Environmental Consequences of Five Site-Specific Travel Plans” section.

Effects Common to All Alternatives

Future vegetative regimens and activities have the potential to affect transportation facilities by providing more roads that could require periodic stabilization, sign maintenance, and bridge and culvert maintenance.

Temporary routes would be constructed where other routes are not available under approved travel management plans. BLM would construct such routes to minimal standards and implement BMPs that supplement basic guidelines for road planning, construction, drainage, and maintenance.

Route location could be affected by forest product activities, directly affecting transportation facility management. Under all alternatives route locations would be determined on the basis of topography, drainage, soil type, and other natural features to minimize erosion. Skid roads would be rehabilitated by seeding and/or scarification. Short-term effects could increase maintenance costs to comply.

Maintenance of BLM roads and facilities would create safer conditions for the public and provide for administrative uses. Certain resources could be affected directly by surface-disturbing maintenance activities or indirectly as a result of increased use or traffic generated by improved travel routes.

Effects of Alternative A

Effects associated with Alternative A are described under “Effects Common to All Alternatives”. Estimated costs for annual maintenance and periodic stabilization would be about 30 percent more than under the action

alternatives (see the “Environmental Consequences of Five Site-Specific Travel Plans” section).

Effects Common to Action Alternatives

Subjecting road maintenance to seasonal timing restrictions to mitigate impacts of human activities on important seasonal wildlife habitat could have short-term effects on facilities management by increasing the planning effort and reducing the economic efficiency of maintenance activities, depending on whether routes in these areas are among those maintained by BLM.

Reducing open road density in big game winter and calving ranges and grizzly bear distribution areas could have indirect effects on facilities management. By condensing current use on fewer roads there could be increased maintenance required and possibly a decrease in public safety due to increased traffic. However, reducing open road miles in these areas would reduce the number of road miles that would need maintenance, thereby contributing to reduced maintenance costs.

Designing roads to reduce the effects of fisheries resources could have short-term economic effects on facility management depending on whether the specifications for these protective features increase project costs or whether additional maintenance would be necessary to ensure their effectiveness.

Installing gates or other barriers at roads and trails closed to the public would have a direct affect on facility management. Increased personnel would be needed to install and maintain these fixtures and therefore, facility management costs would increase.

Under all action alternatives, there would be a moderate increase in facility management costs due to initial travel plan implementation efforts (signing, trailhead development) and sign maintenance. Route maintenance costs would be lower than current levels, due to the overall reduction in available routes.

Designing and maintaining roads in a manner that provides for water quality protection would result in an increase in facility management costs. Controlling placement of fill material, keeping drainage facilities open, following BLM culvert design standards, and repairing ruts and failures to reduce erosion and sedimentation of aquatic habitats would involve additional planning efforts and could result in additional personnel time during maintenance activities.

Effects of Alternative B

Under Alternative B, replacing barbed wire gates with cattle guards and easily operated metal gates (wherever problems are known to occur) would result in a short-term increase in transportation facilities costs. However, due to the overall reduction in available routes under

Alternative B, transportation facility costs would be lower than current levels (see the “Environmental Consequences of Five Site-Specific Travel Plans” section).

Higher design standards under Alternative B, such as outsloping roadway surfaces where possible, minimizing disruption of natural hydrologic flow paths, and minimizing road and landing locations in RMZs may result in a short-term increase in transportation facility costs due to increased engineering efforts during route design and a long-term increase from culvert maintenance compared to Alternative A. Similar effects would be realized from Alternative D.

Effects of Alternative C

Under Alternative C, installing cattle guards and gates on newly constructed roads and trails, as needed, would result in a short-term increase to transportation facility costs. However, due to the overall reduction in available routes under Alternative C, transportation facility costs would be lower than current levels (see the “Environmental Consequences of Five Site-Specific Travel Plans” section).

Higher design standards under Alternative C, such as maintaining stream crossings that would withstand a 100-year flood event, may result in a short-term increase in transportation facility costs due to increased engineering efforts during route design. Less maintenance would be required under Alternative C than under the other action alternatives due to higher capacity drainage fixtures.

Effects of Alternative D

Under Alternative D, replacing barbed wire gates with cattle guards and easily operated metal gates (wherever they currently exist) would result in a short-term increase in cost for transportation facility management. However, due to the overall reduction in available routes under Alternative D, transportation facility costs would be lower than current levels (see the “Environmental Consequences of Five Site-Specific Travel Plans” section).

Increased levels of reconstruction and new route construction to restore deteriorated routes and provide additional loop routes would result in a short-term increase in transportation facility costs for the signage, culverts, and bridges that may be required and a long-term increase for route maintenance.

Higher design standards under Alternative D, such as outsloping roadway surfaces where possible and minimizing road and landing locations in SMZs may result in a short-term increase in transportation facility costs due to increased engineering efforts during route design and a long-term increase from culvert maintenance compared to Alternative A. Similar effects would be realized from Alternative B.

LANDS AND REALTY

This section includes discussion of effects on land tenure adjustments, land use authorizations, utility corridors, and communication sites.

Effects Common to All Alternatives

Effects analysis indicated that vegetation, travel management, and abandoned mine lands would not have impacts on lands and realty.

While management actions for livestock grazing vary among the alternatives, the impacts to the Lands and Realty Program are essentially the same. In areas where livestock grazing occurs, land use authorizations such as rights-of-way and BLM access easements could be required to include conditions and or mitigation measures that limit livestock grazing during the construction and rehabilitation phases of the project, and facilitate livestock movement and public travel (e.g., fencing and cattle guards) throughout the effective period of the authorization. Percentage of the Decision Area (DA) available for livestock grazing would be 93 percent under Alternatives A and D, and 90 percent under Alternatives B and C.

In general, wildland fire management actions would help protect facilities on public lands authorized through the Lands and Realty Program by reducing fuel loads and suppressing fires. However, there is always a slight possibility of losing control of prescribed fire and damaging the above-ground facilities.

Management actions to identify, protect, and conserve special status plant and animal species would impact land use authorizations, land ownership adjustments, and acquisition of legal and physical access to public lands. Facilities proposed to be constructed under various land use authorizations or access easements in areas where these types of vegetation and animal species are present may need to be mitigated, constructed in alternate locations, or in extreme cases, dropped from consideration. The need to protect these resources could also result in the restructuring or elimination of a land ownership adjustment proposal such as an exchange or sale.

Recreation management actions, including designation of Special Recreation Management Areas, could result in land ownership adjustments or easement acquisitions in order to improve access to public lands for recreation opportunities.

Under all alternatives, the six existing Wilderness Study Areas would continue to be managed under the Interim Management Policy and Guidelines for Lands under Wilderness Review (BLM Handbook H-8550-1, dated 1995) until such time as Congress either designates them as wilderness or releases them from further consideration as wilderness. Such management would impose restrictions on the use of these areas for land use authorizations and land disposals.

Managing the national trails located within the DA to protect the values for which they were designated could impact land use authorizations such as rights-of-way as well as BLM actions to obtain legal and physical access to public lands. Proposed facilities such as power lines may need to be mitigated (e.g. burial of the line) or re-routed in order to protect trail values. Land ownership adjustments such as sales or exchanges may need to be restructured or eliminated from consideration in order to avoid disposing of public lands containing important trail segments.

Visual Resource Management under all alternatives would affect land use authorizations such as rights-of-way, leases, and permits. Facilities would need to meet objectives for the particular VRM class in which a project was proposed. This could include mitigation, relocation, or elimination of certain facilities resulting in additional time and costs in project development.

Management actions to protect soil, air, and water quality could affect land use authorizations such as rights-of-way, leases, and permits, as well as BLM actions to obtain legal and physical access to public lands. Proposals for facilities and actions that would degrade these resources would have to be mitigated, sited in acceptable alternative locations, or in more extreme cases, denied altogether. Applicants for such proposals could encounter time delays and greater costs in terms of project development.

Management of cultural resources could affect several aspects of the Lands and Realty Program including land use authorizations, land ownership adjustments, and the acquisition of legal and physical access to public lands. These lands and realty actions are considered federal undertakings and must avoid inadvertent damage to federal and non-federal cultural resources through compliance with Section 106 of the National Historic Preservation Act. Cultural inventories would need to be completed prior to these federal undertakings and impacts to important cultural sites would need to be avoided by project redesign, project abandonment, and/or mitigation of adverse impacts through data recovery. This could result in actions such as re-routing a proposed right-of-way or road easement, or restructuring or abandoning a proposed land ownership adjustment such as a land exchange or sale. Such actions can increase processing costs and processing time for both the federal and non-federal parties.

Impacts from the management of paleontological resources would be similar to those of cultural resources. Lands and realty projects occurring in known fossiliferous areas would require that adequate time and resources be allocated to conduct resource inventory. The discovery of scientifically important paleontological resources could result in the rerouting or redesign of proposed land use authorizations and easement facilities. The presence of these resources could also lead to the restructuring or abandoning of land ownership adjustments such as land

exchanges or sales. Such actions can increase processing costs and time for both the federal and non-federal parties.

Locating new right-of-way facilities within or adjacent to existing rights-of-way would minimize the number of acres designated for new right-of-way development. Implementation of *Suggested Practices for Raptor Protection on Power Lines* (APLIC 1996) and Best Management Practices (BMPs) established in the Programmatic Wind Energy EIS and ROD (December 2005) would require mitigation for wildlife impacts on new rights-of-way development.

The Interagency West-wide Energy Corridor Programmatic EIS currently being prepared will identify energy corridors on BLM and other federal lands. The Final PEIS will provide plan amendment decisions that will address energy corridor related issues, including the utilization of existing corridors, identification of new corridors, supply and demand considerations, and compatibility with other corridor and project planning efforts. Identification of corridors in the PEIS may affect the BFO, and the approved PEIS would subsequently amend the Butte RMP.

Reviewing existing withdrawals and classifications and revoking or terminating those that are no longer serving their intended purpose would ensure that public lands are not unnecessarily encumbered and are open to the widest possible array of public land uses consistent with other portions of the plan. Such reviews would also ensure that withdrawals and classifications still serving their intended purpose would remain in place. Withdrawal proposals under all alternatives would be in conformance with current withdrawal and energy policies and would ensure that such actions encumbered the minimum area necessary to achieve the intended purpose.

New withdrawal proposals would be limited to the minimum area required for the intended use, would require strong justification, and would be initiated only where applicable alternative prescriptions, such as the use of rights-of-way, leases, permits, or cooperative agreements, are inadequate to protect the resource values.

Recommendations developed by the BLM/Secretary of the Interior and Department of Army/Department of Defense on the proposed withdrawal at Limestone Hills will be submitted to Congress. Congress and the President will then determine whether the withdrawal should be enacted, and the amount of public land to be withdrawn. Up to approximately 20,000 acres of public land could potentially be transferred to the administration of the Department of the Army, or managed cooperatively with the BLM. The EIS for this withdrawal would subsequently amend the Butte RMP.

Consideration of land ownership adjustments on a case-by-case basis would allow for flexibility in managing public lands to achieve improved management efficien-

cy or enhance other programs. BLM-administered land within disposal areas would be made available for disposal through sales or exchanges or both. BLM lands to be sold would meet the disposal criteria from the Federal Land Policy and Management Act of 1976.

Actions such as exchanges, sales, and purchases would adjust the relatively fragmented public land pattern to better manage public lands over the long-term. Consolidation of public land holdings could facilitate access to public lands and reduce the number of access easements needed. Consolidation could also lead to a reduction in encroachment problems on public lands from adjacent property owners as a result of fewer private inholdings within the DA.

Lands that meet Recreation and Public Purposes Act (R&PP) classification criteria for public purposes would be made available for state and local governments and other organizations. This would assist those entities in meeting the need for reasonably priced land to serve a broad array of public needs.

Access to public lands would be improved by the pursuit of land exchanges, easement acquisitions, and land donations.

The management of leasable, salable, and locatable minerals under all alternatives would likely result in requests for land use authorizations such as rights-of-way and permits for utilities and access.

Any renewable energy developments proposed for public lands managed by the BFO within the DA lands could result in requests for land use authorizations such as rights-of-way and permits. There are two areas where wind energy developments are anticipated to occur: one near Whitehall in the vicinity of Golden Sunlight Mine and one near Livingston.

In terms of health and safety, land use authorizations for uses which would involve the disposal or storage of material which could contaminate the land would not be issued. Lands proposed for acquisition or disposal would need to be inventoried for the presence of hazardous materials. The presence of contaminants may lead to actions such as the modification or abandonment of a land ownership adjustment proposal, or remediation in the form of cleanup and removal of the contaminants.

Management to protect prime or unique farm lands would require that actions be reviewed to evaluate their impacts on these resources. Although no prime or unique farm lands have been identified in the Decision Area, adjustments to land use authorizations and land ownership may be required to minimize or eliminate these impacts if prime farm lands are identified on a case by case basis.

Tribal treaty rights on public lands within the DA could impact land ownership adjustments such as exchanges and sales. It is possible that potential actions such as these would need to be restructured or eliminated from

consideration if it were determined that they adversely affected tribal treaty rights.

Effects of Alternative A

BLM forest product sales and stewardship projects may also require road easement acquisitions to cross private lands to secure access to the federal sale or project area. In comparison to the other alternatives, Alternative A would likely have a greater need for access to forested areas than Alternative C but a lesser need than Alternatives B and D.

Management of the four National Wild and Scenic River-eligible river segments to protect wild and scenic river eligibility and tentative classification would result in restrictions or denial of land use authorizations for new facilities such as electric transmission lines, roads, etc.

Management actions to protect relevant and important resource values on ACECs would restrict land use authorizations, land ownership adjustments, and access to public lands within the DA. Under Alternative A, the pre-existing Sleeping Giant ACEC (11,679 acres) would continue to be managed as an ACEC. Under the original management plan no new ACECs would be established. Compared to the other alternatives, Alternative A would have the least impact on the Lands and Realty Program from ACEC management.

Alternative A would provide the greatest flexibility in locating facilities such as transmission lines, pipelines, and communication sites since there would be no designated right-of-way corridors or use areas, 74,489 acres of avoidance areas, and no exclusion areas. The lack of designated corridors could lead to a proliferation of separate rights-of-way which would need to undergo NEPA evaluation. Not designating corridors and use areas for the above-mentioned facility types could result in a greater likelihood that other land uses would preclude the location of these types of right-of-way uses. Not concentrating major right-of-way facilities in certain areas could make them, along with the public which relies on them, less vulnerable to potential natural disasters.

Alternative A (along with Alternative D) would allow for the greatest flexibility in authorizing mineral entry activities by considering withdrawals from mineral entry on a case-by-case basis.

Planning guidance with respect to land ownership adjustment would be the same as that provided by the 1984 Headwaters RMP and the 1979 Dillon Management Framework Plan. Further and more specific guidance would be provided by the "Land Pattern and Land Adjustment, Supplement to the State Director Guidance for Resource Management Planning in Montana and the Dakotas, 1984" (BLM 1984b). This guidance was later amended by the 1989 State Director's guidance pertaining to access. This direction established land exchange

as the predominant method of land ownership adjustment. It also established retention, disposal, and acquisition criteria to be used in categorizing public land. Criteria in the supplement were used to identify retention and disposal zones within the DA. These zones would be applied in this alternative.

Under Alternative A, management actions for access would progress toward BLM management goals by following guidance provided by the Headwaters RMP/EIS as supplemented by guidance prepared by the Montana State Office on access (BLM 1989). Alternative A would likely provide the most flexibility than the other alternatives in terms of how and where access could be obtained.

Designation of approximately nine percent of federal mineral estate lands in the DA (54,810 acres) as closed to oil and gas leasing would eliminate effects on land use authorizations, withdrawals, or access from oil and gas leasing in these areas. Under Alternative A, fewer acres would be closed to oil and gas leasing activities than under Alternative C, but more than under Alternatives B and D.

Effects Common to Action Alternatives

Designation of approximately 283 acres (0.10 percent of lands in the DA) as open to wheeled vehicles under the action alternatives would require less road easement acquisitions than Alternative A.

Managing the two National Trails (Continental Divide National Scenic Trail and Lewis and Clark National Historic Trail) in accordance with the Recreation Opportunity Spectrum settings, Visual Resource Management classes, travel plan direction, and oil and gas stipulations established under the action alternatives would further restrict land use authorizations and land ownership adjustments on public lands containing important trail segments. Land ownership adjustments would be required to re-route the Continental Divide Trail segment in coordination with the Forest Service to enhance non-motorized opportunities; reduce current needs for use easements/acquisitions through private lands; and remove user conflicts associated with the motorized road.

Limiting new communication facilities to the seven designated communication sites would concentrate these uses and diminish the proliferation of separate rights-of-way and their associated impacts when compared to Alternative A. Designation of these use areas would put the public on notice that these are the preferred areas for certain types of right-of-way facilities. Designation and management of right-of-way corridors and use areas would make it more likely that these types of right-of-way uses would not be precluded by other land uses. However, having these types of right-of-way facilities in close proximity to one another could make them, and the public that relies on them, more vulnerable to potential natural disasters.

Designating avoidance (75,626 acres) and exclusion (27,361 acres) areas would limit or exclude potential rights-of-way development in those areas. Issuance of any new land use authorizations in or near riparian areas would include special stipulations to protect riparian values.

New leases, permits, rights-of-way, and easements would be permitted in a manner consistent with meeting Land Health Standards and applicable BMPs, and the guidelines set forth in BLM's Wind Energy Development Programmatic EIS, June 2005.

Compared to Alternative A, implementation of any of the action alternatives would improve land ownership adjustment management and provide better guidance in achieving BLM land ownership goals by prioritizing actions which are associated with chronic management problems and protecting public resource values. High priority areas for retention and potential land acquisition would be associated with ACECs, Wild and Scenic Rivers, Wilderness Study Areas, National Trail Corridors, Special Recreation Management Areas, recreation sites, and habitat for priority and special status species. Under all action alternatives, specific land ownership adjustment criteria developed for retention, disposal and acquisition would be followed. These criteria are described in **Appendix L – Lands and Realty**.

Under all action alternatives, management actions would progress toward BLM access management goals by following guidance provided by the specific access criteria outlined in **Appendix L – Lands and Realty** for obtaining new access and managing existing access to BLM-administered lands. Implementation of the action alternatives would provide better guidance than Alternative A in terms of how and when access should be obtained.

Under all action alternatives, up to 8,901 acres of BLM land identified for disposal could potentially pass to private ownership and would no longer be subject to federal land management laws and policies.

