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Predecisional Environmental Assessment

Hoback Ranches Community

Sublette County, Wyoming

Pinedale Field Office, U.S. Bureau of Land Management and
Bridger-Teton National Forest, Big Piney Ranger District, U.S. Forest Service

United States
Department of
Agriculture,
Forest Service

For Information Contact:
Bureau of Land Management
Pinedale Field Office
P.O. Box 768
432 East Mill Street
Pinedale, Wyoming 82941

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CHAPTER 1 – INTRODUCTION: PURPOSE AND NEED

The Bureau of Land Management (BLM), Pinedale Field Office and the Bridger-Teton National Forest, Big Piney Ranger District (Forest Service) have prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations, including the Forest Service Environmental Policy and Procedures Handbook (FSH 1909.15) and the BLM National Environmental Policy Act Handbook (H-1790-1). This EA discloses the direct, indirect, and cumulative environmental effects that would result from the Proposed Action and alternatives. Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Pinedale Field Office in Pinedale, Wyoming.

Chapter One contains the purpose of and need for the Proposed Action, including the background of events leading up to the action. Chapter Two describes the issues and the alternatives including the Proposed Action and summarizes the potential environmental consequences of each alternative. Chapter Three, Affected Environment & Environmental Consequences, describes the existing resource conditions and discloses the effects to the environmental resources from the Proposed Action and alternatives. That chapter also contains a list of persons and agencies contacted in the development of the EA. The Reference section contains a list of the materials used to complete the EA. The appendices contain a glossary of silvicultural terms, a list of standards and specifications, site-specific stand data and prescriptions for BLM and Forest Service lands, and the Class I cultural resource inventory.

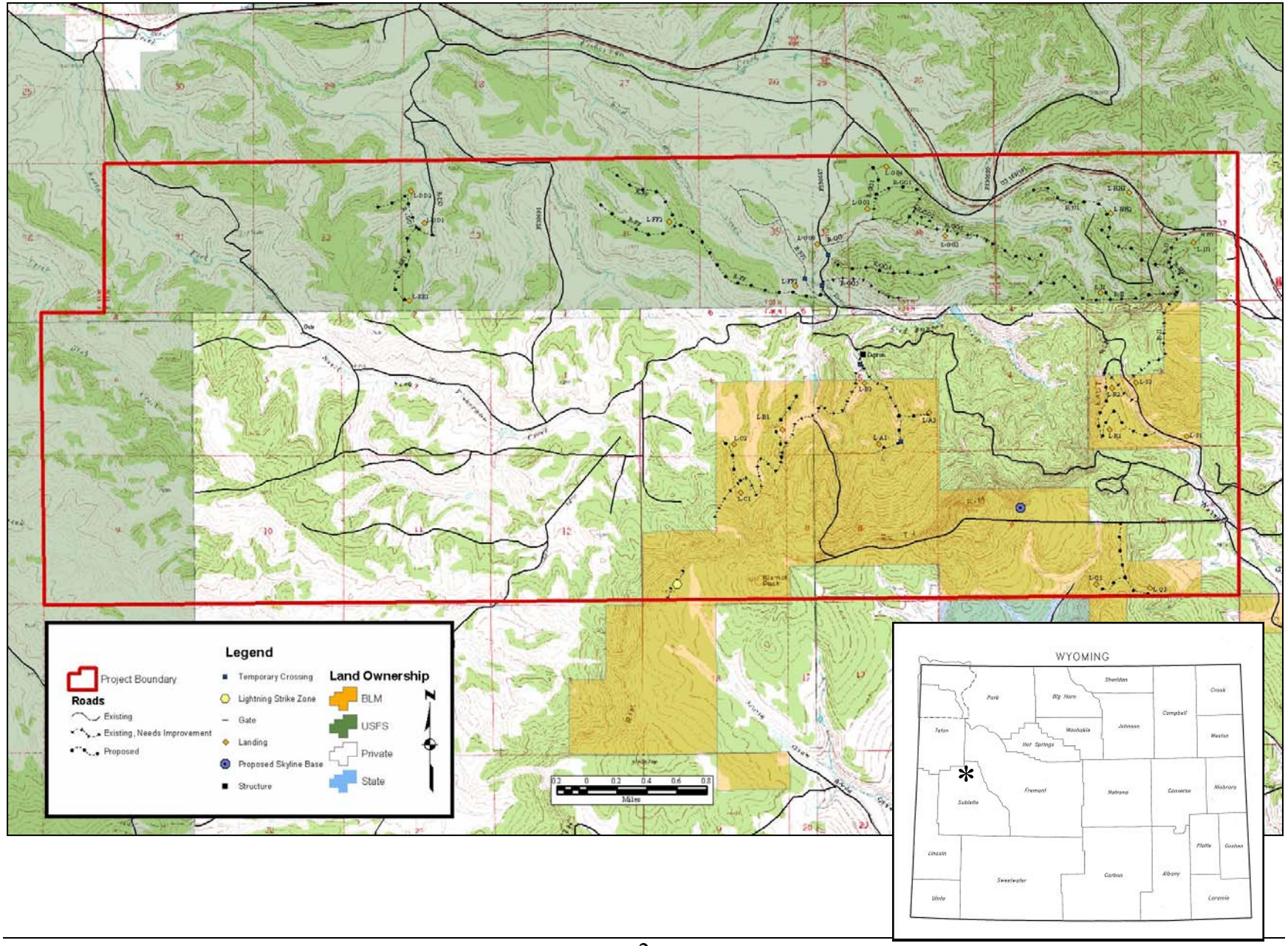
Project Location

The project area is located in the area around the Hoback Ranches community in Sublette County, Wyoming, north of Kismet Peak and Signal Hill, approximately 20.4 miles (32.2 km) north and northwest of Daniel Junction on BLM and Forest Service lands. Hoback Ranches is approximately 35 miles north of Pinedale and 45 miles south of Jackson Hole, Wyoming. The Hoback Ranches development is located to the west and south of State Highway 189/191. Forest Service lands border Hoback Ranches to the north and west, and BLM and private lands border this community on the southern and eastern sides (Figure 1). The project area is 14,710 acres in size and consists of private (6,434 acres), BLM (2,316 acres), and Forest Service (5,960 acres) lands. There are approximately 42.1 miles of existing roads in the project area. The project area is encompassed by the Raspberry Ridge (1967), Pass Peak (1966), Signal Hill (1979), and Kismet Peak (1967) Wyoming quadrangle maps and includes parts of the following: T 36 N, R 112 W, Sections 3,4,5, 6, 7, 8, 9, and 10; T 36 N, R 113 W, Sections 1, 2, 3, 4, 9, 10, 11, and 12; T 37 N, R 111 W, Sections 31 and 32; and T 37 N, R 112 W, Sections 31, 32, 33, 34, 35, and 36.