Effects of Alternative B

Building and using new roads for long-term use for forest products would result in the need for BLM to obtain road access to forested areas through easement acquisition. Compared to the other alternatives, Alternative B would have a greater need for additional access for management of forest products than Alternative C, but likely less than Alternatives A and D.

Under this alternative, impacts to the Lands and Realty Program from the management of suitable Wild and Scenic Rivers segments (5.7 miles) to protect outstandingly remarkable values would be less than under Alternatives A and C, but greater than Alternative D.

Designation of four new ACECs and management actions to protect relevant and important resource values would restrict land use authorizations, land ownership

adjustments, and access to public lands within the DA on approximately 70,644 acres. Compared to the other alternatives, ACEC management in Alternative B would have a greater impact on the Lands and Realty Program than with Alternatives A and D, but a lesser impact than Alternative C.

Alternative B would set the priority for new withdrawal proposals or other protective actions to developed recreation sites followed by new acquisitions, and ACECs to protect resources and values as needed.

In alternative B, approximately 198 acres at various developed recreation sites, would be recommended for withdrawal from mineral location. Designation of approximately 36,406 acres as closed to oil and gas leasing would eliminate the need for land use authorizations, withdrawals, or access for the purpose of oil and gas leasing on approximately 6 percent of BLM-managed federal mineral estate lands in the DA. With fewer acres closed to oil and gas leasing activities than under the other alternatives (except for Alternative D, which would close the same number of acres), Alternatives B and D would have the greatest potential need for land use authorizations, withdrawals, or access from oil and gas leasing in these areas.

Effects of Alternative C

By not building new roads for long-term use, the need for road access through easement acquisitions would be minimized. Compared to the other alternatives, Alternative C would have the least need for additional access for management of forest products.

Alternative C would allow for a similar number of withdrawn acres as Alternative B by setting the priority for new withdrawals to developed recreation sites followed by all new acquisitions through exchange or purchase, and in ACECs.

Under this alternative, impacts to the Lands and Realty Program from the management of suitable Wild and Scenic Rivers segments (12 miles) to protect outstandingly remarkable values would be the same as under Alternative A.

Designation of four new ACECs and management actions to protect relevant and important resource values on ACECs would restrict land use authorizations, land ownership adjustments, and access to public lands on approximately 87,892 acres of the DA. Compared to the other alternatives, ACEC management under Alternative C would potentially have the greatest impact on the Lands and Realty Program of all the alternatives.

Approximately 180 acres of land in riparian areas of the Muskrat Creek drainage, as well as approximately 198 acres at various developed recreation sites, would be recommended for withdrawal from mineral location in Alternative C.

Alternative C would designate 580,382 acres as closed to oil and gas leasing, more than any other alternative. This would eliminate the need for land use authorizations, withdrawals, or access for the purpose of oil and gas leasing on the greatest amount of acreage of any of the alternatives.

Effects of Alternative D

Allowing new roads for long-term use for forest products would result in the need for road access to forested areas in the form of road rights-of-way and road use agreements. Compared to the other action alternatives, Alternative D would have the greatest need for additional acres for access for management of forest products.

Like Alternative A, withdrawals from mineral entry would be pursued on a case-by-case basis.

Under this alternative no river segments would be recommended as suitable for inclusion in the National Wild and Scenic River System, and therefore would not be subject to restrictions on lands and realty actions for eligible river segments.

Designation of two new ACECs and management actions to protect relevant and important resource values on ACECs would restrict land use authorizations, land ownership adjustments, and access to public lands on approximately 23,695 acres of the DA. Compared to the other alternatives, Alternative D would potentially have a greater impact on the Lands and Realty Program than Alternative A, but a lesser impact than Alternatives B and C.

The greatest potential need for land use authorizations, withdrawals, or access from oil and gas leasing would be the same as in Alternative B.

SPECIAL DESIGNATIONS

Effects Common to All Alternatives

No impacts to special designation areas are anticipated from proposed management associated with special status and priority plants, air quality, soils, water quality, cultural resources and traditional cultural properties, paleontological resources, abandoned mine lands, hazardous materials, social and economic, prime farm lands, environmental justice, or Tribal treaty rights.

Actions emphasize monitoring the impact grazing has on meeting resource value standards, particularly for vegetation and water quality. This action would benefit the values of special designation areas since problems and corrective measures would be identified and potentially corrected in a timely manner.

Wildlife actions to improve habitat to stabilize or increase wildlife populations would indirectly enhance wildlife and vegetation resource values within established special designation areas.

Special designation areas with outstanding values associated with wildlife habitat or species diversity would be protected. Habitat management plans, conservation strategies and coordinating with other agencies to improve habitat within special designation areas would directly help retain or enhance vegetation, wildlife species, solitude, naturalness, and scenic values.

All existing special designation areas would be managed to prevent unnecessary and undue degradation to existing values and resource characteristics.

Effects Common to Action Alternatives

Vegetative treatment actions would focus on restoring the desired ecological conditions of special management areas and would occur to protect or enhance important resource values. Wildland fire management would concentrate on the enhancement and/or protection of special area values except in instances where private lands and structures are threatened. Active public outreach to educate visitors about noxious weeds and control efforts would have a positive effect on the vegetation and habitat values in ACECs, National Trail corridors, WSRs and WSAs.

The action alternatives would implement a variety of management actions designed to enhance the habitat conditions for special status and priority plant and animal species in the Decision Area, which would directly enhance the wildlife and habitat values of all special designation areas.

The protection and enhancement of riparian areas, native fisheries, and aquatic resources would have a positive impact on special designation areas and visitor experiences.

Travel management and access within the special designation areas would be limited to designated routes or closed to protect unique resource values and enhance primitive and unconfined recreation opportunities.

All lands within special management areas would be classified for future retention and acquisitions that enhance important values and their management would be given priority.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Effects Common to All Alternatives

Table 4-38 displays the acres of ACEC proposed by Alternative. ACECs located close to or within urban interface areas could be directly affected by wildland fire prevention and suppression activities designed to control the ignition and spread of wildland fires. Activities, such as mechanical or hand thinning, could damage the special characteristics of an ACEC. Fuels reduction treatments in the ACECs outside of the urban interface areas would emphasize prescribed burning; however,

these treatments would be designed to minimize or mitigate effects to values associated with special designation areas.

Activities to improve and maintain wildlife habitat would enhance wildlife and vegetation resource values in the ACECs.

Management would focus on conserving special status and priority species and implementing habitat improvement projects or recovery plans, which would benefit all ACECs by alternative.

The non-WSA portion of the Sleeping Giant ACEC would be managed as “Limited” to motorized use, which would continue to benefit the ACECs outstanding values while allowing vehicle access to walk-in trailheads.

Existing management would protect the relevant and important values of the Sleeping Giant ACEC.

Many ACECs would be managed as Class II areas and proposed projects would be subject to visual contrast ratings to ensure visual resource disturbances are not evident.

The Sleeping Giant and Humbug Spires and portions of the Elkhorn areas would be designated and managed as ACECs under all action alternatives.

Effects of Alternative A

The existing Sleeping Giant ACEC (11,679 acres) would continue to be managed under the current ACEC management plan (Table 4-38). No additional ACECs would be designated and therefore this alternative would pro-

vide the least protection of relevant and important resource values.

Effects of Alternative B

All potential ACECs would be managed as ACECs except Spokane Creek under Alternative B. This alternative would establish the second highest acreage of lands (70,644 acres) under ACEC designation and protection (Table 4-38). This alternative proposes one less ACEC area than Alternative C, and a smaller portion of the Elkhorns area would be designated under Alternative B.

Effects of Alternative C

Alternative C would designate all five potential areas and the most acres (approximately 87,893 acres) as ACECs of all alternatives (Table 4-38). This alternative would designate all of the land within the Elkhorns Wildlife Management Unit MOU in the Elkhorns ACEC and Spokane Creek. This alternative would provide the greatest protection for the identified relevant and important values associated with the ACEC review process.

Effects of Alternative D

Of all the action alternatives, Alternative D would manage the least amount of acreage as ACECs (23,695 acres) (Table 4-38). Three potential ACECs would be designated including Sleeping Giant, Elkhorns, and Humbug Spires. The Elkhorns ACEC boundary would be the same as the Elkhorns Tack-on WSA boundary, which is the lowest acreage managed in the Elkhorns ACEC compared to the other action alternatives.

Table 4-38
Acres of Potential ACECs and WSAs Designated in Each Alternative

Name	Total Acres			
	Alt A	Alt B	Alt C	Alt D
ACEC				
Sleeping Giant	11,679	11,679	11,679	11,679
Humbug Spires	-	8,374	8,374	8,374
Spokane Creek	-	-	14	-
Ringing Rocks	-	160	160	-
Elkhorns	-	50,431	67,665	3,575
Total Acres Managed as an ACEC	11,679	70,644	87,892	23,628
WSA				
Humbug Spires	11,320	11,320	11,320	11,320
Sleeping Giant	6,666	6,666	6,666	6,666
Sheep Creek	3,801	3,801	3,801	3,801
Black Sage	5,917	5,917	5,917	5,917
Elkhorn	3,575	3,575	3,575	3,575
Yellowstone River Island	69	69	69	69
Total Acres Managed as a WSA	31,349	31,349	31,349	31,349

Source: Alternatives Description, BLM Butte Field Office, 2005.

NATIONAL TRAILS

Effects Common to All Alternatives

National Trail segments located close to or within urban interface areas could be directly affected by wildland fire prevention and suppression activities designed to control the ignition and spread of wildland fires.

Effects of Alternative A

No ROS or VRM designations or management plans would be created for the Continental Divide National Scenic Trail. The Lewis and Clark National Historic Trail would be managed in accordance with the Missouri River Comprehensive Recreation Management Plan. Most lands along this river would be managed as VRM Class II and no ROS designations would be allocated.

Lowest protection provided for the two National Trail corridors given that ROS, VRM, Travel and oil and gas restrictions would be lowest.

Effects of Alternative B

Alternative B offers the second highest protection for the National Trails as resource use restrictions would be greater than under Alternatives A and D.

Effects of Alternative C

This alternative offers the greatest protection of the existing National Trails and associated user experiences since all resource uses such as timber harvesting, motorized travel, rights-of-way, minerals, and oil and gas would be restricted the most through ROS, VRM, and travel management.

Effects of Alternative D

This alternative offers the second lowest protection for National Trails as potential impacts from other resource uses would be higher than Alternatives B and C.

WILD AND SCENIC RIVERS

Effects Common to All Alternatives

Management would focus on conserving special status and priority species and implementing habitat improvement projects or recovery plans, which would benefit the Upper Big Hole River, Missouri River and Muskrat Creek WSRs where recommended as suitable by alternative.

Effects of Alternative A

The outstandingly remarkable values of all eligible Wild and Scenic river segments would be protected and would be negligibly-to-minimally impacted by management.

Effects of Alternative B

Under this alternative Muskrat Creek would be recommended suitable for inclusion in the National Wild and Scenic Rivers System. The Missouri River segment would be found preliminarily suitable pending Forest Service concurrence. The management of these two segments would not change from the existing management, as described under Alternative A. The Upper Big Hole River and Moose Creek would be identified as non-suitable for the National Wild and Scenic Rivers System, and protective management actions, regarding important resource values, would not continue. The Moose Creek segment would fall back to WSA and ACEC management as it is part of the Humbug Spires WSA (and potential ACEC) while the Upper Big Hole River would be managed as a Special Recreation Management Area under the Upper Big Hole River Management Plan.

Effects of Alternative C

All four of the Wild and Scenic River segments would be recommended as suitable for consideration in the National Wild and Scenic Rivers System; however, the interim management of these segments would be the same as in Alternative A to manage for their outstandingly remarkable values.

Effects of Alternative D

All four eligible Wild and Scenic River segments would be identified as non-suitable for inclusion into the National Wild and Scenic Rivers System. Management actions governing these river segments would not specifically protect outstandingly remarkable values so they would be subject to greater impacts than in the other alternatives.

WILDERNESS STUDY AREAS

Effects Common to All Alternatives

Table 4-38 displays the acres of Wilderness Study Area proposed by alternative. There are no additional lands with wilderness characteristics in the Decision Area.

All six WSAs would be managed as they are currently, under the Interim Management Policy and Guidelines for Lands under Wilderness Review. This status may change if Congress designates the WSAs as wilderness or if they are removed from consideration. If a WSA becomes a wilderness area, a wilderness management plan would be created. If a WSA is removed from consideration, the area would no longer have legislative protection for the outstanding values. The Sleeping Giant and Sheep Creek WSAs would have fall back administrative protection since these areas would be designated and managed as ACECs under all alternatives.

Fire management activities would be conducted to avoid unnecessary impairment of each area's suitability for preservation as wilderness. Retardant, motorized equipment and earth disturbances would be restricted to the minimum necessary to protect human life and property. Priority would be given to locate large fire camps outside WSAs and to utilize fire crews to rehabilitate impacts prior to being released. These actions would benefit the preservation of the wilderness characteristics within the WSAs.

Pre-FLPMA grazing uses would be allowed to continue subject to unnecessary and undue degradation concerns while new livestock uses and developments would be restricted to actions that enhance wilderness values and satisfy the nonimpairment criteria. Prohibiting the removal of forest fiber products and vegetation conversions/manipulations; allowing noxious weed to be controlled; and limiting vegetative rehabilitation efforts to native species would prevent impacts to naturalness qualities and reduce impacts to visitors seeking wilderness related experiences.

Activities to improve and maintain wildlife habitat for native, priority, and special status species would be conducted subject to IMP guidelines. These efforts would enhance supplemental wildlife values and natural characteristics in the WSAs.

All WSAs would be closed to motorized travel except Black Sage and the southern portion of Humbug Spires which is limited to established routes. These restrictions enhance fisheries, wildlife, water quality, native vegetation, apparent naturalness, solitude, and primitive recreation values.

Opportunities for solitude and a variety of primitive and unconfined recreation experiences within WSAs would continue to be promoted. Recreational activities that do not meet nonimpairment criteria would generally be prohibited with the exception of motorized uses on established vehicle ways.

WSAs would be managed to achieve VRM Class I, which would directly preserve the naturalness and scenic qualities in each WSA.

All land use authorizations within WSAs would follow interim management policies and guidelines. Given that all new actions are subject to the nonimpairment standard, no wilderness character impacts are foreseeable. Land use authorizations relating to grandfathered and valid existing rights may disrupt natural processes and may cause negative impacts on outstanding values.

Oil and gas leasing and development would be prohibited in all WSAs subject to the rights of owners of non-BLM mineral estate. There are no known leases within the WSAs that have valid existing rights or grandfathered uses associated with them. Geothermal leasing would also be prohibited in all WSAs as no valid or grandfathered leases exist.

Locatable mineral activities would be subject to IMP protection within WSAs. Mineral activities within WSAs studied under Section 603 of FLPMA (Sleeping Giant, Humbug Spires, Black Sage, and the Yellowstone River Island) will be regulated to nonimpairment standards while Section 202 WSAs (Sheep Creek and the Elkhorns Tack-on) will be managed to prevent unnecessary and undue degradation. As a result valid mining claim activities pose greater potential risks for impacting the wilderness characteristics of these 202 WSAs.

Effects of Alternative A

All WSAs would continue to be managed under the Interim Management Policy and Guidelines and therefore wilderness values would continue to be protected, under the assumption that no Congressional action would occur.

Effects Common to Action Alternatives

All WSAs (Sleeping Giant, Sheep Creek, Humbug Spires, and Elkhorns Tack-on) except Black Sage and the Yellowstone River Island would be managed as ACECs under all action alternatives. These designations would provide long-term resource value protection should Congress remove these WSAs from further wilderness consideration or in the case of the Elkhorns Tack-on, should the adjoining Forest Service lands be dropped from wilderness consideration.

Black Sage and the Yellowstone River Island, if dropped from wilderness consideration, would be managed under varying fall back managing strategies under Alternatives B, C and D. Management prescriptions for these WSAs would address recreation, motorized travel, visual, minerals, and land ownership, which would aid in protecting their outstanding values (solitude, naturalness and primitive and unconfined recreation opportunities).

The Elkhorn Tack-on WSA would be dropped from further wilderness review, should the adjoining FS lands be released from wilderness consideration, as this small WSA is not capable of providing outstanding opportunities for solitude or primitive and unconfined recreation on its own. This action would not impose major impacts to the existing values of the area given the fall back ACEC designation.

Effects of Alternative B

Under this alternative fall back management for the Black Sage and the Yellowstone River Island would be less protective than under the IMP guidelines. Major changes in the management of Black Sage would be that existing roads could be re-routed; VRM would be managed as Class II; new Rights-of-Ways could be authorized; locatable minerals would be open subject to unnecessary and undue degradation; oil and gas entry would be allowed subject to big-game timing limitations from 12/1 to 6/30; all saleable and other leasable minerals would remain unavailable; and vegetative treatments

could be conducted provided they were done in a manner that restored or maintained natural processes. The effects of these management changes could impact natural qualities, solitude and primitive and unconfined recreation opportunities and supplemental value characteristics of this 5,917-acre area due to surface disturbances, visual modifications, increased vehicular travel, and noise intrusions.

Fall back management changes for the Yellowstone River Island would be less impacting since most resources and uses would be managed similar to IMP protection guidelines. The major differences would be that the VRM Class would change from I to II, locatable mineral entry would be open subject to unnecessary and undue degradation; and leasable minerals would be subject to No Surface Occupancy. Although the island would be open to locatable minerals, the probability for impacts to the island's wilderness characteristics would be minimal given its difficult accessibility issues, natural river barriers, and low desirability for mineral activity given the high operating and reclamation costs.

Effects of Alternative C

Fall back management for Black Sage and the Yellowstone River Island would be similar to Alternative B if dismissed from further wilderness consideration by Congress, with the exception of oil and gas. Oil and gas stipulations would be most restrictive of all alternatives in that no new leases would be issued. Impacts on wilderness characteristics would be less than Alternative B given the added restrictions on oil and gas activities.

Effects of Alternative D

For most land management activities in the Black Sage and Yellowstone River Island WSAs, management would be similar to Alternative B in the event that these areas were dismissed from further wilderness consideration by Congress. The major difference would be that the Black Sage WSA would be open to all salable and leasable minerals and oil and gas leases would have timing limitations from 12/1 to 5/15 for big game winter/spring range protection. These management changes would subject the area's wilderness characteristics to greater potential impact from mineral related activities. Impacts to the Yellowstone River Island could be slightly greater since the island would be available for land adjustment as well as salable and all leasable minerals under this alternative.

EFFECTS ON SOCIAL AND ECONOMIC CONDITIONS

ECONOMIC

Effects Common to All Alternatives

The economic analysis assesses the economic effects of the direct use of resources in terms of jobs and income.