Background

As a result of rapid population growth in the western United States, homes and new developments are frequently constructed in fire-prone areas, often adjacent to Federal lands. This creates a “wildland-urban interface” (WUI), where structures and other human developments meet or intermingle with undeveloped wildland. Development in these areas has

Figure 1. General Project Location



increased the risk of wildland fire occurring and impacting these structures and communities and has also increased the risk to the general public and firefighters (NFP 2002a).

Following the devastating 2000 fire season, the President of the United States urged Congress to approve additional funds for Federal and State agencies and local communities to better prepare for future wildfire seasons. This planning and preparation culminated in the National Fire Plan (NFP 2001), which recognizes the potential for impacts in WUI areas. Wildland fires in WUI areas are costly and difficult to manage. The structures that may be damaged are important capital investments that need to be protected. Because protecting these areas and the structures in them is complex, they pose a significant risk to firefighters tasked with their suppression. Effective management can reduce the risk to people and property. The Secretaries of the Departments of Agriculture and Interior were directed to increase Federal investments in projects to reduce the risk of wildfire in the WUI. Examples of these projects include hazardous fuels reduction, support to State and rural fire departments, economic action programs, fire prevention activities such as the FIREWISE program, and development of value-added wood utilization and related economic opportunities.

Hoback Ranches was identified as a Community-At-Risk and listed in the Federal Register on August 17, 2001 (66 FR 43384). The risk of wildfire to the Hoback Ranches area, specifically along the WUI, was assessed in 2002 (BLM 2002). During the fuel surveys, vegetation, slope, and land aspect were categorized for the project area. The risk of wildland fire to homes, structures, and cultural resources on private land was also evaluated according to road access, building materials, and the presence of survivable space. The culmination of the assessment resulted in identification of several actions to reduce the hazard of wildfire in the Hoback Ranches area (BLM 2002). The actions identified included the following:

- Reducing fuel loading next to roads and homes within Hoback Ranches.
- Constructing fuel breaks on the borders between Federal land and private lands.
- Improving the Hoback Ranches' main east-west road, Rim Road, in T 36 N, R 112 W, Section 9.
- Securing access, temporary or administrative, to Federal lands in the assessment area and initiating forest health measures combined with fuels treatment on Federal lands in the assessment areas in multiple phases.

Additional items were identified and are listed in the *Wildland-Urban Interface Communities-At-Risk Mitigation Report, Hoback Ranches Assessment Area* (Mitigation Report) (BLM 2002). The focus of this EA is the proposed fuels reduction opportunities on Federal lands and the potential environmental impacts of those actions. This EA identifies issues and resources with the potential to be impacted by implementation of the No Action, Proposed Action, or other action alternatives.

Purpose of & Need for Action

The action proposed by the BLM and Forest Service to meet the purpose and need consists of fuels reduction on public lands around the Hoback Ranches community. The creation of shaded fuel breaks on BLM and Forest Service lands is proposed under all action alternatives. Trees would be widely spaced at the center and grow tighter in spacing toward the edges. All ladder fuels and dead and down material would be removed from the forest floor. Grasses, forbs, and

low-flammability shrubs may also be left to control soil erosion. Certain trees may also be left for aesthetic appeal. In Alternatives Two, Three, and Four, additional BLM and Forest Service lands would also be treated more extensively to address the high fuel load in the area. Selective removal of live, diseased, dead, and other trees would occur to decrease stand density, therein addressing the fuel loading issue, while giving consideration to recreation, viewshed, and wildlife habitat. A full description of the Proposed Action appears in Chapter Two.

The goal of the Proposed Action is to increase the amount of defensible space on Federally-managed lands that are adjacent to the Hoback Ranches community to reduce the hazard of wildland fires spreading from Federally-managed lands to the Hoback Ranches community and from within the community to public lands. The project responds to goals and objectives of the National Fire Plan, the Pinedale Resource Management Plan (RMP) (BLM 1988), and the Bridger-Teton National Forest Land and Resource Management Plan (Forest Plan) (Forest Service 1990).

This action is needed to address findings of the Mitigation Report; specifically that areas of excessive fuels and high fire danger were identified around the community. The wildland fire hazard is very high because of dense forest vegetation that is the result of fire exclusion; the buildup of standing dead, dying, and diseased trees; semi-continuous, heavy, downed, dead, woody material; ladder fuels; canopy spacing; topography in conifer forest stands; and the closeness of fuels to structures (BLM 2002). Wildland fire risk is also increased due to forest health issues, such as infestations of various parasites in the conifers, that result in standing dead, red-needled, or dying trees. High canopy densities, combined with even age conifers and heavy loadings of downed, dead, woody material yield minimal vegetative biodiversity. In combination with the topography of the area, these conditions will enable the propagation of crown fires (BLM 2002). Private land covenants also exist that restrict residents from cutting trees that are greater than 3 inches in diameter. These covenants are contributing to the hazardous conditions that are increasing the risk of wildland fire in the area.

During the preliminary assessment conducted in 2002 several characteristics were rated and the results support the need for the Proposed Action.

- One hundred percent of the sites had heavy continuous fuels, with moderate to heavy downed/dead woody fuel and an abundance of fir sapling ladder fuels.
- One hundred percent of the sites had a fuel bed depth of greater than three feet.
- Seventy-two percent of the structures surveyed, had fuels less than 40 feet from structures, twenty-two percent had fuels within 40 to 100 feet of structures, and the remaining six percent had fuels greater than 100 feet from structures.
- Seventy-seven percent of the sections with structures had a majority of the homes with fire resistant roof and/or siding; however, although most of the structures were roofed with metal or other fire retardant material, all were constructed of log or wooden siding that appeared not to be fire resistant.
- In eighty-seven percent of the sections with structures, between 10 and 50 percent of the homes had survivable space around them.
- The project area has a response time of greater than 40 minutes for emergency services, mainly due to the distance from fire suppression forces, and the narrow, steep roads within the area.

- Roads in the area are somewhat maintained, but in general they are narrow with no shoulders.
- The predominant east/west road, Rim Road, is in need of additional engineering and support, and currently may not be capable of supporting fire-fighting trucks and equipment.

Thinning and removal of excessive fuels, including live overstocked and ladder fuels and dead and down fuels, in addition to rejuvenation of aspen stands (through reductions in conifer encroachment) would reduce the potential intensity of wildland fires, providing a safer environment from which firefighters could undertake suppression actions.

Conformance Statement: Relationship to Statutes, Regulations, or Other Plans

National Fire Plan

Under the auspices of the National Fire Plan, the Forest Service and BLM are developing a cohesive strategy for reducing fuels and restoring land health in fire-prone areas (NFP 2003). These two agencies are committed to working together to accomplish community protection and ecosystem maintenance and restoration and working within a collaborative process to implement effective fuel treatment efforts. The agencies recognize that fuel treatments must be coordinated across ownerships to effectively protect communities and improve ecosystem health. The Forest Service and BLM recognize that in order to accomplish this, fuel treatment efforts should be concentrated in high priority areas such as the WUI (Forest Service and BLM 2003).

Under the National Fire Plan, A Collaborative Approach for Reducing Risks to Communities and the Environment, 10-Year Comprehensive Strategy Implementation was developed in May 2002 (NFP 2002b). The top two goals of the 10-year strategy are the improvement of fire prevention and suppression and the reduction of hazardous fuels, with firefighter and public safety continuing to be the highest priority. The Hoback Ranches WUI Fuels Reduction Project is proposed in response to the fuels reduction element of the National Fire Plan.

Pinedale Resource Management Plan

The RMP provides management direction for approximately 931,000 acres of public land administered by the BLM within the Pinedale Resource Area, which includes the project area (BLM 1988). The RMP states that fire protection on public lands will be managed by taking appropriate suppression actions through the fire management plan. Although the existing RMP does not address WUI issues, the Proposed Action is assumed to be in conformance with the plan (Roadifer 2003). The BLM is currently in the process of developing a new RMP for the Pinedale Field Office that will provide future direction for managing the public land in the Pinedale Resource Area. The plan will be comprehensive in nature and will address a wide variety of issues, including WUI areas (BLM 2003).

The RMP provides guidance and objectives for multiple resource categories:

- Fire Management: The fire program will be managed to protect public safety, life, and property. Fire is considered an option for disposal to timber slash as well as for hazard

reduction. Fire protection on public lands will be managed by taking appropriate suppression actions through the fire management plan.

- Visual Resources: The objective of visual resource management (VRM) will be to maintain overall integrity of visual resources while allowing for modification and changes to occur to meet other resource objectives.
- Cultural Resources: Cultural resources will be managed to: 1) resolve conflicts between cultural resources and other resources; 2) provide appropriate levels of protection for significant cultural resources; 3) design cultural resource management actions to maintain the value of cultural resources; and 4) provide for the scientific and educational use of cultural resources.
- Soils and Watersheds: Management objectives will be to maintain or enhance the quality of surface and ground water. Soil conservation will be provided through managing for maintenance of soil productivity and stability. Management actions will emphasize the reduction of soil erosion and sediment contributions to the Green River Basin water system. Soil management practices will be applied on a site-specific basis using soil survey data, and will be related to the soil characteristics such as the steepness of slopes, the length of slope, and soil chemistry and composition.
- Wildlife Habitat: Activity planning will emphasize habitat enhancement and protection. This planning will include other species as well as federally listed threatened and endangered species.
- Air Quality: Air quality management is conducted through cooperation with other agencies such as the Forest Service, Department of Environmental Quality, and the Environmental Protection Agency. Objectives will include the protection of public health and safety and the well being of sensitive natural resources.
- Forest Management: Forest resources will be managed to provide a supply of forest products to the various segments of the public and to maintain or enhance other resource management objectives. All forest management activities authorized under this plan will adhere to restrictions identified in the RMP.

Bridger-Teton National Forest Land and Resource Management Plan

The 1990 Forest Plan provides direction for the Bridger-Teton National Forest. The Forest Plan allows for a wide range of silvicultural practices and requires that the practices be applied to achieve multiple resource objectives and ensure potential effects on other resource values are not unacceptable. The Forest Plan sets a fire protection standard for the development of a program aimed at fire protection and reducing fuel loadings adjacent to or on private in holdings in coordination with local, State, and other Federal agencies (Forest Service 1990). The Proposed Action is in conformance with the Forest Plan because it would contribute to the annual timber sale amount and provide for continued or greater prosperity for local communities.

The Forest Plan uses Management Areas to guide management of lands within the Bridger-Teton National Forest. The majority of the project area is in Management Area 23 – Upper Hoback and Community Interest Area 7 – Big Piney. This Management Area is located in the Bridger West Division of the Bridger-Teton National Forest, south of the Hoback Basin area and north of the Horse Creek area. Additionally, a small portion of the project area lies in Management Area 21 – Hoback Basin, which is south of the Union Pass area and east of the Cliff Creek and Upper Hoback areas. Desired Future Conditions 10 and 12 apply to the project area.

Desired Future Condition 10: Simultaneous Development of Resources, Opportunities for Human Experiences, and Support for Big-Game and a Wide Variety of Wildlife Species
The management prescription for the DFC is to provide long-term and short-term habitat to meet the needs of wildlife managed in balance with timber harvest, minerals development, and grazing. All designs for surface-disturbing activities must have a no effect or beneficial effect on wildlife.