This type of analysis does not include other types of economic value that may be associated with unique natural resources and protected areas. These types of values, often referred to as non-market values, include natural amenities and quality of life, non-use values, bequest values, and ecosystem services.

Non-Market Values

Natural amenities and quality of life have been increasingly recognized as important factors in the economic prospects of many rural communities in the American West and elsewhere (Rudzitis and Johnson 2000). While natural amenities and life quality do not directly generate income in the same sense as, for example, a sawmill or a tourist lodge, they do act to attract and keep residents, and may attract new businesses. Open spaces, scenery, and protected lands are important to residents of Montana and throughout the Rocky Mountain west and may contribute to healthy economies and lifestyles (Sonoran Institute 2003). This relationship is, however, difficult to quantify as is assessing the effects of different management actions on the economic activities that these amenities are believed to indirectly generate. In this case, the impacts of the action alternatives relative to Alternative A are not expected to result in measurable changes in this type of indirect economic activity.

Non-Use Values

Non-use values, as the name might suggest, represent the value that individuals assign to a resource independent of the use of that resource. These types of values, which include existence, option, and bequest values, are usually measured via surveys that ask people how much they would be willing to pay to have a particular area preserved or designated as wilderness. These values represent the value that individuals obtain from knowing that a resource exists, knowing that it would be available to use in the future, and knowing that it would be left for future generations. Wilderness has been the subject of numerous non-use studies, usually conducted for specific natural areas, and willingness-to-pay estimates for protection or designation have identified a wide range of values (Krieger 2001; Loomis and Richardson 2001).

No attempt has been made to quantify potential non-use values associated with the RMP alternatives because none of the alternatives propose new wilderness that would significantly restrict current uses.

Based strictly on the number of acres that would be in an ACEC, Alternative C would likely have the highest wilderness and protected land-related non-use values. Alternative A would have the lowest values, followed by Alternative D.

Ecosystem Services

Ecosystem services may be defined as those natural processes that provide long-term life support benefits to society as a whole. Examples of these types of benefits include watershed processes, soil stabilization and ero-

sion control, improved air quality, climate regulation and carbon sequestration, and biological diversity (Krieger 2001).

No attempt has been made to assign monetary values to the ecosystem services that would be provided because these values are difficult to quantify at this analysis level. In addition to the difficulties involved in developing accurate estimates of these values, the impacts of project alternatives are rarely quantified in the type of units that would allow these values to be assigned. However, the fact that no monetary value is assigned to ecosystem services in this document does not lessen their importance in the decision making process.

The potentially affected local economy is characterized for the Planning Area counties in the Affected Environment portion of this document (Chapter 3). None of the alternatives would be expected to affect economic diversity (the number of economic sectors) or economic dependency, which occurs when the local economy is dominated by a limited number of industries. While the proposed alternatives have the potential to affect local businesses and individuals, as discussed in the following sections, the relative contribution of Butte Field Office-related activities to the local economy and the relative differences between the alternatives would not be large enough to have any measurable effect on economic diversity or dependency. This is also the case with respect to economic stability, which is typically assessed in terms of seasonal unemployment, sporadic population changes, and fluctuating income growth rates. Butte

Field Office-related activities include logging and recreation, which are typically characterized by seasonal employment, but none of the alternatives would be expected to affect existing trends in these or other industries.

Wildland fuel treatment costs are included for the purposes of this analysis in the total BLM expenditures identified by alternative (**Table 4-39**). Projected fuel treatment costs range from approximately \$400,000 under Alternative C to approximately \$1.26 million under Alternative D. Other potential wildland fire-related costs (such as property loss, lost revenues, and increased suppression costs) are difficult to project and are unknown. It is commonly accepted that fire suppression costs and risk to life and property should be less on wildland fires that occur where hazardous fuels have not been reduced. For example, fires generally burn hotter, flame length is higher, and fires in tree canopies are more likely in non-treated areas. A comparison of fire suppression costs in Western Montana and Eastern Montana help illustrate the differences in suppression costs.

Fire suppression costs incurred on the Beaverhead-Deerlodge, Gallatin, and Helena National Forests from 2000 through 2003 are summarized in (**Table 4-40**). These costs, presented as average suppression costs per acre, are provided to illustrate potential wildland fire suppression costs. The alternatives involve different approaches to, and levels of, vegetation treatment, as well as different approaches to wildland fire manage-

Table 4-39
Estimated Outputs by Alternative

Output	Current¹	A	B	C	D
Actual Use Cattle (head month) ²	31,200	31,200	28,300	28,800	31,200
Actual Use Sheep (head month) ²	6,430	6,400	6,400	6,400	6,400
Estimated Timber Output (CCF) (PSQ) ³	9,800	9,800	9,200	4,100	10,800
Dimension Stone (short tons)	N/A	400	400	400	400
Construction Sand and Gravel (short tons)	20,000	20,000	20,000	20,000	20,000
Limestone (short tons)	330,000	330,000	330,000	330,000	330,000
Natural Gas (M Cubic Feet)	0	980,000	980,000	0	980,000
General Recreation (1000 visits)	897	897	889	882	894
Fish and Wildlife Recreation (1000 visits)	437	437	426	417	434
BLM Expenditures (\$000,000s)	3.7	3.7	4.2	3.5	5.0

¹ Estimates include actual use levels (recreation visits in 2004) and authorized amounts (grazing and timber). Data are not available for minerals.

² Data, including the current estimate, are based on head months available for activation. Actual use has averaged about 70 percent of the total over the past seven years. 1 head month of cattle and horses = approximately 0.78 AUMs for cattle and horses; 1 head month for sheep and goats = approximately 0.2 AUMs for sheep and goats.

³ Sawtimber data, including the current estimate, are based on the Probable Sale Quantity (PSQ). Actual sawtimber harvest was approximately 21 percent of the PSQ in 2003.

ment. This would tend to reduce the threat to life and property. Across all fire size class categories, the fire suppression costs per acre for the Custer NF were about one-fourth the average of the cost over the other three forests. It is not, however, possible to project the level of non-prescribed wildland fire that would occur under any of the alternatives. Based on the level of hazardous fuels treatments for each alternative, total wildland fire suppression costs for fires in the Butte Field Office would be highest for Alternative C and lowest for Alternative D.

This section discusses impacts to potentially affected groups that are unlikely to vary substantially by alternative.

Timber and Forest Product Production

The local primary forest product industry described by the Bureau of Business and Economic Research (BBER, 2001) is a long standing and basic industry that all of the alternatives would continue to supply with traditional materials shown in the PSQ estimates. The alternatives provide for changes that are anticipated through industrial research and development, and through entry of new businesses in the field, offering a different assortment of products such as biomass, that would use non-traditional and currently low value forest materials that were utilized inefficiently or were often considered to be waste in the past. While the harvest amounts being proposed under all of the alternatives would not have a significant effect on the total amount of material available from all ownerships in the area, they are still important, as the current timber harvest levels in Montana are considered to be insufficient to sustain the current industry for the next decade (BBER, 2004).

The commercial treatments proposed would tend to reduce the intensity of wildfire events and the tree conditions that favor development of epidemic levels of forest insect or disease. These treatments are expected to reduce the severe levels of tree mortality and site damage that are experienced during such large scale, stand replacement events, and would reduce the amount of salvage volume available from such events in the future. The intended reductions in the severity from such events would also tend to insure a steady and continuing supply of future forest products, helping to sustain economic conditions and improving local acceptance of active forest management and forest product removals.

Each of the alternatives also would sustain current local government revenues from the product sales within the eight-county area, as four percent of non-stewardship timber receipts are returned through the state to the counties where they are generated.

Ranching

Livestock grazing on BLM-managed land in the eight-county Planning Area would continue to involve approximately the same number of operators. Less than seven percent of the farms and ranches in the Planning Area would hold BLM grazing permits. The amount of livestock grazing would change less than 10 percent among the alternatives and BLM would continue to provide less than one percent of the total forage needed to feed livestock in the Planning Area (AMS, Appendix P (USDI-BLM 2006c)). The economic dependency of livestock producers on BLM forage would remain unchanged. However, often BLM forage would continue to provide a critical element of some livestock producers' complement of grazing, forage, and hay production. Farm income would continue to account for approximately one percent of total income in the eight-county study area.

National Forest	Fire Size Class^{1,2}						
	A	B	C	D	E	F	G
Beaverhead-Deerlodge	14,667	5,913	2,387	1,435	519	808	340
Custer	8,938	1,156	305	206	264	462	39
Gallatin	15,033	8,136	4,264	4,150	2,881	1,245	411
Helena	8,668	2,500	2,049	N/A	N/A	N/A	120
Average	12,789	5,516	2,900	2,793	1,700	1,027	290

¹Fire size class is defined as follows:

- | | | | |
|---|------------------------------|---|----------------------------------|
| A | 0.01 acres to 0.25 acres | E | 300.00 acres to 999.90 acres |
| B | 0.26 acres to 9.90 acres | F | 1,000.00 acres to 4,999.90 acres |
| C | 10.00 acres to 99.90 acres | G | 5,000.00 acres and larger |
| D | 100.00 acres to 299.90 acres | | |

²Data are from the Forest Service which manages fire suppression in the Planning Area.

Source: Region 1 (FS) Fire Suppression Average Acre Cost by Unit. Derived from individual S100-2 reports 2000-2003.

Recreation Use, Permitted Outfitters and Guides

None of the proposed alternatives would be expected to affect current outfitter and guide use. The action alternatives do vary in terms of fee collections for commercial fishing and floating outfitters who use developed BLM river access sites. Payment of these fees would have different administrative impacts, but the actual costs would likely be passed on to the clients. Outfitters and guides would continue to have the same opportunities under all alternatives as they currently do, with the exception of potential hunting outfitter and guides who would not be able to camp at developed fee sites during hunting season under Alternatives B and C. There are currently no commercial outfitter and guides using developed fee sites during hunting season.

Revenues from recreation use permits, campground receipts, and outfitter and guide receipts would be similar (approximately \$123,000 per year) for all alternatives.

Lands and Realty

Use authorizations, e.g., rights-of-way, permits, and lease rentals would continue to generate an estimated \$110,000 of revenue annually for the federal government. Payments in Lieu of Taxes (PILT) from the federal government to the eight counties would continue to be approximately \$5.1 million with all the alternatives.

Other Impacts

Under all alternatives, economic diversity indicated by the number of economic sectors would remain relatively unchanged, though shifts in emphasis could occur. Estimated costs to local governments would also remain unchanged, i.e. demand for services and infrastructure would not change.

Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each federal agency to make the achievement of environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low income populations. The Order further stipulates that agencies conduct their programs and activities in a manner that does not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination because of their race, color, or national origin.

None of the proposed alternatives would be expected to have disproportionately high and adverse human health or environmental effects on minority and low income populations. All four alternatives are expected to result in increases in employment and labor income over the next decade, with alternatives resulting in a very small

share of total employment within the eight counties that comprise the Planning Area.

Public involvement efforts for this project have been inclusive and the agency has considered input from persons or groups regardless of race, color, national origin, income, or other social and economic characteristics.

Public Health and Safety

Under all alternatives, the hazardous materials management program focuses on immediate and urgent threats to human health and the environment from spills, releases, dumping, and discovery of hazardous waste sites. In terms of health and safety, land use authorizations for uses which would involve the disposal or storage of materials which could contaminate the land would not be issued. Lands proposed for acquisition or disposal would need to be inventoried for the presence of hazardous materials. The presence of contaminants may lead to actions such as the modification or abandonment of a land ownership adjustment proposal, or remediation in the form of cleanup and removal of the contaminants. Standard operating procedures required under the National Oil and Hazardous Substances Pollution Contingency Plan would be implemented during cleanup.

There would be no effects to public health and safety from proposed management associated with vegetation communities, special status and priority plant and animal species, recreation, ACECs, air quality, soils, water, paleontological resources, energy and minerals, environmental justice or tribal treaty rights.

Under all alternatives, abandoned mines that pose a significant risk to human health and the environment would be remediated.

Abandoned mine land (AML) reclamation prioritization would enable BLM to address immediate problem sites that pose a threat to public health and safety.

Reclamation activities conducted in accordance with Land Health Standards would contribute to achievement of the resource use vision statement.

Monitoring AML sites after reclamation would reduce risk to public safety by clarifying where risk to public health and safety has been reduced as well as where risks still exist.

Effects of Alternative A

Economic Environment

Estimates of the levels of employment and labor income that would be supported by Alternative A are based on projected resource outputs and projected BLM expenditure levels (**Table 4-39**). Estimated average annual employment and labor income are summarized by resource area in **Table 4-42** and **Table 4-41**, respectively.

Resource	Current	A	B	C	D
Recreation	510	510	506	502	508
Wildlife and Fish	292	292	285	278	290
Grazing	11	11	10	11	11
Timber	106	106	99	45	117
Minerals	D	92	92	D	92
Ecosystem Restoration	10	10	18	6	23
Payment to State/Counties	144	157	157	144	157
BLM Expenditures	89	89	92	87	99
Total Field Office Management	1,193	1,266	1,259	1,104	1,297
Percent Change from Current	---	6.1	5.5	-7.5	8.7

D = Data withheld to avoid disclosing confidential data of individual firms Source: FEAST 2007.

Resource	Current	A	B	C	D
Recreation	\$13,073.6	\$13,073.6	\$12,960.5	\$12,860.7	\$13,030.4
Wildlife and Fish	\$7,549.9	\$7,549.9	\$7,373.3	\$7,206.7	\$7,498.8
Grazing	\$197.9	\$197.9	\$180.1	\$183.0	\$197.9
Timber	\$2,999.9	\$2,999.9	\$2,816.4	\$1,269.8	\$3,312.9
Minerals	D	\$4,592.3	\$4,592.3	D	\$4,592.3
Ecosystem Restoration	\$335.6	\$335.6	\$585.4	\$248.2	\$746.6
Payments to State/Counties	\$5,563.3	\$6,064.9	\$6,064.9	\$5,563.3	\$6,064.9
BLM Expenditures	\$2,887.8	\$2,887.8	\$3,217.2	\$2,699.5	\$3,871.4
Total Field Office Management	\$33,898.5	\$37,701.8	\$37,790.1	\$31,321.8	\$39,315.2
Percent Change from Current	---	11.2	11.5	-7.6	16.0

D = Data withheld to avoid disclosing confidential data of individual firms. Source: FEAST2007

Alternative A would allow an average annual harvest of approximately 9,800 CCF of timber (Table 4-39). The majority of this estimate (9,700 CCF) is based on the sawtimber PSQ and reflects the annual volume that would be available rather than actual harvest projections. Actual sawtimber harvest was approximately 21 percent of the PSQ in 2003. The remainder of the harvest estimate consists of fuel wood (61CCF) and post and poles (5.5 CCF). This harvest, if it were to occur, would support approximately 110 jobs and \$3.0 million in labor income (Table 4-42 and Table 4-41) within the local or regional economy.

Alternative A would continue current levels of forest product offerings and provide no adjustment in current economic condition.

Alternative A would authorize average annual grazing of approximately 31,200 cattle head months (HMs) and 6,400 sheep HMs (Table 4-39) and support about 10 jobs and \$200,000 in labor income (Table 4-42 and Table 4-41). Annual revenues from grazing permits would amount to approximately \$35,000 (25,677 AUMs x \$1.35/AUM= \$34,664). Approximately 64 percent of the AUMs sold within the Butte Field Office are section 3 permits of which 12.5 percent of revenues are distributed to the state and local counties; 36 percent of the

AUMs are section 15 permits of which 50 percent of revenues are distributed to state and local counties. Total consumer surplus associated with 25,677 BLM AUMs would continue to be approximately \$376,000. Annual federal revenues from livestock grazing would be about \$35,000, of which about \$8,400 would be distributed to the state and counties.

Recreation is the largest program managed by the Butte Field Office. It is estimated that recreation, including fish and wildlife-related recreation activities, would account for about 60 percent of all the jobs and about 50 percent of all the labor income that would be supported by Butte Field Office activities (Table 4-42 and Table 4-41). Motorized access and motorized recreation opportunities would not change from the current condition. An annual average of approximately 900,000 general recreation visits and 440,000 fish and wildlife-related recreation visits are projected under Alternative A (Table 4-39). Alternative A would support approximately 800 jobs and \$21 million in labor income (Table 4-42 and Table 4-41). Annual federal revenues from recreation management (including user fees and partnership donations for site maintenance and improvements) would be about \$123,000.

Currently, no oil and gas operations occur on federal lands/minerals. About 36,200 acres of federal minerals are currently leased within the planning area. Although acres available for oil and gas leasing would vary among alternatives, for this analysis the number of acres that would be leased under Alternative A, B, and D is projected to be about 37,700 acres. (37,731 acres are currently suspended with nominations. These would be available for lease upon completion of the RMP under alternatives A, B, and D.) Federal revenues from oil and gas leasing would include one-time lease bids (minimum of \$2.00/acre), and annual rental fees on leases (\$1.50 per acre/year for the first five years and \$2.00 per acre/year each year thereafter). Currently, 36,243 acres are leased and generate about \$72,000 in rental revenues. If all the new acres with suspended nominations were leased in one year the one-time lease bid would be at least \$75,000. Annual lease rentals for the first five years of these new leases would be about \$56,000. After the first five years, annual lease rentals (current and new) would be about \$148,000. Total State lease revenue would be 50 percent of Federal lease revenues. This would amount to about \$74,000 annually. At the scale of development projected, employment and income impacts on local residents would be limited and temporary. For analysis purposes, it is assumed that not more than one exploratory well would be drilled per year. Drilling would employ 15-20 workers per well for periods of up to 300 days. Average income per job in the mining sector would be about \$49,000 per year (average for the State of Montana, 2000, Northwest Economic Association). However, since drilling would likely be undertaken by outside firms, much of the employment and income effects would not show up in the local economy. Gas production would contribute to state and local government revenues through oil and gas tax revenues. For analysis purposes it is assumed that 980,000 MCF of natural gas would be produced annually. This would generate an estimated \$813,000 in Federal royalties (based on a six month average price of natural gas at wellhead of \$6.64/MCF, Energy Information Adminis-

tration, 10/11/07); one half (approximately \$407,000) would be distributed to the State of Montana; and 12.5 percent of the state portion (about \$102,000) would be distributed to the county or counties of production.