Specific prescriptions, standards, and guidelines apply to management prescription 10. They include the following:

- Recreation - Existing roaded recreation opportunities continue where they do not interfere with the objectives for the area. Areas of both Semi-primitive Motorized and Semi-primitive Non-motorized use are provided.
- Visual Quality – The Visual Quality Objectives (VQOs) are Retention, Partial Retention, and Modification.
- Fisheries and Wildlife – Wildlife prescriptions emphasize groups of species in order to increase species richness or diversity. Habitat is managed to achieve the game and fish populations, success, harvest levels, and recreation-day objectives identified by the Wyoming Game and Fish Department and agreed to by the Forest Service. The Forest Plan contains specific guidelines for wildlife habitat.
- Vegetation – Rangeland is managed to maintain and enhance range and watershed condition while providing forage for wildlife and livestock. The timber prescription emphasizes achieving desired wildlife habitat conditions while developing long-term, overall big game hiding cover values. Specific silvicultural systems are identified in the Forest Plan.
- Protection: Fire – Fire management emphasizes preservation and enhancement of habitat. A full range of suppression techniques is used. Fuel conditions should be maintained that permit fire suppression forces to meet fire protection objectives for the area under historic weather conditions.

Desired Future Condition 12: Backcountry Big-Game Hunting, Dispersed Recreation, and Wildlife Security Areas
Part of the project area lies in DFC 12. The management emphasis for DFC 12 is to provide such important habitat for biggame as winter ranges, feedgrounds, calving areas, and security areas. Habitat capability and escape cover are provided for and Semi-primitive Non-motorized opportunities emphasizing big-game hunting activities are maintained. The project area lies near the southern extent of the Greater Yellowstone Ecosystem. If any portion of the project area contains grizzly bear habitat, no surface-disturbing activities can occur there until the grizzly bear cumulative effects model can be run to help determine potential effects on the grizzly bears.

Specific prescriptions, standards, and guidelines apply to management prescription 12. They include the following:

- Recreation – Recreation and other human activities are managed to meet the needs of big-game species.
- Visual Quality – The VQOs are Retention and Partial Retention.

- Fisheries and Wildlife – Habitat is managed to achieve the game and fish populations, success, harvest levels, and recreation-day objectives identified by the Wyoming Game and Fish Department and agreed to by the Forest Service. The Forest Plan contains specific guidelines for wildlife habitat.
- Vegetation – Range is managed to maintain and enhance range and watershed condition while providing forage for livestock and wildlife, particularly big game. Silvicultural practices emphasize preserving and enhancing critical big-game habitat values and specific silvicultural system guidelines and standards are identified in the Forest Plan.
- Protection: Fire – Fire Management emphasizes preservation and enhancement of habitat, particularly through prescribed fire. A full range of suppression techniques is used.

Decision Framework

The BLM and Forest Service are working cooperatively on this project and have identified the BLM as the lead agency. The Deciding Officers for the Hoback Ranches EA process are the BLM's Pinedale Field Office District Manager and the Forest Service's Big Piney District Ranger. Based on the analysis documented in this EA, the Deciding Officers will decide whether and how to reduce fuel loading and thus the risk of high severity fire in the Hoback Ranches project area. The Deciding Officers will document the decision in a Decision Notice (DN) accompanying the EA. In the DN the Deciding Officers may:

1. Select the Proposed Action.
2. Select an alternative to the Proposed Action.
3. Defer the fuels reduction at this time.

All alternatives for entry include mitigations associated with the action. The scope of this decision is limited to addressing the significant issues and possible environmental consequences of the project. The proposed and other included actions are not connected to factors or projects outside this analysis.

CHAPTER 2 – ISSUES AND ALTERNATIVES

This chapter identifies the issues determined to be important in this analysis. This chapter also describes and compares the alternatives considered for the Hoback Ranches project area. It includes a description of each alternative considered and presents the alternatives in comparative form, defining the differences between each alternative and providing a basis for choice among options (40 CFR §1502.14). Some of the information used to compare the alternatives is based upon the design of the alternative and some of the information is based upon the environmental effects of implementing each alternative.

Public Involvement and Development of Issues

Scoping is described as an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action (40 CFR §1501.7). In addition to determining the scope and the significant issues to be analyzed in depth, scoping also helps to identify and eliminate from detailed study the issues that are not relevant including those that have been covered by prior environmental review.

A public meeting was convened during the hazard assessment and mitigation plan phase of the project on July 17, 2002, at the Bondurant Fire Hall in Bondurant, Wyoming. Announcements about the meeting were published in the local newspaper and posted in public places such as the Hoback Ranches notice and information boards. During the public meeting, FIREWISE brochures were handed out and information was provided to attendees. Information was obtained from the community on hazardous fire situations and desired conditions. In addition, as part of the public involvement process, interviews were conducted with residents and numerous local public officials, including the County Fire Warden, Emergency Management Director, County Sheriff, and Forest Service and State of Wyoming Forestry Division employees (BLM 2002). An additional public meeting was held in September 2002, in Pinedale, Wyoming to review and receive public input on the draft Mitigation Report.

Using the comments from the public and other agencies, in conjunction with the field-related resource information, and field surveys of the proposed project area, the Forest Service and BLM interdisciplinary team (IDT) developed a list of relevant issues to address (40 CFR §§ 1500.4 and 1501.7). Issues are addressed in the Proposed Action, alternatives to the Proposed Action, mitigation measures, and design criteria. The following issues were determined to be significant and within the scope of the project decision:

- Soils
- Fuels/Fire Hazard
- Visual Resources
- Air Quality
- Water Quality
- Noise
- Noxious Weeds/Invasive Species
- Threatened, Endangered, and Proposed Federal Species, e.g. Canada lynx
- BLM and Forest Service Sensitive and Management Indicator Species
- Cultural Resources

Alternative Development Process

The IDT initially proposed three broadly defined action alternatives for consideration for the Hoback Ranches project area through assessment of the findings of the Mitigation Report (BLM 2002). Information in the Mitigation Report was acquired from fuel and structure surveys, town meetings, and interviews of community officials. The items of concern that were identified by this report included fuel loads, vegetation types currently present, and historic vegetation types for the project area. Specific locations for treatments were not defined, but these served as guidelines for the development of more detailed alternatives. In addition to the No Action Alternative, the three alternatives that were initially discussed by the IDT are:

- Twenty miles of shaded fuel breaks (87 to 102 BLM acres and 150 Forest Service acres).
- Twenty miles of shaded fuel breaks (58 BLM acres and 150 Forest Service acres). Additional forest treatments would include prescriptions for up to 500 BLM acres and 2700 Forest Service acres over a 10-year period.
- Twenty miles of shaded fuel breaks (58 BLM acres and 150 Forest Service acres). Additional forest treatments would include prescriptions for up to 1000 BLM acres and 2700 Forest Service acres over a 10-year period.

Forest treatment under the latter two alternatives would: include construction of up to 6 miles of temporary roads; removal of approximately half of the trees (basal area) and half of the ground vegetation; leaving large well-formed dominant trees and removing smaller trees; eliminating ladder fuels; leaving 5-6 snags per acre, clustered as much as possible; performing a pre-commercial thinning (12’ X 12’ spacing) on about 40 acres; and hand piling and burning slash. Harvest method considerations for these two alternatives were largely to be determined by slope and access, with helicopter logging a possibility. Mitigation measures include water bars on all skid trails; roads with a 12 foot running surface; ripping, water barring, and seeding all temporary roads; pile and slash burning in thinned areas; and 60-80 percent slash burning with the remainder used for nutrient cycling and erosion control.

These general forest treatment guidelines and mitigations were considered and further refined by the IDT following the collection of project specific fuels information. Site-specific fuels information was obtained from intensive surveys of the project area completed by North Wind, Inc. in 2003. (This complete data set is stored in the project files at the Forest Service and BLM Offices.) Information gathered included observations about stand health including presence of insects and disease, species composition, average tree height, average tree diameter, stocking levels, and average age of the trees. Recommended silvicultural systems that incorporate landing locations, a cutting cycle, and a travel management plan, were developed for each compartment. This information is included in Appendix C for BLM lands and in Appendix D for Forest Service lands. In addition to the No Action Alternative, four actions alternatives were developed for timber treatment activities within the project area based on this site-specific information. These alternatives represent a reasonable range of implementable actions that meet the purpose and need of the project. Each of the action alternatives considered are structured to reduce fuels in and around the project area. The extent and location of the treatments and the method of harvest are the main factors that vary among the alternatives.

The project area is 14,710 acres in size and consists of private (6,434 acres), BLM (2,316 acres), and Forest Service (5,960 acres) lands. There are approximately 42.1 miles of existing roads in the project area. Depending on the alternatives chosen, some of the existing roads would need some level of improvement to make them useable during forest treatment implementation and some new roads would need to be constructed. Further details, including maps, are provided below as part of the description of the alternatives. All alternatives are consistent with the Pinedale RMP and the Bridger-Teton Forest Plan.

Alternative 1 NO ACTION

Analysis of a No Action Alternative is required by NEPA (40 CFR §1502.14d). The No Action Alternative provides the baseline for the rest of the environmental analysis. Under the No Action Alternative, no fuels reduction would be implemented to accomplish project goals. The project area would remain subject to natural or ongoing changes only. Presence and increase of invasive species would still exist because the existing environment is not static. The Sublette County Fire Department, along with the BLM and Forest Service for fires on public lands, would continue to fight wildland fires in the area in an attempt to protect the environment and the Hoback Ranches community; however, no firebreaks would be created to aid in fire suppression. Chapter three contains a detailed description of the current environmental conditions.