Alternative A would result in the estimated average annual production of 980,000 MCF of natural gas, 330,000 short tons of limestone, 400 short tons of dimension stone and 20,000 short tons of construction sand and gravel from public lands and federal minerals (Table 4-39). It is estimated that minerals exploration, development, and production on public lands/federal minerals would support about 90-100 local jobs and an estimated \$4.6 million in local labor income. (Table 4-42 and Table 4-41)

Annual average level of activities associated with ecosystem restoration would include fuels treatments and pre-commercial thinning (1,275 acres), weed spraying (2,000 acres), and road closures (172 miles). These activities would support about 10 jobs and \$340,000 in labor income. BLM expenditures include both expenditures for employee salaries and other non-salary expenditures related to Butte Field Office operations. Non-salary expenditures are purchases made in support of resource programs and operations and include items such as contracts, gasoline, diesel, ammunition and explosives, animal feed, computer equipment, and so on. Budget expenditures by program would remain constant under Alternative A and would continue to support approximately 90 jobs and \$2.9 million in labor income (Table 4-42 and Table 4-41).

In conclusion, the estimated total (direct, indirect, and induced) number of local jobs and associated local labor income contributed by BLM land and resource management would be about 1,270 jobs and \$38 million, respectively. Total employment and labor income generated by BLM resource management would increase by about 6 percent and 11 percent, respectively, compared to current management. These BLM-related contributions, i.e. jobs and labor income, would continue to be less than one percent of total within the local economy. The largest employment and labor income effects would occur in the accommodations and food services, government, and retail trade industry sectors (FEAST, 2007). All program revenues to the federal government would be about \$1.1 million per year. Annual payments to the State of Montana and to counties would be approximately \$5.5 million, most of which would be PILT payments. The dependency of the local economy on livestock industry, timber production, mining, oil and gas exploration, and recreation activities would not be affected by BLM resource management. The influence of resource management on BLM-administered lands would not change local economic diversity (as indicated by the number of economic sectors), dependency (i.e. where one or a few industries dominate the economy), or stability (as indicated by seasonal unemployment, sporadic population changes, and fluctuating income rates).

Social Environment

The following social analysis assesses the potential effects of different management actions on potentially affected social groups. These groups were identified based on past studies in and around the Planning Area and the results of public scoping conducted for the Butte RMP. The analysis addresses the potential impacts of the alternatives based on the issues and concerns raised by these groups during the public scoping process.

Timber employment is concentrated in only a few areas in the analysis area and lands managed by the Butte Field Office account for a very small portion of total harvest in this area. There would be no change in available timber harvest opportunities under this alternative. Public access and the availability of firewood and other forest resources would also remain unchanged. As a result, this alternative would be unlikely to affect current social conditions with respect to forest products. Timber-related issues, raised during public scoping for this project included concerns regarding noxious weeds, fuel hazard reduction, and dead tree salvage. The action alternatives, with the possible exception of Alternative C, would treat larger areas of weeds and based on this issue, Alternative A is likely to be less favored among those concerned about noxious weed treatments.

Fire suppression within the first burning period would limit the loss of forest products to fire. Wildland fire use and prescribed burning could cause a loss of forest products, but could also create salvage opportunities. Heavily stocked tree conditions contribute to epidemic levels of forest insect or disease and increase the intensity of wildfire events. Commercial treatments would reduce heavily stocked conditions and corresponding severe levels of tree mortality and site damage. Local acceptance of active forest management and forest product removals would likely be improved as the threat of intensive wildfire and the threat of forest mortality from disease and insects is reduced.

Lands managed by the Butte Field Office accounted for less than one percent of the total AUMs in the Planning Area in 2003, ranging from 0.02 percent of total AUMs in Broadwater County to 2.7 percent of the total in Jefferson County. These lands do, however, account for more than one-third of total AUMs for approximately 20 of the 174 existing ranchers who use Butte Field Office lands. In addition, these lands may be important to operators because of their relatively low grazing fees, which are \$1.35 per AUM for 2007.

There would be no change in the authorized AUMs under Alternative A (Table 4-39). Conflicts between livestock grazing and wheeled vehicles would continue under this alternative. A wide range of recreation opportunities are available within the Planning Area. These activities involve diverse groups of people and changes in recreation management can affect people who engage in particular recreation activities very differently. Con-

cerns were expressed during the public scoping process that demand for motorized recreational access has increased in recent years, while motorized access has decreased, largely as a result of federal land management action and policies that favor non-motorized users. Some commenting felt that public lands should be available to all users, both motorized and non-motorized, but some areas and trails should have limited types of use (hiking use only or OHV use only) where different types of use tend to be incompatible. Others felt that non-motorized uses are presently favored over motorized uses and felt that this balance should be changed, with motorized users allowed equal access (USDI-BLM 2005a).

Alternative A would not allocate ROS classes and recreation opportunities on Decision Area lands would continue to be managed under site-specific plans only. Management would continue to be challenging around developed recreation sites during peak recreation use seasons, particularly near shorelines and water-based recreation opportunities. Motorized access and motorized recreational opportunities (including organized motorized events) would continue unchanged under this alternative. As a result, this alternative would not address concerns about conflicts between motorized and non-motorized use or, between motorized use and livestock grazing. It would also not address concerns that the Butte Field Office should provide additional motorized recreation opportunities.

Permit requests by outfitter/guide hunters would be considered on a case-by-case basis throughout the decision area subject to environmental, social, and public health and safety concerns. No fees would be charged for commercial fishing and floating outfitters using developed BLM river access sites. This alternative would likely be favored by outfitter/guides over Alternatives B and C, which would impose constraints on potential outfitter/guide activities.

A number of individuals and organizations commenting during scoping for this project expressed concern about resource protection issues, with particular emphasis placed on wildlife, fisheries, water, and special area designations. Comments included requests that habitat corridors for threatened, endangered, and sensitive species and the integrity and non-motorized character of all roadless areas be maintained. Some respondents identified areas for designation as special use areas, including ACECs, wild and scenic river areas, and recreational river areas (USDI-BLM 2005a).

The current levels, methods, and mix of multiple use management would continue on Decision Area lands under this alternative and activity-level wildlife habitat and riparian protection measures would be less restrictive under this alternative than they would be under Alternatives B and C. The four eligible Wild and Scenic River segments would continue to be managed to protect the values that make them eligible and the six existing

WSAs would continue to be managed under the Interim Management Policy and Guidelines. No new ACECs would be established under this alternative. Based on these criteria, individuals and groups who give high priority to resource protection would be less likely to support this alternative than they would Alternatives B and C.

A number of individuals and groups expressed concern about limitations being placed on the availability of public lands for commercial uses such as livestock grazing, mineral development, and timber harvest. These people believe that local communities depend on these industries, which are a primary source of high paying jobs to local economies. Comments received during scoping for this project requested that the RMP revision focus on beneficial economic and social use of public lands, not locking them up from development or public access.

The current levels, methods, and mix of multiple use management would continue on Decision Area lands under this alternative. Resource outputs and current levels of motorized access and motorized recreation opportunities would not change under this alternative. Individuals and groups concerned about resource use limitations would likely favor this alternative or Alternative D.

Effects Common to Action Alternatives

Social Environment

ROS classes would be established and used to manage for desired recreation opportunities, experience levels, facility developments, and other resource uses. Implementation plans for Special Recreation Management Areas delineated Recreation Management Zones would be developed where specific management, marketing, monitoring, and administrative guidance is needed. The greatest difference between the action alternatives is the variation between motorized and non-motorized access.

Alternatives B and C would have the overall effect of reducing opportunities available for motorized recreation when compared to Alternative A, but the quality of the experience may increase because separating uses would reduce conflicts between user groups. Allocating areas to non-motorized use lets both non-motorized and motorized users know which areas they would have access to in the future.

Localized impacts from changes in management direction would be most likely to occur in the Scratchgravel Hills area, which would be managed differently under the action alternatives.

Public Health and Safety

In addition to impacts described under Effects Common to All Alternatives, Alternatives B, C and D would include the AML reclamation program requiring an abandoned mine shaft in the Ringing Rocks Potential ACEC

to be reclaimed. The physical safety hazard for this site would be reduced.

Effects of Alternative B

Economic Environment

Estimates of the levels of employment and labor income that would be supported by Alternative B are based on projected resource outputs and projected BLM expenditure levels (**Table 4-39**). Estimated average annual employment and labor income are summarized by resource area in (**Table 4-42** and **Table 4-41**), respectively. The projected outputs and estimated employment and labor income are discussed by resource in the following sections.

Alternative B would provide for an average annual harvest of approximately 9,200 CCF of timber (**Table 4-39**). The majority of this estimate (9,100 CCF) is based on the sawtimber PSQ and reflects the annual volume that would be available rather than actual harvest projections. Estimated sawtimber harvest (9,100 CCF) would be approximately 99 percent of the PSQ. The remainder of the harvest estimate would consist of fuel wood (82 CCF) and post and poles (7.7 CCF). This harvest, if it were to occur, would support approximately 100 jobs and \$2.8 million in labor income (**Table 4-42** and **Table 4-41**).

Alternative B would cause slightly smaller levels of forest product offerings with higher levels of acreage treatments. These changes would not have noticeable difference in economic conditions locally.

Alternative B would authorize average annual grazing of approximately 28,300 cattle HMs and 6,400 sheep HMs (**Table 4-39**) and support approximately 10 jobs and \$180,000 in labor income (**Table 4-42** and **Table 4-41**). Annual revenues from grazing permits would amount to less than \$32,000. (24,710 AUMs x \$1.35/AUM = \$31,587). Estimated total distribution to state and local counties would be about \$7,600. Total consumer surplus associated with 24,710 BLM AUMs would be about \$362,000. Annual federal revenues from livestock grazing would be about \$31,600 and the amount distributed to the state and counties would be about \$7,600. Alternative B emphasizes a balance of motorized and non-motorized recreation and access opportunities compared to the other action alternatives (Alternatives C and D). The number of recreation visits to Butte Field Office-managed areas is expected to increase at a rate of two percent per year over the next 10 years under all of the alternatives. The projected average annual visits summarized for Alternative B in **Table 4-39** were estimated based on this expected increase. The total number of visits projected under Alternative B is expected to be slightly lower than under Alternative A.

Management actions under Alternative B are projected to result in a relative reduction in the number of visits associated with motorized vehicle travel, hunt-

ing/archery, wildlife/natural viewing, and snowmobiling, and a relative increase in non-motorized recreation visits (e.g., foot travel, biking, and horseback riding) (**Table 4-39**). Annual federal revenues from recreation management would be about the same as with Alternative A (\$123,000).

An annual average of approximately 889,000 general recreation visits and 426,000 fish and wildlife-related recreation visits are projected under Alternative B (**Table 4-39**). These visits would support approximately 790 jobs and \$20.3 million in labor income (**Table 4-42** and **Table 4-41**).

The economic impacts associated with minerals management and operations would be similar to those described for Alternative A. (**Table 4-42** and **Table 4-41**). Indirectly, Alternative B would likely provide an environment that is more conducive to continuing long-term population growth and corresponding economic growth than Alternatives A and D because it offers more protection of public lands and resources through the management of ACECs, Wild and Scenic Rivers, travel management restrictions, and semi-primitive non-motorized recreation management. Studies indicate that “protected public lands, set aside for their wildland characteristics, can and do play an important role in stimulating economic growth...” (Prosperity in the 21st Century West, Rasker et al, 2004).

Estimated annual average level of activities associated with ecosystem restoration would include hazardous fuels treatments and pre-commercial thinning (2,560 acres), weed spraying (2,900 acres), road decommissioning (5 miles), and road closures (318 miles). These activities would support about 20 jobs and \$590,000 in labor income.

In conclusion, the economic effects of Alternative B would be very similar to those of Alternative A. The estimated total (direct, indirect, and induced) number of local jobs and associated local labor income contributed by BLM land and resource management described above in Alternative B would be about 1,260 jobs and \$38 million, respectively. Like Alternative A, total employment and labor income generated by BLM resource management under Alternative B would increase by about 6 percent and 11 percent, respectively, compared to current management. These BLM-related contributions, i.e. jobs and labor income, would continue to be less than one percent of total within the local economy. The largest employment and labor income effects would occur in the accommodations and food services, government, and retail trade industry sectors. All program revenues to the federal government would be about \$1.1 million per year. Annual payments to the State of Montana and to counties would be approximately \$5.53 million, most of which would be PILT payments. The dependency of the local economy on livestock industry, timber production, mining, oil and gas exploration, and recreation activities would not be affected by BLM

resource management. The influence of resource management on BLM-administered lands would not change local economic diversity (as indicated by the number of economic sectors), dependency (i.e. where one or a few industries dominate the economy), or stability (as indicated by seasonal unemployment, sporadic population changes, and fluctuating income rates).

Social Environment

Projected timber harvest levels under Alternative B are slightly lower than current levels. Access to firewood, Christmas trees and other forest resources would be reduced under this alternative due in part to a 34 percent reduction in the roads currently available for public use to remove such materials and a 17 percent reduction in the forest and woodland area available under Alternative A through Recreational Opportunity Spectrum designation as Semi-primitive non-motorized where in some cases currently open roads would be closed. Access reductions would be greater than under current conditions, but lower than they would be under Alternative C.

An estimated 21,000 to 50,000 acres of weeds would be treated each decade under Alternative B. This may be slightly more to over twice the estimated 20,000 acres that would be treated under Alternative A. As a result, Alternative B would likely be relatively favored by those primarily concerned with noxious weed issues. Fire management impacts would be similar to those projected under Alternative A. Timber salvage would produce sawlogs and other timber products, but salvage would be more limited under this alternative than it would be under Alternatives A and D.

The numbers of AUMs permitted for livestock would be slightly less than for Alternative A; this decrease is not expected to affect any ongoing operation.

The effects to ranching would be the same under this alternative as they would under Alternative A. Relinquished allotments would be evaluated for suburban/urban interface issues, critical wildlife habitat, riparian values, or recreational considerations before being re-offered for permit or lease. Fewer conflicts between livestock grazing and wheeled vehicles would occur under this alternative than under Alternative A.

Alternative B emphasizes a balance of motorized and non-motorized recreation and access opportunities compared to the other action alternatives (Alternatives C and D); with 34 percent of Decision Area lands allocated to semi-primitive ROS classes. Management actions under this alternative are expected to result in a relative reduction in the number of visits associated with motorized vehicle travel, hunting/archery, motorized wildlife/scenery viewing, and snowmobiling, and a relative increase in non-motorized recreation visits (e.g., foot travel, biking, and horseback riding) (**Table 4-39**). Organized motorized events would be limited to the Pipestone area unless being held in conjunction with adjacent public or private lands. With the exception of a few

routes needed for residential access, the entire Scratch-gravel Hills area would be closed to wheeled motorized vehicle use yearlong. This alternative would address concerns about conflicts between non-motorized and motorized use and between motorized use and livestock grazing. It would not address concerns that the Butte Field Office should provide additional motorized recreation activities.

Annual day-use fees (to be established in accordance with FLREA) per commercial guided boat would be charged for commercial fishing and floating outfitters using developed BLM river access sites. Payment would be collected at the time of use. Commercial camping permits within developed fee sites would not be allowed during the fee season (Memorial Day to Labor Day). Special Recreation Use Permits during the hunting season would be limited to day-use activities with the exception that camping uses would be considered within developed recreation sites during the non-fee season. Based on these constraints, commercial outfitter/guides would be less likely to favor this alternative than they would Alternatives A or D.

This alternative emphasizes moderate levels of resource protection, use, and restoration, with project-level wildlife habitat and riparian protection measures greater than under Alternatives A and D, but less than under Alternative C. Individuals and groups who give high priority to resource protection would be more likely to favor this alternative than Alternatives A and D.

This alternative emphasizes moderate levels of resource protection, use, and restoration. Estimated average annual timber harvest would be higher under this alternative than under Alternative C, approximately the same as under Alternative A, but less than under Alternative D (Table 4-39). Oil and gas leasing constraints would be more restrictive than under Alternatives A and D, but less restrictive than under Alternative C. Based on these criteria, individuals and groups who give high priority to resource use would be more likely to favor this alternative than Alternative C and possibly Alternative A, depending on the specific priorities of the group or individuals concerned.

Effects of Alternative C

Economic Environment

Estimates of the levels of employment and labor income that would be supported by Alternative C are based on projected resource outputs and projected BLM expenditure levels (Table 4-39). Estimated average annual employment and labor income are summarized by resource area in Table 4-42 and Table 4-41, respectively. The projected outputs and estimated employment and labor income are discussed by resource in the following sections.

Alternative C would provide for an average annual harvest of approximately 4,100 CCF of timber (Table 4-39).

This is lower than under current conditions and lower than the other alternatives. The majority of this estimate is based on the sawtimber PSQ and reflects the annual volume that would be available rather than actual harvest projections. This harvest, if it were to occur, would support approximately 50 jobs and \$1.3 million in labor income (Table 4-42 and Table 4-41). The local employment and labor income supported by timber harvest on BLM lands would be less than half of current levels.

This alternative would authorize average annual grazing of approximately 28,800 cattle HMs and 6,400 sheep HMs (Table 4-39) and support approximately 10 jobs and \$183,000 in labor income (Table 4-42 and Table 4-41). Economic effects of and permittee responses to grazing management would be similar to those described for Alternatives A and B. Annual revenues from grazing permits would be similar to Alternative B (about \$32,100), (24,710 AUMs x \$1.35/AUM=\$32,095). Estimated total distribution to state and local counties would be about \$7,700. Total producer surplus would be about \$362,000. The total number of visits projected under Alternative C is the lowest of the four alternatives. Management actions under Alternative C are projected to result in a relative reduction in the number of visits associated with motorized vehicle travel, hunting/archery, wildlife/natural viewing, and snowmobiling. Projected reductions in these areas would be twice as large as those under Alternative B but still relatively minor when measured in terms of regional economic impacts. Alternative C is also expected to result in a relative increase in non-motorized recreation visits (e.g., foot travel, biking, horseback riding, and non-motorized boating).

An annual average of approximately 882,000 general recreation visits and 417,000 fish and wildlife-related recreation visits are projected under Alternative C (Table 4-39). This increase over the current (2004) level of visitation is due to the baseline increase in recreation visits (two percent per year) that is projected under all of the alternatives. Alternative C would support approximately 780 jobs and \$20.1 million in labor income (Table 4-42 and Table 4-41). Annual federal revenues from recreation management would be about the same as with Alternative A because the increase in recreation use would occur largely in dispersed recreation use where BLM does not collect fees. Alternative C would result in the estimated average annual production of 330,000 short tons of limestone, 400 short tons of dimension stone, and 20,000 short tons of construction sand and gravel from public lands (Table 4-39). It is estimated that minerals exploration, development, and production on public lands/federal minerals would support about the same level of employment and labor income as current management. However, there would likely be no contribution from oil and gas leasing from BLM mineral estate lands due to the high degree of leasing restrictions under this alternative.