Alternative 2 PROPOSED ACTION

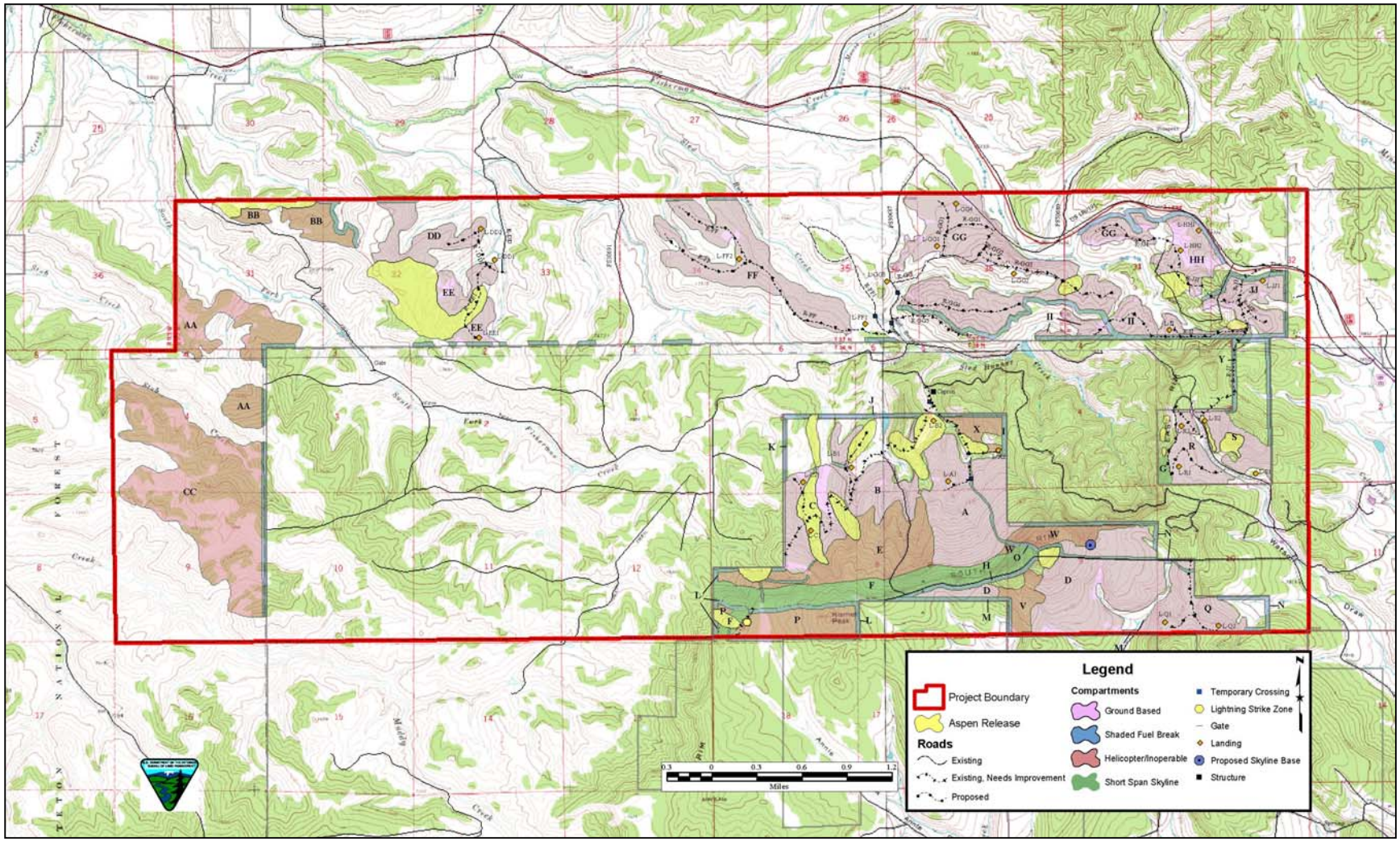
Under the Proposed Action, approximately 3,726 acres would be treated (1,954 BLM and 1,772 Forest Service). Of the acreage associated with the Proposed Action, 2,038 acres would be treated using ground-based yarding systems, 338 acres would be hand-cut fuel breaks, 1,150 acres would be helicopter logged, and 200 acres would be treated by short span skyline. The locations for these treatments are shown in ***Figure 2***. More specific harvest prescription information for each mapped compartment is discussed in ***Appendices C and D***.

In the areas designated as shaded fuel breaks, all trees would be removed except for some "shade" trees. Shaded fuel breaks are areas where large shrubs and understory trees are removed to create an area relatively free of midlevel fuel. Grasses, forbs, and low-flammability shrubs may be left to control soil erosion. Certain trees may also be left for aesthetic appeal. The shaded fuel breaks would take advantage of topographic features and preexisting roads.

The width of the fuel breaks would vary between 300 and 500 feet depending on vegetation and terrain. The center of the fuel break would be approximately 100 feet in width and would resemble a shaded open park-like atmosphere. Tree spacing on each side would be feathered back to a natural forest starting with about 50 foot spacing in the middle and a little tighter on the edges.

All operable acres should be thinned from below to an average basal area of 60 square feet per acre. This basal area corresponds to an average of 30 trees per acre with an average D.B.H. of about 19 inches. Spacing would be about 38 feet between trees if spacing were uniform, which is unlikely. The result of the treatment is an open, park-like stand. It is critical that all woody surface materials and ladder fuels be cleared within this fuel break area.

Figure 2. Proposed Action



Thinning, selective removal of living, diseased, and other trees would occur in selected areas to decrease stand density while giving consideration to recreation, viewshed, and wildlife habitat. Conifers would be removed from aspen stands to improve the health of stands where encroachment has occurred. For all areas scheduled for thinning treatment, this alternative would require piling of slash and ultimately burning of piles. Standard Federal environmental and silvicultural methods would be applied and requirements would be met. This action would be implemented over the next 10 years.

Under this alternative, approximately 11.3 miles of new roads would need to be constructed (3.2 miles would be on BLM land and 8.1 miles would be on Forest Service land) and 6.4 miles of existing roads would need some level of improvement or reconstruction. Five stream crossings have been identified as part of this alternative. Three are on existing roads, one would be on a road needing improvement, and one would be on a new road. All of these crossings are in the headwaters above fish-bearing portions of the streams and are not expected to negatively impact water quality or fisheries habitat. Standard BMPs would be used to mitigate the sediment impacts from road construction.

The goal of the Proposed Action is to increase the amount of defensible space on Federally-managed lands that are adjacent to the Hoback Ranches community. The fuel reductions associated with the Proposed Action are designed to promote wildland firefighter and public safety, as well as increase the defensibility of private lands and structures in the WUI area, and would ultimately lessen the probability of a high severity wildfire. The Proposed Action would reduce the crown fire hazard by reducing fuel loadings and available canopy fuels as well as crown base heights in the project area. The reduction in the amount of hazardous fuels would significantly reduce the intensity of wildland fires within the treatment areas under all but the most severe burning conditions. A maintenance schedule is proposed to identify time frames for re-entry into treatment areas to keep fuel volumes at a level that maintains the desired lower fuel volumes and the associated lower probability of severe wildland fire for the project area (***Appendices C and D***).

Cost of implementation of any of the action alternatives has not been determined. Different methods of implementation and extent of the treatments would be the variables with the most impact on cost. In general, the more acres proposed for treatment and the more implementation methods proposed, the greater the cost. Using that rationale the Proposed Action would be the most costly action alternative. Implementation would take place over several years, which would result in the cost being spread out over that time period. Treatment costs would be partially offset by the sale of forest products in the form of house logs, sawlogs, post and poles, and firewood.

Mitigations Associated With All Action Alternatives

Both the BLM and Forest Service use mitigations and preventative measures in the planning and implementation of land management activities. Measures associated with the action alternatives have been formulated to mitigate or reduce adverse impacts. These measures have been tested on past harvest and temporary road actions and have proven effective at minimizing impacts to resources. Mitigations are documented at the Pinedale Field Office and the Big Piney Ranger

District. Some of the mitigations identified for this project include, but are not limited to the following.