Estimated annual average level of activities associated with ecosystem restoration would include hazardous fuels treatments and pre-commercial thinning (450 acres), weed spraying (2,200 acres), road decommissioning (5 miles), and road closures (375 miles). These activities would support less than 10 jobs and about \$250,000 in labor income.

BLM budget expenditures would be lower under Alternative C than under any other alternative, including Alternative A, No Action (**Table 4-39**). Alternative C would have lower expenditures than Alternative A in the range, fuels, and weed treatment programs, with the largest reduction occurring under the fuels program. BLM expenditures under this alternative would support approximately 90 jobs and \$2.7 million in labor income (**Table 4-42** and **Table 4-41**).

Indirectly, Alternative C would provide an environment that would be more likely to sustain long-term population growth and corresponding economic growth than the other alternatives because it offers the most protection of public lands and resources through the management of ACECs, Wild and Scenic Rivers, travel management restrictions, semi-primitive non-motorized recreation management, and less mineral development. Studies indicate that “protected public lands, set aside for their wildland characteristics, can and do play an important role in stimulating economic growth...” (Prosperity in the 21st Century West, Rasker et al, 2004).

In conclusion, Alternative C is the only alternative analyzed in detail that would result in a short-term loss of local employment and labor income. The estimated total (direct, indirect, and induced) number of local jobs and associated local labor income contributed by BLM land and resource management described above in Alternative C would be about 1,100 jobs and about \$31.3 million, respectively. Total employment and labor income generated by BLM resource management under Alternative C would decrease by about 8 percent compared to current management. These BLM-related contributions, i.e. jobs and labor income, would continue to be less than one percent of total within the local economy. The largest employment and labor income effects would occur in the accommodations and food services, government, and retail trade industry sectors. All program revenues to the federal government would be about \$0.2 million per year. Annual payments to the State of Montana and to counties would be approximately \$5.1 million, most of which would be PILT payments. The dependency of the local economy on livestock industry, timber production, mining, oil and gas exploration, and recreation activities would not be affected by BLM resource management. The influence of resource management on BLM-administered lands would not change local economic diversity (as indicated by the number of economic sectors), dependency (i.e. where one or a few industries dominate the economy), or stability (as indi-

cated by seasonal unemployment, sporadic population changes, and fluctuating income rates).

Social Environment

Projected timber harvest levels are much lower under Alternative C than under the other alternatives. This alternative would likely be less favored than the other alternatives by those primarily concerned about timber employment. Access to firewood, Christmas trees and other forest resources would be limited under this alternative due in part to a 41 percent reduction in the roads currently available for public use to remove such materials and a 29 percent reduction in the forest and woodland area available under Alternative A through Recreational Opportunity Spectrum designation as Semi-primitive non-motorized where in some cases currently open roads would be closed.

Projected ground disturbance would be lower under this alternative than it would under the other action alternatives and, as a result, less aggressive weed treatment would be required. An estimated 16,000 to 38,000 acres of weeds would be treated per decade under this alternative.

Timber salvage would be limited under this alternative and, as a result, is less likely to be favored by those primarily concerned with salvage opportunities. Similarly, this alternative would require that firewood be live trees and could, as a result, substantially reduce the number of firewood permits.

The effects to ranchers would be similar to Alternative B. The existing Indian Creek allotment (2,215 acres and 376 AUMs), as well as any lands acquired from the Iron Mask acquisition, would be unavailable for grazing lease or permit under this alternative.

Alternative C would emphasize non-motorized recreation opportunities more than the other alternatives, with 41 percent of the Decision Area lands allocated to semi-primitive ROS classes. Based on this relative distribution, Alternative C is likely to be preferred by recreationists who favor non-motorized recreation opportunities. Management actions under this alternative are expected to result in a relative reduction in the number of visits associated with motorized vehicle travel, hunting/archery, motorized wildlife/scenery viewing, and snowmobiling. Opportunities for organized motorized events would be eliminated and the entire Scratchgravel Hills area would be closed to motorized vehicle use after dark (dusk to dawn) yearlong. This alternative would address concerns about conflicts between motorized and non-motorized use and between motorized use and livestock grazing. It would not address concerns that the Butte Field Office should provide additional motorized activities.

Annual day-use fees of \$90 per commercial guided boat would be charged for commercial fishing and floating outfitters using developed BLM river access sites. Out-

fitters would be billed in advance. Commercial camping permits within developed fee sites would not be allowed during the fee season (Memorial Day to Labor Day). Special Recreation Use Permits during the hunting season would be limited to day-use activities only. Based on these constraints, commercial outfitter/guides would be less likely to favor this alternative than they would the other alternatives.

This alternative emphasizes a lesser degree of vegetative restoration than the other action alternatives (Alternatives B and D), but project-level wildlife habitat and riparian protection measures would be greater than under the other three alternatives. All four eligible Wild and Scenic River segments would be recommended as suitable for the National Wild and Scenic Rivers System and four new ACECs, including a total of approximately 76,000 acres, would be established. Based on these criteria, individuals and groups who give high priority to resource protection would likely favor this alternative.

Estimated average annual timber harvest would be lower under this alternative than under any other alternative (Table 4-39). Oil and gas leasing constraints would be the most restrictive of any alternative. Groups and individuals who are concerned about restrictions on resource use would likely prefer all other alternatives over Alternative C.

Effects of Alternative D

Economic Environment

Estimates of the levels of employment and labor income that would be supported by Alternative D are based on projected resource outputs and projected BLM expenditure levels (Table 4-39). Estimated average annual employment and labor income are summarized by resource area in Table 4-42 and Table 4-41, respectively. The projected outputs and estimated employment and labor income are discussed by resource in the following sections.

Alternative D would provide for an average annual harvest of approximately 10,800 CCF of timber (Table 4-39). This is higher than the volumes projected for the other action alternatives. The majority of this estimate (10,700 CCF) is based on the sawtimber PSQ and reflects the annual volume that would be available rather than actual harvest projections. This harvest, if it were to occur, would support approximately 120 jobs and \$3.3 million in labor income (Table 4-42 and Table 4-41).

Alternative D would offer higher levels of forest product offerings with higher levels of acreage treatments; however these changes would not be large enough to cause substantial differences in local economic conditions.

Economic impacts associated with grazing management would be similar to current management (Alternative A). This alternative would authorize average annual grazing of approximately 31,200 cattle HMs and 6,400 sheep

HMs (Table 4-39) and support approximately 10 jobs and \$198,000 in labor income (Table 4-42 and Table 4-41). Annual revenues from grazing permits would amount to about \$35,000 (25,677 AUMs x \$1.35/AUM = \$34,664). Estimated total distribution to state and local counties would be about \$8,400. Consumer surplus would be about \$376,000. Annual federal revenues from livestock grazing and the amount distributed to the state and counties would be about the same as with Alternative A.

Alternative D emphasizes motorized access and recreation opportunities more than the other action alternatives. The total number of visits projected under Alternative D is the highest of the four alternatives. Management actions under Alternative D are projected to result in a relative increase in the number of visits associated with motorized vehicle travel, hunting and archery, wildlife and natural viewing, and snowmobiling, with the projected visits for other activities expected to remain as projected under Alternative A.

Management actions under Alternative D, coupled with an annual two percent increase in the number of visits, are expected to result in an annual average of approximately 894,000 general recreation visits and 433,000 fish and wildlife-related recreation visits (Table 4-39) and support approximately 800 jobs and \$20.5 million in labor income (Table 4-3 and Table 4-4). Annual federal revenues from recreation management would be about the same as with Alternative A (\$580,000).

Alternative D would result in the estimated average annual production of 980,000 MCF of natural gas, 330,000 tons of limestone, 400 short tons of dimension stone and 20,000 short tons of construction sand and gravel from public lands (Table 4-39) and support 90-100 jobs and \$4.6 million in labor income (Table 4-42 and Table 4-41). The economic impacts associated with minerals management would be similar to those described for Alternative A.

Estimated annual average level of activities associated with ecosystem restoration would include hazardous fuels treatments and pre-commercial thinning (3,345 acres), weed spraying (3,600 acres), road decommissioning (4 miles), and road closures (266 miles). These activities would support about 20 jobs and \$750,000 in labor income.

Budget expenditures would be higher under Alternative D than under any other alternative, with the majority of the relative increase associated with expenditures in the fuels and fish and wildlife management programs. BLM expenditures under this alternative would support approximately 100 jobs and \$3.9 million in labor income (Table 4-42 and Table 4-41).

In conclusion, the estimated total (direct, indirect, and induced) number of local jobs and associated local labor income contributed by BLM land and resource management described above in Alternative D would be about

1,300 jobs and almost \$39.3 million, respectively. Total employment and labor income generated by BLM resource management under Alternative D would increase by about 9 percent and 16 percent, respectively, compared to current management. These BLM-related contributions, i.e. jobs and labor income, would continue to be less than one percent of total within the local economy. The largest employment and labor income effects would occur in the accommodations and food services, government, and retail trade industry sectors. All program revenues to the federal government would be about \$1.1 million per year. Annual payments to the State of Montana and to counties would be approximately \$5.5 million, most of which would be PILT payments. The dependency of the local economy on livestock industry, timber production, mining, oil and gas exploration, and recreation activities would not be affected by BLM resource management. The influence of resource management on BLM-administered lands would not change local economic diversity (as indicated by the number of economic sectors), dependency (i.e. where one or a few industries dominate the economy), or stability (as indicated by seasonal unemployment, sporadic population changes, and fluctuating income rates).

Social Environment

Alternative D would have the highest projected timber harvest levels and would support approximately 70 jobs (Table 4-42 and Table 4-41). This alternative would likely be relatively favored by the timber industry and workers concerned about employment. These potential employment opportunities represent a very small share of total employment within the Planning Area, but may be important to those concerned and may have small, but positive, impacts in one or more local communities. Access to firewood, Christmas trees and other forest resources would be reduced under this alternative due in part to a 24 percent reduction in the roads currently available for public use to remove such materials and a 16 percent reduction in the forest and woodland area available under Alternative A through Recreational Opportunity Spectrum designation as Semi-primitive non-motorized where in some cases currently open roads would be closed. Access reductions would be greater than under current conditions, but lower than Alternatives B and C.

Projected ground disturbance would be higher under this alternative than it would under the other action alternatives and, as a result, more aggressive weed treatment would be required. An estimated 25,000 to 61,000 acres of weeds would be treated per decade. Timber salvage would be limited under this alternative compared to Alternative A. Fire created salvage opportunities would be higher under this alternative than under the other action alternatives. The effects on ranching would be the same under this alternative as Alternative A. Unlike the other action alternatives (Alternatives B and C), relinquished allotments would remain available for livestock

grazing leases or permits without evaluation for suburban/urban interface issues, crucial wildlife habitat, riparian values, or recreational considerations before re-offering. Fewer conflicts between ranchers and off-highway motorized vehicle users would occur than under Alternative A.

Alternative D emphasizes motorized access and recreation opportunities more than the other alternatives, with just 21 percent of Decision Area lands allocated to semi-primitive ROS classes. Based on this relative distribution, Alternative D is likely to be preferred by recreationists who favor motorized recreation opportunities, including hunters who prefer motorized hunting opportunities and groups and individuals that engage in snowmobiling. Two areas would remain open for organized motorized events and motorized and non-motorized recreational uses would be allowed 24 hours per day in the Scratchgravel Hills area in accordance with the travel management plan. This alternative would address some of the concerns about conflicts between motorized and non-motorized use. It would not address concerns that the Butte Field Office should provide additional motorized recreation activities.

BLM would postpone fees for commercial fishing and floating outfitters using developed BLM river and lake sites accessing state waterways until a multi-agency statewide fee system is established. Authorization of commercial camping activity and permit requests by outfitter and guide hunters would be considered throughout the Field Office on a case-by-case basis subject to resource constraints, management capabilities, social conflicts and public health and safety concerns. This alternative would impose fewer constraints on commercial outfitter and guides than the other two action alternatives (Alternatives B and C) and would, as a result, be more likely to be favored by those groups.

This alternative emphasizes a greater degree of vegetative restoration than the other action alternatives (Alternatives B and C), but project-level wildlife habitat and riparian protection measures would be less restrictive under this alternative than they would be under the other three alternatives. None of the four eligible Wild and Scenic River segments would be recommended as suitable for the National Wild and Scenic Rivers System. This alternative would establish two new ACECs, including a total of approximately 12,000 acres, less than half the new ACEC acres proposed under the other action alternatives (Alternatives B and C). Based on these criteria, individuals and groups who give high priority to resource protection would be less likely to favor this alternative than the other action alternatives.

Estimated average annual timber harvest would be higher under this alternative than under any of the other alternatives (Table 4-39). Oil and gas leasing constraints would be less restrictive than Alternatives A and B, and much less restrictive than Alternative C. Alternative D emphasizes motorized recreation opportunities more

than the other alternatives. Based on these criteria, individuals and groups who give high priority to resource use would likely favor this alternative.

TRIBAL TREATY RIGHTS

Effects Common to All Alternatives

BLM will manage vegetation to fall within the historic range of variability, with diverse plant communities that contain healthy populations of a variety of native species. Enhancement of wildlife habitat and native plant communities provides increases in opportunity for tribal members to exercise tribal treaty rights such as hunting, fishing, and gathering on public lands. New road construction would not occur in association with travel plan alternatives with the exception of a small number of short routes to provide loop opportunities under Alternative D.

CUMULATIVE EFFECTS

This section is divided into two main parts. The first part describes the past, present, and reasonably foreseeable future actions on lands within the Planning Area, organized by management activities associated with the most pertinent particular resources or resource uses. Activities described under one resource or resource use heading could affect other resources or resource uses in the Planning Area. The second part of this section describes cumulative effects on resources and resource uses.

The cumulative effects analysis area for this RMP consists of the approximately 7.2 million acre Planning Area. BLM lands are generally widely scattered throughout the Planning Area and therefore tend to have a relatively small contribution to cumulative effects of all activities taking place within the Planning Area. Major approximate land ownership acreages within the Planning Area consist of the following: 3.5 million acres of private lands; 2.8 million acres of National Forest (USFS) lands; 320,000 acres of state-owned land; 307,309 acres of BLM lands (Decision Area lands); 150,000 acres of National Park Service lands; 15,000 acres of local government lands; and 11,000 acres of Bureau of Reclamation lands. BLM lands make up approximately four percent of all lands in the Planning Area. The wide distribution of BLM lands within the Planning Area make it necessary to establish such a large analysis area in order to encompass Decision Area lands addressed in this document.

PAST, PRESENT AND REASONABLY FORESEEABLE ACTIONS

The following discussion characterizes past, present and reasonably foreseeable future actions considered in the cumulative effects analysis. More detail on these activities can be found in the administrative record.

Activities outside of BLM jurisdiction considered in the cumulative effects analysis are included. Some activities identified under a particular resource or resource use heading may affect more than one resource. For example, activities listed under Soil Resources may affect water quality. Effects are discussed in the second main part of this section. It should be noted that acreage figures are approximate based on GIS layers from multiple sources that are subject to varying degrees of error.

Soil Resources

Approximately 8,000 acres of land near Helena (Fort Harrison) in the Planning Area are managed by the National Guard. Some activities include military maneuvers, non-live fire training, and off-road use of military vehicles. Some soil compaction will likely occur with these activities.

Acquisition of the Iron Mask property would place approximately 5,565 acres of range and mountainous land under more stringent resource protection standards through the implementation of Land Health Standards than are currently in place on these private lands. In addition, the acquisition would protect the area from future development.

Expansion of the Indian Creek Mine could increase the disturbance area within the Limestone Hills Training Area from the present size of about 300 acres.

Construction and use of a 75-acre area for a new qualifying training range proposed for the Limestone Hills Training Area could result in short-term episodes of accelerated erosion during road construction and clearance for facilities. In addition, the range would be located within a grazing area and could occur on productive soils. This potential future action would result in the loss of some soil productivity and short term accelerated erosion.

The proposed Limestone Hills Training Area withdrawal of the Limestone Hills Training Area could result in a transfer of natural resource and resource use management from BLM to the Montana Army National Guard on approximately 20,000 acres of federal land. Because the Montana Army National Guard is required to manage land in accordance with requirements similar to those implemented by BLM, no different impact on soil resources is expected from this reasonably foreseeable action.

Water Resources

Canyon Ferry Reservoir and Dam on the Missouri River would continue to be operated to provide flood control, power generation, irrigation, municipal water and to stabilize downstream flows.

PPL of Montana manages water flows through Hauser, and Holter Lake dams. Hauser and Holter Lakes are managed as full-pool, run-of-river reservoirs. Flows within and through these three reservoirs are managed to

optimize energy production; provide for water right uses; and maintain appropriate conditions for fisheries, wildlife and recreation.

Since 1997, the Butte Field Office has reclaimed the Alta Mine, Comet Mine/High Ore Creek, Redwing/Waldy Mines, Gregory Mine, Bertha Mine, Park Mine/Upper Indian Creek, Wicks Smelter, Wicks Manganese, and Lower Indian Creek Dredge Piles to address water quality.

Beginning in 1997, BLM began cleanup of abandoned mines under the Abandoned Mine Lands (AML) program. To date, 14 mines have been reclaimed covering approximately 81 acres, 7 repositories were constructed, and 5 mines are planned for reclamation in the next 5 to 10 years including the Belle Lode (Wickes Manganese), Indian Creek Dredge Piles, Great Divide, Iron Mask and Hard Cash.

Irrigation of privately owned lands will continue.

Vegetation

The Vegetation Management EIS (Draft EIS, November 2005) covering 17 western states, including Montana, expanded herbicide use and allows for use of new herbicides to improve BLM's ability to control hazardous fuels and unwanted vegetation.

Vegetation disturbances likely occur from National Guard training activities. The Guard inventories, maps, and treats noxious weeds on their lands. In the past wildland fires have occasionally initiated there as a result of training exercises.

There are approximately 3.5 million acres of private lands within the Planning Area. Vegetation management will likely include loss of vegetation from road construction and residential development, effects of continued livestock grazing, forest fuels reduction in urban interface areas and timber harvest for commercial uses.

Vegetation management will continue on National Forest System lands (outside some special designation areas) including noxious weed treatment and control, livestock grazing, road construction/management, forest products removal, timber salvage, fuel reduction and wildland fire suppression. Effects would likely be most pronounced on 2.1 million acres, but less pronounced on the approximately 700,000 acres of wilderness on National Forest lands in the Planning Area.

Wildlife

Past, present, and reasonably foreseeable actions focused on wildlife and wildlife habitat on BLM lands include: establishment of a multi-party vision for vegetation conditions in the Elkhorn Mountains Cooperative Management Area to benefit wildlife, primarily big game; reintroduction of bighorn sheep into historically occupied habitat in several locations including Crow Creek and Indian Creek areas in the Elkhorn Mountains, the

Sleeping Giant area, and the Camp Creek/Soap Gulch area in the Highland Mountains; restoration of approximately 1,000 acres of bighorn sheep habitat through vegetative treatments in the Shep's Ridge area (6 miles west of Townsend); and vegetative treatments to improve approximately 700 acres of habitat in the Toll Mountain area to provide a desirable mosaic of vegetative conditions for local wildlife species.

The Canyon Ferry reservoir supports white-tailed and mule deer, antelope, elk, moose, grouse, ducks, geese, pheasants, numerous song birds, beavers, mink, bald eagles, osprey and other raptors. Approximately 11,500 acres of Bureau of Reclamation lands surrounding Canyon Ferry will continue to be managed to enhance wildlife.

Approximately 170,000 acres in the Planning Area are managed by MFWP as wildlife management areas.

Approximately 2.1 million acres of National Forest lands are managed for multiple use including maintenance and improvement of wildlife habitat through projects such as noxious weed reduction, removal of conifer encroachment in grasslands and shrublands, conifer thinning, road closures, and aspen and riparian restoration. An additional approximately 700,000 acres of National Forest lands are in wilderness where wildlife remains relatively undisturbed by human activity.

An additional approximately 150,000 acres in the Planning Area are within the boundary of Yellowstone National Park and are managed for natural values including wildlife.

Fish

Fish populations are subject to recreational fishing throughout the Planning Area. Rivers that provide high quality opportunities include the Big Hole River, Missouri, Jefferson, and Madison. Within the Decision Area, Hauser and Holter Lakes as well as Canyon Ferry provide sport fisheries. Most sport fisheries are for non-native fish species such as rainbow trout, brown trout, brook trout, walleye, and yellow perch.

Approximately 11,500 acres of Bureau of Reclamation lands surrounding Canyon Ferry will continue to be managed to enhance fish. The Canyon Ferry reservoir supports a wide variety of sport fish, including rainbow and brown trout, perch, and walleye.

There is one fish hatchery in the Planning Area, located in Anaconda and operated by Montana Department of Fish, Wildlife, and Parks. This hatchery focuses on propagating westslope cutthroat trout for stocking into local lakes, ponds, and waterways to provide sportfishing opportunities. This hatchery may also provide westslope cutthroat trout for restorative re-introduction projects.

Special Status Species

Federal and state land management agencies will continue to protect habitat for listed species as required by law. Protection for sensitive species will continue on most federal and state lands. No specific requirements for the protection of sensitive species exist on privately owned lands. Some species listed as Threatened on the Endangered Species List could be removed from the list, and others may be added.

One of the most impactful human activities affecting special status fish populations has been the historic stocking of non-native fish. Throughout the Planning Area non-native fish have either outcompeted or hybridized with native fish such as westslope cutthroat trout, Yellowstone cutthroat trout, bull trout, and to some extent Arctic grayling. The result has been broad-scale displacement of native fish species from their historically occupied habitat.

Recent projects on BLM lands to improve habitat for special status fish species include the following: pool creation in LaMarche Creek, tributary to the Big Hole River, to benefit Arctic grayling; and watershed restoration including road decommissioning and instream wood placements in Nursery Creek, tributary to Muskrat Creek in the Elkhorn Mountains, to benefit westslope cutthroat trout.

BLM has continued to be a funding partner in re-establishing the genetically pure westslope cutthroat trout population in Muskrat Creek from approximately 1997 to the present. This project has entailed removal of non-native brook trout and establishment of a barrier to prevent brook trout immigration at the downstream end of approximately 5.3 miles of habitat now occupied solely by westslope cutthroat trout.

Wildland Fire Management

Treatments

Fuel reduction and fire management actions that have occurred recently include prescribed fire (472 acres) and mechanical treatments (141 acres) in the Big Hole Watershed since 1997.

Planned projects in the Big Hole watershed include prescribed fire on 3,159 to 4,159 acres with prescribed fire and approximately 3,087 to 7,087 acres of mechanical treatment.

BLM has treated approximately 2,332 acres of forest and non-forest ground with prescribed fire, and approximately 2,339 acres of the same using mechanical methods since 1997 in the Jefferson River watershed.

In the Missouri River watershed, BLM has treated approximately 4,965 acres with prescribed fire and 2,284 acres with mechanical methods since 1997. Currently three projects are planned with prescribed fire on a total of approximately 314 acres, and mechanical treatment is

planned on approximately 8,500 acres could occur in these areas over approximately the next decade.

In the Yellowstone River watershed, BLM has treated approximately 40 acres with prescribed fire and currently, no mechanical or prescribed fire treatments are planned.

Wildland fire suppression and management will continue on most lands within the Planning Area, including state, private, Bureau of Recreation, BLM, and National Forest Lands. Counties within the Planning Area have generally developed plans to identify where fuels treatments are needed to protect communities. Federally managed lands generally have a plan in place that allows some areas to burn where conditions would result in beneficial vegetation changes as a result of naturally occurring wildland fires.

Vegetation management on privately owned lands and National Forest System lands will likely include forest fuels reduction in urban interface areas.

Wildland Fire

The Butte Field Office has record of approximately 200 wildland fire starts in the Planning Area from 1981 to 2004, 93 of which were lightning caused, and 107 of which were human-caused wildfires. The total acres were approximately 20,257.8 acres from human-caused wildland fire and 435.8 acres of lightning caused wildland fire. Wildland fire will continue to occur in the Planning Area. The numbers of recorded fire starts and acres affected may increase in rate in the future because past fire statistics underestimated past fire history and hazardous fuels buildup has made fires harder to control.

In the past wildland fires have occasionally initiated from National Guard training exercises.

Across the Planning Area, wildland fires will continue to be ignited from lightning and human activities (mostly accidental). In most cases, these fires will continue to be suppressed to protect health, safety, property, and natural resources. Some may be allowed to burn where a plan is in place and results would be beneficial.

Forestry and Woodland Products

Table 4-43 characterizes the forest products removed from BLM lands prior to and after 1996. For the same period of time, this amounts to less than 20 percent of the total product volume removed from BLM lands in Montana and less than 0.1 percent from all timber lands in Montana for the same period (USFS Region 1, 2005). Out of a total timber harvest of 6,994 MMBF in Montana during that period, private lands harvested approximately 70 percent, state lands under DNRC administration harvested 5 percent and the National Forests harvested 19 percent.

Removal of forest products will continue mainly from privately owned lands in the Planning Area as well as

from State Lands managed by DNRC and the non-wilderness National Forest System lands, including timber salvage.

Livestock Grazing

In the past, livestock grazing has been permitted on approximately 90 percent of Butte Field Office lands, or 273,000 acres. On average, 70 to 75 percent of allowable AUMS (25,677 Active preference) have been activated each year—roughly 18,000 to 19,000 AUMS.

Livestock grazing and vegetation management to facilitate availability of livestock forage will continue on privately owned lands. The extent of livestock grazing on private lands will likely decrease over the next 20 years due to continuing subdivision and residential development of existing ranches.

Other past and future grazing related activities include development of livestock water wells, new spring developments, new fence construction, and fence removal.

Livestock grazing will continue on National Forest lands throughout the Planning Area. This will likely focus mostly on the 2.1 million acres available for multiple use. Some livestock grazing may occur in the 700,000 acres of wilderness areas on National Forest System lands but relatively little commodity production would occur here.

Energy and Minerals

Leasable Minerals

There are currently 34 suspended lease nominations within the Planning Area covering approximately 41,611 acres. These parcels will be offered for lease when this RMP is finalized. In addition there are seven lease nominations covering approximately 4,892 acres under review by BLM staff as of July 2006. In June 2006, nine leases were issued by the BLM for lands within Broadwater and Gallatin counties for mineral estate under BLM jurisdiction. These leases cover approximately 7,583 acres. Activity is anticipated to take place from 2006 through 2016. If fluid minerals are discovered then activity would expand and occur over a much longer time period.

It is estimated that a total of 31 conventional oil and gas wells could be drilled, most likely within the five areas with the most potential over 15-20 years. Nineteen of these wells would be exploratory, with six of them being producers. The RFD assumes that there would be two additional step-out wells developed for each of the six producers, resulting in a total of 18 producing wells overall. The RFD also assumes that seven of these producing wells would be on federal mineral estate with the remainder being non-federal. As many as 40 wells might be drilled for coal bed natural gas, most likely near Bozeman Pass. None of this activity is forecast to take place on federal mineral estate. (A further description of the RFD scenario can be found in **Appendix M – Fluid Minerals**). Each well would consist of a well pad, mud pit, and staging complex, generally totaling less than 5 acres per site with associated access roads if needed.

In addition to BLM activity, there are currently 68 suspended oil and gas leases on the Gallatin National Forest that cannot be developed until the Forest Service, with assistance from the BLM, completes an EIS that examines the effects of leasing and development of these leases.

Canyon Ferry Reservoir and Dam on the Missouri River would continue to be operated to provide power generation. Water flow through Hauser and Holter Lake dams will continue to be managed to optimize energy production.

Locatable Minerals

Larger-scale mining operations are listed in **Table 4-44**.

The Butte Field Office routinely permits a number of small scale placer mining operations. These take place in various locations throughout the field office and collectively occupy up to 30 acres of BLM land at any one time. Small-scale placer mining has taken place since before the previous RMP was written and will continue into the foreseeable future.

At any given time there are a number of precious and/or base metal exploration projects taking place at various locations throughout the field office. These may occupy up to 30 acres of BLM land at any one time.

Salable Minerals

Forest Product	1984 – 1995	1996 – 2004
Sawtimber (MMBF)	2,951	6,444
Christmas Trees and Boughs (# of trees/lbs. of boughs)	6,633/500	4,013/1,500
Post and Pole Sales (CCF)	253	50
Public Use Products (# permits)	No data	352
Firewood (cords)	1,082	694
Trespass (MMBF)	0.4	0.4

**Table 4-44
Present and Foreseeable Mining Activity**

Name	Description	Location	Approximate Size	Anticipated Operation Timeframe
	rock quarry railroad ballast and other durable crushed rock	T2N, R5W, Section 20	55-acre	1992 - 2010
Golden Sunlight Mine	gold and silver open pit mine	T2N, R3-4W,	2,500 acres with approximately 600 acres on BLM	1992 - 2010
Montana Tunnels Mine	lead and zinc with associated gold and silver from an open pit mine	T7N, R4W, various sections	1,500 acres with 130 acres on BLM.	1986 - 2008
Graymont Western U.S.	limestone to produce lime and hydrated lime	T7N, R1E, various sections	600 acres on BLM	1981 - 2060
Bald Butte Mine	molybdenum	T11N, R6W, section 10	Currently less than 5 acres, likely to expand to a total of 30 acres with 5 acres of BLM	2006 - 2015

The Butte Field Office routinely permits a number of mineral material sales, the majority of which are sand and gravel for county or state use. These take place in various locations throughout the field office and collectively occupy up to 30 acres of BLM land at any one time. These sales have been important sources for construction material in the past and will continue into the foreseeable future.

Mineral Developments on Private Land

On private land, Holcim currently mines limestone north of the town of Three Forks (T2N, R3E, various sections). This mine is approximately 300 acres, none of which occurs on BLM lands.

Ash Grove Cement company mines limestone west of Montana City (T9N, R3W, various sections) on approximately 100 acres. None of this occurs on BLM lands.

Activity began in 1980 and is anticipated to continue until approximately 2060.

The Butte Mine operated by Washington Group is currently mining molybdenum, copper and associated precious metal by-products from the open pit mine in Butte. This activity occurs in uptown Butte over an extensive area of several thousand acres. Mining activity has occurred here since 1870 and will likely continue well into the foreseeable future. None of this ongoing activity is on public land.

Recreation

Past, present, and reasonably foreseeable actions include ROS designations; improvement of recreation sites at White Sandy, Holter Dam, Holter Lake day-use facilities, French Bar, and Spokane Bay; 15 to 20 special use permits annually for a variety of events; VRM classification; and continued management of 49 recreation sites on BLM lands.

Canyon Ferry will continue to be managed to enhance recreation. There are approximately 24 recreation sites

around the reservoir, 12 of which are managed for camping. In addition there are three boat marinas that are managed as private concessions.

Lands owned by local governments in the Planning Area would continue to be managed as parks to provide public recreation opportunities.

On National Forest Lands, Recreation Opportunity Spectrum classifications would continue to be used to manage for a variety of recreation opportunities, including road access and degree of development.

The BLM will continue to participate fully in the coordinated management of the Missouri River through the Missouri River Comprehensive Recreation Plan.

Motorized and non-motorized recreation and developed and undeveloped recreation will continue on state and federal lands.

Travel Management and Access

Past, present and reasonably foreseeable future actions for Travel management and access are discussed in the "Environmental Consequences of Five Site-Specific Travel Plans" section.

Lands and Realty

Land Use Authorizations

The Butte Field Office administers approximately 554 rights-of-way, which encumber over 40,837 acres of BLM land including: water pipelines, communication sites, ditches, railroads, material sites, fiber optic lines and a Montana Army National Guard training site. Road rights-of-way are the most common type of grant, accounting for 53 percent, or over half of the total. Approximately 10 to 15 right-of-way actions are processed annually.

Twenty communication site rights-of-way on seven different locations are authorized within the Planning Area.

The Butte Field Office administers seven FLPMA Section 302 leases involving about 910 acres of BLM land (BLM 2004i): 904.91 acres to the Great Divide Ski Area and six occupancy leases for a total of 5.3 acres. There are no permits or easements under Section 302 of FLPMA or airport leases located within the DA. One R&PP lease has been issued under Section 212 of FLPMA to the Last Chance Handgunners involving 39.1 acres (USDI-BLM 2004i). R&PP patent transfers are discussed below under the section Land Ownership Adjustment.

Approximately 20,000 acres in the Limestone Hills west of Townsend, is under a right-of-way grant held by the Montana Army National Guard for military training purposes (BLM 1984c).

Wind Hunter LLC has submitted an application for a Wind Energy Site Testing and Monitoring Facility near Whitehall Montana.

Land Ownership Adjustments

Seven land acquisitions were completed using Land and Water Conservation Fund (LWCF) appropriations: one in the Devil’s Elbow area, two associated with Crimson Bluffs, portions of the Iron Mask Ranch, McMaster Ranch, and a small portion of the Ward Ranch. The Causeway Land Exchange is currently pending. Eight parcels of land were donated to the United States, through BLM: one in the Sleeping Giant area, two on Holter Lake, two on the Ward Ranch, two at Iron Mask, and one at White Sandy. Three land sales were completed, one southeast of Mount Helena, one near Montana City, and one east of Holter Lake.

The Butte Field Office completed five Recreation and Public Purposes (R&PP) patent transfers since approval of the Headwaters RMP. These are: 34.09 acres to the MFWP for a recreation site; 40 acres to Lewis and Clark County for a sewage treatment area; 71.62 acres to Jefferson County for a warehouse and storage area; 400 acres to Broadwater County for a shooting range; and 622.38 acres to MFWP for expansion of the Beartooth State Wildlife Management Area.

Table 4-45 lists land ownership adjustment actions for the Planning Area since the approval of the Headwaters RMP in 1984. Note that acreage values are approximate.

Access

Since 1984, 40 permanent exclusive easements were acquired for legal access to BLM land. Six permanent non-exclusive easements were acquired. Eleven temporary easements, encroachment permits/easements or permanent easements for specific projects such as fences, livestock or water pipelines and troughs were acquired.

Special Designations

Nearly 700,000 acres of National Forest are designated wilderness lands managed to protect natural values and provide non-motorized recreation experiences.

The Forest Service is the lead managing agency for the Continental Divide National Scenic Trail and is currently in the process of reconstructing and upgrading numerous segments of this trail system. The National Park Service is the lead managing agency for the Lewis and Clark National Historic Trail.

Social and Economic

No cumulative impacts were identified for Environmental Justice.

Social Conditions

Under all the RMP alternatives, public access and recreational opportunities have the greatest potential to affect social conditions. As such, Alternative C, being the most restrictive on public access for firewood and other product gathering as well as motorized recreational access, would have the greatest cumulative effects. Other federal land management agencies in the Planning Area are following a trend of reducing motorized access. Alternatives B and D also reduce motorized access and would have some cumulative effects as described above, but not to the same degree. Alternative A maintains current access. Since BLM manages only 4.2 percent of the access in the Planning Area, the extent of cumulative

Type of Action	Number of Actions	Acres Disposed	Acres Acquired
Public Sales	3	10	-
Purchases	4	None	140
LWCF Purchases	9	None	8,987
Donations	7	None	2,352
R&PP Patent transfers	5	1,168	-
Land Exchanges	13	23,290	18,895
Total Acres		24,468	30,374

effects is not great. However, federal and state public lands are used more extensively than other lands for these purposes.

Economic

Outputs compared to the overall output in the Planning Area are relatively minor and cumulative impacts from BLM resource management would likely not be noticeable.

The differences in timber production between the alternatives would amount to less than five percent of the annual timber volume removed from the Planning Area.

Reduced AUMs in Alternatives B and C would place additional grazing pressure on private lands and/or increase the demand for hay or other forage alternatives. Expanding recreational demand across all alternatives could increase opportunities for private sector business growth.

While some BLM actions may affect individuals or businesses in a few communities, none of the alternatives would cause more than one percent change in local employment or labor income over the Planning Area.

Public Health and Safety

Under all alternatives, BLM actions to reclaim abandoned mine lands should contribute to a cumulative beneficial effect to public safety by reducing the numbers of hazardous mine openings and improving water quality in areas where projects occur.

Tribal Rights

Cumulative impacts on cultural resources may occur through incremental resource degradation. Decreases in resource conditions such as water quality, riparian habitat, wildlife forage, native plant communities, or land

tenure and access could affect cultural, traditional, and other tribal treaty rights important to Native Americans. If resources were to become scarce on BLM lands or other adjacent federal lands, there could be increased competition between tribal members and non- members for these resources.

CUMULATIVE EFFECTS ON RESOURCES

Cumulative effects discussions below are general due to the general lack of site-specificity of proposed management actions in RMP alternatives. At the activity plan or project level, site-specific NEPA analyses would be completed for proposed management actions. Finer scale cumulative effects analysis would occur within these finer scale NEPA documents and would more specifically analyze and describe cumulative effects to pertinent resources and resource uses.