- All skid trails would be water barred.
- Roads would be ripped, water barred, and seeded.
- Sixty to eighty percent of slash would be burned with the remainder left in place for nutrient cycling and erosion control. Slash burning would meet Federal and State air quality standards.
- Seeps, springs, wetlands, and riparian areas would be identified and standards would be observed when determining buffer distance for harvest activities near these areas.
- To minimize introduction of noxious weeds and the risk of erosion following harvest activities, disturbed areas would be seeded with an appropriate seed mix containing native vegetation, which has been reviewed and approved by the Forest Service and BLM.
- Coarse woody debris should be retained within each fuel reduction area at or above five to seven tons per acre to maintain soil productivity and provide wildlife habitat elements.
- Snags (of the largest diameter available) should be maintained within each fuel reduction area at or above four to six per acre, when available and would be left in clusters as much as possible.
- If a nest, den, or important site for any threatened, endangered, or sensitive species is found within the project area, activities may need to be curtailed or additional restriction imposed to avoid effects. Such decisions would be made jointly between Forest Service, BLM, and U.S. Fish and Wildlife Service (USFWS) biologists.
- Appropriate trash and food storage and disposal procedures would be implemented to minimize any potential conflicts with grizzly bears. Crews will be required to keep a sanitary work site and environment at all times. Waste materials at the work site shall be disposed of promptly at an appropriate waste disposal site. "Waste" means all discarded matter including, but not limited to, human waste, trash, garbage, refuse, etc.
- One hundred and fifty foot buffers should be established along perennial and intermittent streams and wetlands (if any occur in the project area), to ensure that no fuels treatments occur in those areas.
- The selected alternative will be subject to Section 106 of the National Historic Preservation Act and all proposed developments will be subject to a Class III level cultural resource inventory.

Monitoring Requirements Associated With All Action Alternatives

Monitoring would occur to assess whether the project was implemented as designed and whether it complies with the respective agency requirements. The monitoring objective for this project would be to assess the success of implementation. A successful reduction in fuel loadings and flammability of the treatment areas, in addition to favorable public opinion regarding the implementation, would indicate the desired results. Monitoring of treated sites would occur in designated increments (as identified in the silvicultural prescriptions in ***Appendices C and D***) to assess maintenance of the project area in order to retain treatment-achieved stand characteristics. Monitoring for noxious weeds would also occur in treatment areas, particularly in areas where slash piles were burned.

Alternative 3 NO HELICOPTER LOGGING

This alternative would not use helicopters to log any of the project area. This alternative was developed in order to make the vegetative treatment more economically feasible. Helicopters can be used to extract logs from forest areas that would otherwise be inaccessible due to difficult terrain or from environmentally sensitive areas where ground-based and cable systems are undesirable or not possible. With helicopter logging methods, there is no exposed ground surface inside the logging block due to the absence of skid trails or cableway corridors. However, helicopter logging has, to date, proven more expensive per unit volume than conventional logging and therefore may be cost-prohibitive for some operations. Under this alternative, 2,576 acres would be harvested. This alternative would harvest the same areas as in Alternative Two using the same methodology and mitigations, except the identified helicopter logging areas would be omitted (***Figure 2***). Road construction and improvements would also occur under this alternative and would total 11.3 and 5.7 miles, respectively. Road construction would be needed to reach some areas and to provide access into areas where landings would be constructed to minimize the distance that trucks have to haul the logs.

Alternative 4 NO NEW ROAD CONSTRUCTION

Under this alternative, no new roads would be constructed. This alternative also excludes the helicopter logging as described in Alternative Three. This alternative was developed to limit potential sedimentation issues and costs associated with building and rehabilitating temporary roads. This alternative would reduce the number of acres treated to 1,286. Under this alternative, 5.7 miles of road improvements are proposed. The same methodologies and mitigations described in Alternative two would be applied.

Alternative 5 SHADED FUEL BREAKS ONLY

This alternative would only treat areas identified in ***Figure 2*** associated with the shaded fuel breaks. This alternative would only treat approximately 338 acres of forested land, but would meet the purpose and need by reducing fuel loads directly at the wildland-urban interface zone between Federal and private lands. No road construction or improvement would be needed under this alternative. Applicable methodologies and mitigations described in Alternative Two would be applied.

Alternative Comparison

Table 1 provides a comparison of the degree of action associated with each alternative. The acres treated and miles of road construction and improvements are identified for each alternative.

Table 1. Extent of Treatment for Each Alternative

Alternative	Acres Treated	Miles of Road Construction	Miles of Road Improvements
Alt. 1 - No Action	0	0	0
Alt. 2 - Proposed Action	3726	11.3	6.4
Alt. 3 - No Helicopter Logging	2576	11.3	5.7
Alt. 4 - No Road Construction	1286	0	5.7
Alt. 5 - Shaded Fuel Breaks Only	338	0	0

Table 2 provides a summary of the direct effects of implementing each alternative. Information presented is focused on resources for which different levels of effects or outputs can be distinguished among alternatives. The terms "High", "Moderate", and "Low" are used to depict the potential level of direct effect. For example, a low rating for water quality might mean that no BMPs or mitigations would be necessary to protect the resource. Whereas a moderate rating may indicate that some kind of screening would be needed and a high rating may indicate that cobble might have to be added in addition to screening in order to keep the stream bed from becoming embedded. These environmental consequences are discussed in detail in Chapter Three.

Table 2. Comparison of Direct Effects by Alternative

Resource	**No Action**	**Proposed Action**	**No Helicopter Logging**	**No Road Construction**	**Shaded Fuel Breaks Only**
Soils	Low	Moderate	Moderate	Low	Low
Fuels/Fire Hazard	High	Low	Low	Low	Moderate
Visual Resources	Moderate	Moderate	Moderate	Low	Low
Air Quality	Low	Moderate	Low	Low	Low
Water Quality	Low	Moderate	Low	Low	Low
Noise	Low	Moderate	Low	Low	Low
Noxious Weeds	Moderate	Moderate	Moderate	Low	Low
Special Status Species	Low	Moderate	Moderate	Low	Low
Cost	Low	High	Moderate	Moderate	Low

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

Chapter Three contains a summary of the existing resources in the project area that could be affected by the alternatives. This chapter also describes the potential changes to the environmental resources due to implementation of the alternatives. It presents the basis for comparison of the alternatives presented in Table 2, which compared the direct effects of the alternatives on the nine resources described in this chapter. This chapter is organized by alternatives; consequences to the affected resources from the No Action Alternative are described first, followed by consequences from the Proposed Action and other action alternatives. Where effects from alternatives are anticipated to be similar the effects are presented together.