Cumulative effects on resources or resource uses may result from any of the alternatives considered. For many resources (air, soil, special status species, cultural and paleontological resources, energy and minerals, transportation facilities, lands and realty, special designations), and tribal rights) management actions in each alternative are similar enough that the cumulative effects would be the same. Cumulative effects for those resources are discussed below, but not by alternative. For other resources (water, vegetation, wildlife, fish, wildland fire management, visual quality, forestry and woodland products, recreation, transportation, and access, and social and economic conditions) management actions would result in differing direct and indirect effects and therefore, their potential cumulative effects may vary. Cumulative effects on those resources are broken out by alternative.

Watershed	Total Acres in Watershed	BLM Managed Acres In Watershed	Percent of Watershed Managed by BLM
Blackfoot	126,749	932	0.7%
Big Hole	406,542	58,983	14.5%
Boulder	485,996	40,341	8.3%
Gallatin	1,023,095	872	0.1%
Jefferson	465,188	40,748	8.8%
Shields	514,509	223	0.0%
Upper Missouri	1,894,597	153,103	8.1%
Upper Clark Fork	520,950	649	0.1%
Upper Yellowstone	994,054	8,010	0.8%
Scattered*	760,669	3,449	0.5%
Total	7,192,349	307,309	4.2%

*These acres occur within the counties that make up the Planning Area, but not in any of the major watersheds listed.

An important component of the cumulative effects analysis is the degree of influence that management actions taken by the BLM would have when added to actions taken by other land owners or management agencies. Because of the distribution of public lands managed by BLM in any particular watershed, BLM's actions would have limited impacts on the ecosystem and human environment. **Table 4-46** demonstrates the percent of each watershed managed by BLM. As shown, over the extent of the Planning Area, BLM manages slightly more than four percent of the land base.

AIR QUALITY

Smoke from prescribed or wildland fires burning on state, federal, and private land could cause air quality to deteriorate in local airsheds. Large wildland fires or escaped prescribed fires could occur simultaneously, resulting in an increase in air quality degradation caused by separate events. Dust generation from unpaved federal, state, and county roads would add to the particulates contributed by smoke.

Additional adverse effects to air quality due to airborne dust and greenhouse gas (GHG) emissions would occur from a variety of activities in the Planning Area such as vehicle emissions, residential and industrial developments on non-BLM lands, agricultural uses, energy development, and energy consumption in day to day human life activities. Contributions of BLM activities to greenhouse gas emissions would be relatively low in the context of other activities on non-BLM lands due to the dominance of non-BLM lands and the presence of many human communities within the Planning Area. On BLM-administered lands, greenhouse gas emissions would originate from implementation of BLM projects, permitted public recreation and use of roads/trails, permitted livestock grazing, and potential oil and gas exploration and development.

While oil and gas development potential is low overall on BLM mineral estate lands, the RFD predicts up to 7 producing federal conventional gas wells. This represents a small proportion of the total of up to 18 producing conventional oil and gas wells, and up to 30 producing coalbed natural gas wells forecast in the RFD Planning Area-wide. The wells on federal mineral estate would constitute approximately 0.1 percent of projected state-wide oil and gas development. Greenhouse gas emissions from this activity would be minor at both the Planning Area-wide and state-wide scales. While there are potential emissions of GHGs from the RFD for oil and gas development in this RMP, these effects may not actually occur. The Butte Field Office would permit the development in the RFD, but this office has not received an Application for a Permit to Drill (APD) on any of its federal mineral estate lands in over 20 years.

While some BLM activities would emit GHGs, carbon sequestration would also occur on BLM lands as vegetation takes in and uses carbon dioxide. Vegetation treat-

ment activities may promote increased carbon sequestration in the long-term. It is unknown whether BLM lands and activities would be a net source or sink of GHGs under the various RMP alternatives.

SOIL RESOURCES

All identified reasonably foreseeable activities across all land ownerships in the Planning Area would contribute to soil disturbance, erosion, and compaction. At the scale of the 7.2 million acre Planning Area, the extent of effects from BLM activities would be relatively minor.

Within the RMP alternatives, livestock grazing, vegetation treatments, roads management, and mining activities have the greatest potential to contribute to cumulative effects to soils on BLM lands. Alternatives A and D would likely contribute the greatest to cumulative effects to soils. Alternative B would contribute less than either Alternative A or D, but more than Alternative C.

WATER RESOURCES

Under all alternatives, water quality on BLM managed lands should improve, over the long-term, through the management actions proposed in these alternatives. The most important actions are improving riparian conditions through the use of the Riparian Land Health Standard and vegetative restoration, road closures and reclamation, abandoned mine land reclamation, and reducing the risk of high severity fire.

While ground disturbing activities on adjacent ownerships would continue to affect BLM managed lands, there should not be substantial increases in adverse effects over the current levels. Part of the reason for this is that there are now several watershed groups in the area that have been formed to improve water quality at the watershed scale. This is a ground based effort that includes local landowners, conservation districts, environmental groups, local governments, state government, and other federal governments. The efforts of these groups should improve overall water quality throughout the Planning Area.

Another factor that should lead to improved water quality is the anticipated completion of several "Total Maximum Daily Loads" (TMDL). The Lake Helena TMDL has already been completed and water quality restoration work is already being planned (road rehabilitation). TMDLs for the rest of the Planning Area are scheduled for completion by 2012. The BLM would also work with Montana Department of Environmental Quality to ensure that contaminants affecting BLM resources are addressed, regardless of ownership (as noted in our 2002 Memorandum of Understanding).

Given the expected long-term improvements on both BLM and non-BLM managed lands, there should be an overall cumulative improvement of water quality under all alternatives. Potential impacts resulting from additional decreases in stream flow should be negligible

since most basins in the Planning Area are closed to additional appropriation.

Of the alternatives, B and C would tend to minimize cumulative effects to water quality associated with erosion and sedimentation because they provide for Riparian Management Zones that would be more protective of water resources than the standard Streamside Management Zones provided for under Alternatives B and D. These alternatives also have the greatest potential for water quality improvement due to road related restoration and reduced grazing impacts.

It is expected that coalbed natural gas would be developed in the Butte Field Office on non-federal lands. These wells would likely be injected with a combination of sand and chemicals to allow the gas to flow to the surface. The fluids can migrate along the coal seam and contaminate groundwater and streams (Pembina 2007). After completion, water produced during coalbed methane operations may have high levels of salinity that may seep into the groundwater or be directly discharged into stream channels (Davis et al. 2006). The production of water from coalbed methane developments can significantly drawdown aquifers and reduce important ground and surface water. This could reduce the flow in rivers and streams adjacent to the wells. In this case, based on projected well depths, it is assumed that produced water would be reinjected if technically possible and not disposed of on the surface which will mitigate potential impacts.

VEGETATIVE COMMUNITIES

Table 4-47 displays the extent of proposed vegetation treatments on communities on BLM lands within the Planning Area per decade.

Grasslands and Shrublands

Management actions on grasslands and shrublands throughout the Planning Area (e.g., prescribed fire, weed treatments, livestock grazing, mechanical treatments, and reseeded) would affect vegetation composition and structure. Grasslands and shrublands would likely continue to be altered or lost on private lands where residential and urban development occurs. Although proposed vegetation treatments on Decision Area lands would vary by RMP alternative (**Table 4-47**), effects at the Planning Area scale would be minor for all alternatives.

Riparian

Riparian vegetative communities would likely continue to be altered on private lands by residential/urban development, mining, livestock grazing, road construction, timber harvest, wildland fire, and other uses.

On public lands riparian vegetation would continue to be affected primarily by livestock grazing, wildland and prescribed fire, timber harvest, road construction/maintenance, and in some cases mining exploration and development.

Although proposed vegetation treatments to restore riparian vegetative communities on Decision Area lands would vary by RMP alternative (**Table 4-47**), effects at

			Acres and % of Planning Area Treated Per Decade on BLM Lands*			
Vegetation Zone	Acres in Planning Area	% of Acres in Planning Area	Alternative A	Alternative B	Alternative C	Alternative D
Grassland Zone	2,451,212	34	5,250	11,800	2,000	19,050
			0.2%	0.5%	0.1%	0.8%
Shrubland Zone	313,385	4	0	3,650	750	6,800
			0.0%	1.2%	0.2%	2.2%
Dry Forest	1,091,820	15	5,100	14,750	4,800	18,200
			0.5%	1.4%	0.4%	1.7%
Cool Moist Forest	800,387	11	2,400	3,750	550	5,050
			0.3%	0.5%	0.1%	0.6%
Subalpine Fir Zone	1,305,766	18	0	0	0	0
			0.0%	0.0%	0.0%	0.0%
Riparian	171,313	2	30	700	200	1,700
			0.0%	0.4%	0.1%	1.0%
BLM Treatment Totals/ Percent of PA Total Acres			12,780 0.2%	34,650 0.5%	8,300 0.1%	50,800 0.7%

*Based on top range identified in Chapter 2.

the Planning Area scale would be minor for all alternatives.

On Decision Area lands, Alternatives B and C would lessen impacts to riparian vegetation associated with potentially harmful activities and promote vegetative recovery more than Alternatives A and D due to the provision of Riparian Management Zones in Alternatives B and C. This effect would be minor in the context of the Planning Area scale.

Forests and Woodlands

Timber harvest activities would continue on private, state, and federal land throughout the Planning Area. On private lands in urban interface areas there would likely be a focus on removing trees and snags to reduce fuel loading, especially where forest insects or disease have caused substantial tree mortality. Some forest and woodlands on private lands may be converted to residential or urban developments.

Roads built to access forest treatment units on BLM land may lead to timber harvest on adjacent land. Under all RMP alternatives, timber harvest and other vegetation management actions on BLM lands would be geared toward restoring forest health in most cases. This could reduce vegetation density and fuel loads and help prevent wildland fires that could affect non-BLM vegetation resources in the Planning Area.

Although proposed forest vegetation treatments on Decision Area lands would vary by RMP alternative (**Table 4-47**), effects at the Planning Area scale would be minor for all alternatives.

Noxious Weeds

The total acres of noxious weed and non-native invasive species infestations would increase in the Decision Area. Noxious weed infestations would increase on BLM land and on adjacent private, state land and other federal land through natural expansion and with management actions that disturb soils and vegetation and increase motorized traffic. Noxious weeds would also increase with severe wildland fire on BLM and adjacent land. Infestations of noxious weeds and non-native invasive species could displace desirable native plants and increase erosion.

WILDLIFE

Vegetation management and travel management in the RMP alternatives have the most potential to affect wildlife. Many other activities would continue to occur within the Planning Area that can also affect wildlife including timber harvesting, livestock grazing, fire, road construction and use, mining, weed treatment, residential and commercial development, and recreational activities. Low density rural home development is the fastest growing form of land use in the United States since 1950 (Hansen et al. 2005). Many people are choosing to live away from town on small parcels of land or in rural subdivisions. This is currently occurring adjacent to

many communities in the Planning Area including but not limited to; Helena, Butte, Bozeman, Livingston, and Boulder. Land that was traditional used for ranching, forest products, or mining is now being converted to home sites. Although these lands had historic human uses, they also provided quality and/or functioning wildlife habitat. Historically, these areas provided a diversity of habitats that contributed to; big game winter range, travel corridors, habitat for resident and migrating wildlife, as well as foraging, breeding and hiding habitat. For many plant and animal communities, native species richness decreases as housing density increases. Non-native species, however, tend to increase with development (Hansen et al. 2005). Wildlife populations, including carnivores, may be reduced even at very low levels of residential development due to; loss of habitat, an increase in human access (from roads) in areas that previously had low levels of disturbance, and an increase in hunting pressure. Residential development can also lead to an increase in noxious weed infestations that can reduce the quality and quantity of wildlife habitat.

Pets can also have a negative impact to native wildlife. Cats hunt and kill birds and small mammals. Dogs that are allowed to roam can chase, injure, or kill wildlife. This can result in areas becoming unavailable to wildlife.

Other federal and state agencies are generally following a trend of reducing areas where motorized access is allowed in the Planning Area. As shown in Appendix P of the AMS (USDI-BLM 2006c), timber harvest has also declined across the Planning Area in the last 30 years, which reduces human disturbance of wildlife, including roads and road use.

Throughout the Planning Area, regardless of land ownership, roads can impact wildlife in a number of ways. Roads can increase harassment, poaching, collisions with vehicles, and displacement of terrestrial vertebrates, affecting a variety of large mammals such as caribou, bighorn sheep, mountain goat, pronghorn antelope, grizzly bear, and gray wolf. Direct mortality of large mammals on forest roads is usually low, except for those with a home range that straddles a road. Forest roads pose a greater hazard to slow-moving migratory amphibians than to mammals. Nearly all species of reptiles seek roads for cooling and heating. Vehicles may kill considerable numbers to a point of making well-used roads population sinks for some species. Roads can prevent wildlife movement, create disturbance, cause the spread of noxious weeds, and fragment habitats on the landscape. Open roads typically increase the level of recreation within areas adjacent to them. This can result in additional disturbance or displacement of wildlife species within the vicinities of more heavily used open roads.

Timber harvest has declined across the Planning Area over the last 30 years. This reduction in timber harvest activity has resulted in reduced alteration of habitat and

disturbance to wildlife associated with timber harvest operations including road construction and use.

Alternative C reduces the effects on wildlife associated with roads and in some cases disturbance due to other management actions more than the other RMP alternatives and therefore would contribute less to the cumulative effects. Alternative A would contribute the most, followed by Alternative D, then Alternative B. With any RMP alternative, the relative extent of effects at the Planning Area scale is limited by the area of BLM lands where effects could occur, less than five percent of the Planning Area.

Alternative D would, however, be the most active in restoring vegetation to more resemble its historic conditions, which would, in turn benefit most wildlife within the cumulative effects analysis area (Planning Area) in the long-term. Alternative B would have the second greatest long-term benefits to wildlife of all alternatives due to vegetation restoration, followed by Alternatives A and C. Again, the extent of the effects is limited by the acres BLM manages.

Livestock grazing in the Planning Area could reduce the amount of annual residual grass, forbs, and shrub vegetation, and potentially cause changes to productivity. In the Decision Area, the applied utilization and resource management standards would provide for maintenance or improvement of vegetative and soil resource conditions that are consistent with objectives. Deferred and rotational grazing systems used in allotments would vary the time of year each pasture is grazed so plants have the ability to reproduce and recover.

Throughout the Planning Area, continued development of mining operations can affect wildlife by reducing the quality and quantity of habitat available, creating disturbance to wildlife, and releasing contaminants. Effects to wildlife from mining vary by the size and nature of individual operations.

FISH

BLM is responsible for managing lands containing about 239 miles of the 7,638 miles of stream within the Planning Area (3 percent). Consequently, the variation between effects from most activities within the RMP alternatives is likely to be immeasurable within the cumulative effects analysis area. Additionally, activities that occur on other ownerships have a much greater potential to have effects on fisheries at the Planning Area scale than the BLM's RMP alternatives.

The types of activities that can result in cumulative effects to fisheries include, but are not limited to, new proposals and ongoing actions involving:

- Livestock grazing;
- Placer and hard-rock mining;
- Highway construction;
- Construction or maintenance of power transmission corridors;
- Maintenance of irrigation diversions;
- Maintenance of existing communication lines;
- Crop production;
- Herbicide application for weed control;
- Road and highway maintenance;
- General travel management;
- Construction of new or improvement of existing developed recreational sites; or,
- Fisheries and watershed enhancement projects.

Many watersheds in the Decision Area are already in less than optimal condition due at least partly to negative cumulative effects that have occurred from past activities. In some cases, ongoing activities or conditions present from past activities continue to result in localized negative effects on fisheries and aquatic resources.

The effects of roads on aquatic habitat can be widespread. At the landscape scale, roads can influence the frequency, timing, and magnitude of disturbance to aquatic habitat. Increased fine-sediment composition in stream gravel has been linked to decreased fry emergence, decreased juvenile fish densities, loss of winter carrying capacity, and increased predation of fishes, and can reduce benthic organism populations and algal production. Roads can act as barriers to migration, lead to water temperature changes, and alter stream flow regimes. Improper culvert placement at road-stream crossings can limit or eliminate fish passage. Roads greatly increase the frequency of landslides, debris flow, and other mass movement. These effects are currently taking place to varying degrees across all land ownerships in the Planning Area. In some areas where increased residential or urban development occur on private lands, these effects would likely increase in severity.

Within Decision Area lands, Alternative C would have the least contribution to adverse cumulative effects to fisheries resources associated with roads and vegetation treatments combined. Alternative D would have the greatest contribution of all alternatives associated with roads and vegetation treatments combined. Alternative A would have the greatest contribution to cumulative effects associated with roads but a lesser contribution associated with vegetation treatments than Alternative D. Alternative B would have a greater contribution to cumulative effects to fisheries resources associated with roads and vegetation treatments than Alternative C but a lesser contribution than either Alternatives A or D. Although Alternative B proposes more ground-disturbing

vegetation treatments than Alternative A, it also establishes more protective Riparian Management Zones than the Streamside Management Zones provided in Alternatives A and D.

Mineral development has occurred across the region in the past and will continue into the future. The effects from mining in both the Planning and Decision Areas could be loss of habitat due to placer mining and mining in riparian habitat, the introduction of contaminants and effects due to associated development such as roads and facilities. Mining in the Planning Area could result in isolated populations of aquatic species or the decline in species.

Other effects of activities in the Planning Area could include loss of fish habitat or reduction in habitat quality associated with oil and gas related development, prescribed fire or wildland fire, or water diversion and reservoir drawdown.

SPECIAL STATUS SPECIES

Activities on non-federal lands such as timber harvest, livestock grazing, residential development, mining, agriculture, and road construction would negatively influence special status species. Human developments are expected to expand in major valleys, resulting in barriers to movement and displacement or increased mortality of grizzly bear, wolf, and lynx.

Loss of riparian habitat associated with residential and industrial development and agriculture on non-federal land is expected to cause additional loss of habitat for bald eagle.

Roads can cause a wide variety of effects to terrestrial wildlife. Species, such as gray wolf and grizzly bear, are adversely affected by repeated encounters with people. Roads can increase harassment, poaching, collisions with vehicles and displacement of special status wildlife species.

In the context of special status fish species, historic stocking of non-native sport fishes has displaced native fishes (bull trout, westslope cutthroat trout, Yellowstone cutthroat trout, and Arctic grayling to some extent) from the majority of their historic habitat in the Planning Area.

Restoration and maintenance of the Muskrat Creek population of westslope cutthroat trout has beneficial cumulative effects in many places within the Upper Missouri River watershed. Westslope cutthroat trout from Muskrat Creek are currently being used by Montana Fish, Wildlife and Parks as brood stock for re-introduction of this species in several streams within and near the Planning Area. Muskrat Creek fish are also being collected and used in development of a westslope cutthroat trout broodstock that will be used throughout the Upper Missouri River watershed beyond the Planning Area boundaries. The proposed mineral withdrawal of 180 acres of

riparian areas in the Muskrat Creek watershed under Alternatives B and C would protect westslope cutthroat trout habitat in 2.4 miles of stream from direct effects of potential mining activities. This benefit would not take place with either Alternative A or D as these alternatives do not include the proposed withdrawal.

Cumulative effects to special status plant species across all land ownerships in the Planning Area would be habitat loss, destruction of individual plants, habitat conversion to less than marginal habitats, and loss of habitat connectivity and variability.

Noxious weed management may have the greatest potential to affect special status plant species and habitat conditions under all of the alternatives. Ineffective control of noxious weed spread would lead to habitat degradation and loss. Herbicides used to control noxious weeds could have a cumulative and detrimental effect on potential future special status plant species (i.e. species which are not considered imperiled or threatened now, but may be in the future.) Unauthorized herbicide treatments could potentially have detrimental effects on special status plants and habitat.

Activities implemented on non-public lands could detrimentally affect special status plant populations in a manner that contributes to federal listings of special status plants. Although the BLM could not change the way other land owners manage special status plant species, the development of conservation agreements and species management plans with other land managers/owners could potentially reduce these off-site effects to special status plant species. The BLM would consider these effects in the analysis of all proposed management activities that affect special status plant species and their habitats.

Because Alternative A would provide the least protection of special status species, it may contribute to adverse cumulative impacts resulting from activities on adjacent lands, particularly wildland fire, residential development and grazing. Alternatives B, C, and D would improve conditions to varying degrees, but due to the limited extent of BLM's influence on management across the Planning Area, these effects would not likely be measurable or distinguishable at the Planning Area scale, with the exception of the proposed Muskrat Creek mineral withdrawal in Alternatives B and C described above.

WILDLAND FIRE MANAGEMENT

Residential development and population increases could create more Wildland Urban interface areas. Additional interface areas could increase potential ignition sources, the need for fire protection services, and the potential need for fuel treatments. Residential development and population growth could also result in an increase in the numbers of recreational users and create the potential for more human-caused ignitions on public lands. As a

result, an increase in these activities would also add risk to firefighter and public safety.

Compared to the present levels of fuels treatments, there could be an increase of treatment acres over the long-term across federal, state, and private lands. As a result more acres would move toward historic fire regimes and a reduction of fuel loading would occur. Where treatments have been implemented, future fire intensity and severity could be reduced. Urban interface areas would be the highest priority for treatment. This could increase conflicts with visual concerns, smoke emissions, and funding for these projects.

CULTURAL RESOURCES

Cumulative impacts to cultural resources could occur through incremental degradation of the resource base from a variety of sources and all ownerships. Degradation which reduces the interpretive and informational potential of historic and prehistoric properties, or affects the traditional cultural values important to Native Americans impacts cultural resources. Potential impacts could stem from vegetation management, recreation, travel route closures and development, wildland fire, wildland fire suppression, mineral/oil and gas development, increases in human population and vandalism.

Other regional resource, land use and economic development planning could affect the types and intensity of uses on lands within the Planning Area and could potentially affect regional cultural resources, in addition development of lands not protected by federal or state cultural resource statutes and regulations could further decrease the resource base and limit cultural resource management opportunities in the Planning Area. Planning coordination at the regional level could help protect important cultural resource values.

PALEONTOLOGICAL RESOURCES

Cumulative impacts to paleontological resources would be similar to those described in the *Cultural Resources* section.

VISUAL RESOURCES

Activities such as timber harvest, mine development, subdivision and development, road construction or the occurrence of wild and prescribed fire on adjacent lands will continue to impact the visual features of form, line, color, and texture. These changes will influence development of similar projects on BLM lands where visual resource management objectives are a consideration.

Alternative C provides for the least amount of forest products removal, thereby resulting in the least cumulative impacts on visual resources. Alternative D could have the greatest impact on visual resources in the Planning Area due to its highest level of proposed vegetation treatments.

CUMULATIVE EFFECTS ON RESOURCE USES

FORESTRY AND WOODLAND PRODUCTS

Private and state forests and woodlands would tend to be managed for timber products and commodities while federal lands would tend to be managed for forest health and restoration with associated commodity outputs from restorative vegetation treatments.

Additional effects on forested vegetation would occur from stand replacing fires; continued fire suppression necessary as a result of increasing wildland urban interface; intermingled land ownership; and large-scale insect and disease outbreaks that are likely to continue throughout the planning period.

Fuel build-up on adjacent lands could influence the susceptibility of BLM stands to high severity fire events. Insects and diseases present in adjacent forest stand could impact BLM forest. Loss of forest resources due to insects and disease and wildfire events occurring under the current declining forest health and fuel conditions could result in long-term resource impacts and a general reduction in the future availability of forest products from the stands impacted by such events.

On BLM lands Alternative D would provide the most forest products and contribute the most to long-term forest health improvement due to restorative vegetation treatments. Alternative B would provide the next highest contribution to these effects, followed by Alternative A, then Alternative C.

LIVESTOCK GRAZING

Potential cumulative impacts on livestock grazing would occur from a combination of activities and land uses occurring within the Planning Area. Such impacts would result primarily from surface-disturbing activities such as road construction, mining operations, and possibly some vegetation treatments, that reduce the quantity of available forage. These activities result in livestock displacement and direct removal and indirect degradation of forage, regardless of land ownership.

On BLM lands, mine reclamation efforts and some vegetation treatments would increase forage for livestock to a similar degree in all alternatives.

BLM lands would provide less than one percent of the AUMs available in the Planning Area under any of the RMP alternatives. The variability in livestock grazing by RMP alternative would have a negligible effect on livestock grazing at the Planning Area scale.

Sale, subdivision, and residential development of rangeland on private lands will likely increase in the future and reduce the amount of livestock grazing in the Planning Area.

ENERGY AND MINERALS

Leasable Minerals

Oil and gas resources would be removed by producing wells on leases.

Oil and gas development will have the potential to occur on BLM and other lands within the Planning Area. Alternative C would reduce the available mineral estate more than other alternatives for a total of 88 percent.

Alternatives A, B, and D are similar within the extent of the Planning Area and would maintain current development levels. However, under Alternatives B, C, and D the impact to federal leases would be a reduction in lease value resulting from stipulations and regulations. The impacts to lease developments would result from a reduction in wells drilled on leases encumbered with stipulations, an increase in wells drilled on leases with minimal constraints, and an increase in operating costs because of land use decisions, lease stipulations, and regulations.

Restrictions on federal leases could impact the leasing and development of adjacent non-federal leasable minerals. If an exploration company cannot put a block of leases together because of restriction on federal leasable minerals, the private or state minerals may not be leased or developed. Leasing of federal minerals on the other hand, could encourage the leasing of private or state minerals.

Locatable Minerals

Within the Planning Area, all the RMP alternatives would generally have similar impacts on locatable mineral exploration and development. While there are differences in the levels of restrictions between the alternatives, the majority of the lands in all categories of mineral potential, high, moderate, and low, would be open to mineral location. There would be little discernible cumulative effects on locatable minerals associated with the RMP alternatives.

Salable Minerals

The effects on salable minerals would be similar between RMP alternatives, and have a minor contribution to cumulative effects within the Planning Area.

RECREATION

Demands for recreational opportunities and resources will continue to increase with increases in population. Development of private and other state and federal land will decrease the resource base available for recreation putting further pressure on BLM resources.

Potential impacts also include management directed activities such as prescribed fire, thinning, timber harvest, weed control, riparian restoration, wildlife habitat improvement, and other activities which would affect recreational experiences in the short term but provide long-term resource benefits.

Mineral and gas leasing on BLM or adjacent lands may limit recreational opportunities due to area closures, development of facilities, roads, and increased traffic.

Alternatives B and C would provide for greater solitude on BLM lands by reducing road access. However, they also concentrate motorized use which increases impacts on recreation values and facilities.

Recreation management and enhancements along the Missouri River would continue to be coordinated in a comprehensive manner by numerous agencies and the public through a multi-agency MOU and the Missouri River Comprehensive Recreation Management Plan.

TRAVEL MANAGEMENT AND ACCESS

Cumulative effects to travel management and access are discussed in the Cumulative Effects portions of the "Environmental Consequences of Five Site-Specific Travel Plans" section.

TRANSPORTATION FACILITIES

Continued growth in population and demands for recreation facilities is expected. Furthermore, impacts could occur as the result of population growth, changing recreation values and changes in accessibility on other federal state and private lands in the Planning Area. Changes in resource availability (funding) for continued compliance monitoring, weed control, signage and maintenance of roads and trails could affect transportation facilities. Regional coordination of recreation and travel planning could reduce potential impacts on facilities in the Planning Area.

Alternatives B and C provide the least miles of open road and could concentrate recreation and other forest uses; having the greatest effect on existing facilities.

LANDS AND REALTY

Demand for communication facilities, road rights-of-way, and utility corridor rights-of-way and permits for communication sites will increase as population increases and if resources are developed in the area for mineral or power generation. In addition, development of adjacent federal, state, and private land will increase the need for utility and communication equipment and right-of-way development.

CUMULATIVE EFFECTS ON SPECIAL DESIGNATIONS

ACECs

No other agency in the Planning Area has ACECs so there would be no cumulative effects from ACEC designations. Impacts from activities implemented on adjacent land not managed by BLM could create additional cumulative impacts to relevant and important values in an indirect fashion. Lack of noxious weed abatement on adjacent land could impact relevant and important special status plant values, and exercise of water rights could result in impacts to water or wetland-based values. Upstream de-watering actions above Spokane Creek or Humbug Spires would degrade aquatic and riparian habitats as well as fish spawning activities. Adjacent land disturbances to soils and vegetation from development actions could create both short and long-term air quality, soil erosion and visual impacts within potential ACECs. Finally, trespass actions such as grazing, timber harvests, motorized travel, and created routes within the ACECs could cause serious impacts to relevant and important values.

National Trails

Resource management decisions or actions on state, private, and other federal lands have the potential to affect designated National Trails in the Planning Area, particularly since segments of both National Trails are across other agency lands and potential cumulative impacts are difficult to estimate.

Wild and Scenic Rivers

Potential impacts to outstandingly remarkable values from present or future projects or actions on lands within the Decision Area would be considered to be negligible to nonexistent because of the existing protections under current laws, regulations and policies. Water related projects on streams within the Decision Area have had an influence on natural stream flows, but not to the extent to alter their free-flowing nature. However, impacts from activities implemented on adjacent land not managed by BLM could create additional cumulative impacts to outstandingly remarkable values. Should upstream water users fully exercise their water rights during low flow periods, both the quantity and quality of water flows within BLM segments would be degraded. In addition, wetland plant species and fisheries would be impacted. The lack of weed control efforts on proximity lands could impact special status plant species and native vegetation. Poor livestock grazing practices upstream could alter water quality and adversely impact aquatic communities. Finally, additional residential developments or other soil disturbing activities could have detrimental impacts on Wild and Scenic Rivers as well.

Wilderness Study Areas

There are several wilderness areas within the planning area on Forest Service lands. In addition the FS has other areas that are under wilderness review. There are no known legislative bills pending before Congress that affect these areas. The wilderness characteristics of the six existing WSAs will continue to be protected under the Interim Management Policy and Guidelines for Lands under Wilderness Review until Congress acts and therefore impacts to these values are unlikely.

CUMULATIVE EFFECTS ON SOCIAL AND ECONOMIC CONDITIONS

Social and Economic

No cumulative impacts were identified for Environmental Justice.

Social Conditions

Under all the RMP alternatives, public access and recreational opportunities have the greatest potential to affect social conditions. As such, Alternative C, being the most restrictive on public access for firewood and other product gathering as well as motorized recreational access, would have the greatest cumulative effects. Other federal land management agencies in the Planning Area are following a trend of reducing motorized access. Alternatives B and D also reduce motorized access and would have some cumulative effects as described above, but not to the same degree. Alternative A maintains current access.

Economic

BLM's contribution of outputs compared to the overall output in the Planning Area is relatively minor and cumulative impacts from BLM resource management would likely not be noticeable.

The differences in timber production between the alternatives would be less than five percent of the annual timber volume removed from the Planning Area.

Reduced AUMs in Alternatives B and C would place additional grazing pressure on private lands and/or increase the demand for hay or other forage alternatives. Expanding recreational demand across all alternatives could increase opportunities for private sector business growth.

While some BLM actions may affect individuals or businesses in a few communities, none of the alternatives would cause more than one percent change in local employment or labor income over the eight-county planning area.

Public Health and Safety

Under all alternatives, BLM actions to reclaim abandoned mine lands should contribute to a cumulative beneficial effect to public safety by reducing the num-

bers of hazardous mine openings and improving water quality in areas where projects occur.

Tribal Treaty Rights

Cumulative impacts on cultural resources may occur through incremental resource degradation. Decreases in resource conditions such as water quality, riparian habitat, wildlife forage, native plant communities, or land tenure and access could affect cultural, traditional, and other tribal treaty rights important to Native Americans. If resources were to become scarce on BLM lands or other adjacent federal lands, there could be increased competition between tribal members and non- members for these resources.

Ongoing consultation would strengthen the government-to-government relationships between the Butte Field Office and tribal entities associated with the DA. These relationships would help preserve resource availability and access to those resources guaranteed by treaty.

GLOBAL CLIMATE CHANGE (GCC)

The science of assessing “greenhouse gas” (GHG) emissions and their effect on global climate change is in its formative phase; therefore, it is not yet possible to predict with confidence impacts to climate from particular sources of GHG emissions. The lack of scientific tools designed to predict climate change on regional or local scales also limits the ability to quantify potential future impacts. This is due, in large part, to the lack of historical baseline data from which to form definitive conclusions (Easterling et al. 1999), so various predictive models have been formulated to explain GCC. Generally, these models lack the predictive ability to be of use at a site-specific scale to aid in land management practice decision making and can even offer contradictory predictions (Zhang 2003). Efforts are underway by other agencies and educational institutions to improve climatic monitoring with GCC in mind, which may in the future lead to better analytical tools for analyzing and quantifying the effects of land management activities on GCC as well as the effects and trends of GCC on natural resources. Because the tools and necessary level of information are not available to address net effects of climate change quantitatively, impacts in this section are described qualitatively and are “common to all alternatives.”

At the scale of the state of Montana, greenhouse gas (GHG) emissions associated with the Butte RMP would be minimal. Leading sectors emitting GHGs in Montana include electricity (26 percent), agriculture (26 percent), transportation (20 percent), and the fossil fuel industry (11 percent). Most activities associated with GHG emissions that may be authorized consistent with the Butte RMP would fall under transportation (public use of BLM roads), agriculture (livestock grazing), and the fossil fuel industry (fluid mineral leasing). At approx-

imately 307,300 acres, the Decision Area for surface management makes up 0.3 percent of total acres state-wide. The approximately 652,000 acres of federal mineral estate in the Decision Area make up 0.7 percent of state-wide acreage. There are no activities proposed with this RMP that would be disproportionate contributors to GHG emissions beyond other contributing activities in the state. Montana GHG emissions make up 0.6 percent of total gross emissions in the United States (Center for Climate Strategies 2007). However, most BLM acres in the Decision Area are vegetated where carbon sequestration occurs and where proposed vegetation treatments would emit GHGs during implementation, but would tend to foster improved carbon sequestration in the long-term. Net effects of all these activities are unknown.

It is important to note that many of the projected effects associated with global climate change described for specific resources or resource uses would occur at variable rates, mostly over the next several decades to a century. The monitoring approach described in **Appendix N** of this RMP is intended to provide for flexibility to alter management as needed based on site-specific conditions to respond to changes that may occur for particular resources or resource uses. A more specific monitoring plan will be described in the Approved RMP that will be released with the Record of Decision for this plan.

IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES

Irreversible and ir retrievable resource commitments are related to the use of nonrenewable resources and the effects this use could have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Ir retrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., loss of special status species habitat or the disturbance of a cultural resource).

Actions that alter a vegetation community sufficiently enough to change the site potential, or give other species competitive advantage over native species may represent irreversible commitment of resources. Mineral development would result in the loss of vegetation resources, habitat, and wildlife and livestock forage. While reclamation of disturbed areas would reduce the magnitude of these impacts, loss of wildlife habitat could result in altered migration patterns and displacement of local wildlife populations. Ir retrievable losses to visual characteristics near mining sites would occur during development and operation. In addition, ir retrievable loss of forested habitat could result from wildland fire, insects and disease, or harvesting. Most forest habitat loss, while long-term, would eventually regenerate and is therefore not irreversible. Without vegetation treatments,

noxious weeds or invasive species may not be reasonably controlled, potentially resulting in an irreversible change in ecosystem health.

Alternative A, having the most miles of open road, could contribute to irreversible impacts on passive or wilderness experiences if OHV use continues to grow. Cultural resources are by their nature irreplaceable, so the alteration or elimination of any such resource due to management under one of the alternatives, represents an irreversible and irretrievable commitment. There would be no irretrievable or irreversible impacts on recreational resources if management restrictions were implemented effectively. The exact nature and extent of any irreversible and irretrievable commitment of resources cannot be well defined due to uncertainties about location, scale, timing, and rate of implementation, as well as the relationship to other actions and the effectiveness of mitigation measures.

UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts are impacts that remain following the implementation of mitigation measures, or impacts for which there are no mitigation measures.

Some unavoidable adverse impacts would occur as a result of proposed management under one or more of the alternatives.

Vegetative treatments including prescribed fire could cause displacement of wildlife, decreases in quantity and quality of forage, and loss of non-target ecosystem components. Changes in the amount of recreational visitation and patterns of use could result in increased conflicts between users, vandalism, and illegal collection of cultural resources.

Other unavoidable adverse impacts also result from public use within the Planning Area such as development of mineral resources which could create visual intrusions, soil erosion, compaction problems, or loss of vegetation cover. Accidental introduction of exotic plant or animal species could result in harm or loss of populations of native plants or animals. However, proposed restrictions on recreation, livestock operations, and other land use authorizations to protect sensitive resources and other values would lessen the ability of operators, permittees, individuals, and groups to use the public lands and could increase their operating costs. Potential unavoidable adverse impacts could range from short-term to long-term and are difficult to quantify.