General Setting

The project area is located in northwest Wyoming within the east slopes of the Wyoming Range. Topography is rolling to steep mountainous landscapes with narrow to broad valleys. Elevations in the assessment area range from 7,000 to 8,400 feet above mean sea level (amsl) at Kismet Peak. Soils are generally residual and are formed on igneous, metamorphic, and sedimentary rocks. Transported soil materials are mostly derived from alluvium, although some glacial outwash also occurs (Roberts 1989).

Vegetation in the area is mixed shrubland/conifer forest (Knight 1994). The project area is in a transitional zone characterized by big sagebrush at the lower elevations that grades into aspen and lodgepole pine at the higher elevations, with Douglas fir and subalpine fir. The treeless areas have a mixed foothill shrubland vegetational mosaic that consists of bluebunch wheatgrass, fringed sagewort, mountain big sagebrush, needle-and-thread grass, Saskatoon serviceberry, skyrocket gilia, stonecrop, yarrow, and other grasses and forbs (North Wind 2003). Dominant hazardous fuels are the overstocked mixed conifer stands with saplings as ladder fuels that occur on lands south and north of Hoback Ranches and on private land in the eastern sections of Hoback Ranches (BLM 2002).

Information about the climate is from Bondurant, Wyoming, which is near the project area. The average total precipitation in Bondurant is 21.26 inches. Average daily maximum temperatures range from -4.9° F in January to 78.7° F during July. The project area is in a 15-19 inch precipitation zone. Native cool season plant communities' growth begins during April and continues into July (Soil Conservation Service [SCS] 1988).

The general area contains habitat for game species such as mule deer, elk, moose, pronghorn, jackrabbit, cottontail rabbit, and sharp-tailed grouse. Other animal and bird species include black-tailed prairie dog, skunk, fox, raccoon, badger, coyote, bobcat, magpie, sharp-shinned hawk, Cooper's hawk, red-tailed hawk, as well as various songbirds (SCS 1988).

The major land use in the immediate area is recreation and numerous recreational opportunities exist within and near the project area including: wildlife observation, bird watching, hiking, motorcycle riding, all-terrain vehicle (ATV) riding, cross country skiing, snow machine riding, and snowshoeing. Livestock grazing occurs on BLM and Forest Service lands as well as on some adjacent State of Wyoming lands and private land not located within Hoback Ranches.

Hoback Ranches span more than 6,000 acres of the Hoback Rim and adjacent foothills. Approximately 106 homes exist within the project area, with more being constructed. Landowners and homeowners in the Hoback Ranches subdivision have adopted certain covenants that restrict activities that may take place on the properties. One stated intention of the covenants is to, "maintain the natural environment and protect the ecology of the area." In order to reach this goal the covenants include restrictions on grazing and tree removal. One restriction prohibits cutting trees that are greater than three inches in diameter (Hoback Ranches 2003).

Critical Elements of the Human Environment

Federal regulations require that issues that are not significant to the project be identified and eliminated from detailed study. Resource components identified by an "X" in the "Not Present" or "Present, No Effect" columns of Table 3, Critical Elements of the Human Environment, are not affected and will receive no further consideration in this EA. Elements that are present and are likely to be affected by the alternatives are discussed further in this chapter. The rationale for the conclusion is also shown in Table 3.

Table 3. Critical Elements of the Human Environment

Critical Element	Not Present	Present, No Effect	Present, May Affect	Governing Regulation	Rationale
Air Quality			X	The Clean Air Act as amended (42 USC 7401 et seq.)	Slash pile burning would deteriorate air quality in the short term in and adjacent to the project area. Activities related to road construction and improvement would also impact air quality in the short term in the project area by potentially increasing fugitive dust.
Areas of Critical Environmental Concern	X			Federal Land Policy and Management Act of 1976 (43 USC 1701)	There are no areas of critical environmental concern in the project area.
Cultural Resources		X		National Historic Preservation Act as amended (16 USC 470)	A Class I Cultural Resource Inventory (literature search) was conducted for the project area. The literature search consisted of a file search (No. 8848) from the Wyoming State Historic Preservation Office, homestead patents, and examination of General Land Office maps. The file search revealed that three projects have occurred in the area and one site was recorded. Additionally, 12 homesteads are located, either wholly or in part, within the project area (See North Wind, Inc. 2003 in Appendix E). No effect is anticipated because implementation of the action alternatives would avoid cultural resource sites near the proposed fuels reduction sites. In the event an inadvertent discovery is made during implementation, all activities would be stopped until the BLM or Forest Service Archaeologist with jurisdiction could evaluate the finding and make a determination as to whether the project could continue or not.
Environmental Justice	X			E.O. 12898 2/11/94	The Proposed Action does not exclude persons (including populations) from participation in, deny persons the benefits of, or subject persons to discrimination because of race, color, or national origin.
Farmlands, Prime or Unique	X			Surface Mining Control and Reclamation Act of 1977 (30 USC 1201 et seq.)	There is no prime/unique farmland located within the project area.
Floodplains	X			E.O. 11988, as amended, Floodplain Management, May 24, 1977	There are no floodplains located in the project area.

Table 3. Critical Elements of the Human Environment

Critical Element	Not Present	Present, No Effect	Present, May Affect	Governing Regulation	Rationale
Hazardous Substances or Solid Wastes	X			Resource Conservation and Recovery Act of 1976 (42 USC 6907 et seq.), Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended (42 USC 9615)	There are no known hazardous materials within the proposed project area and hazardous waste would not be created by the Proposed Action. If any sites are encountered during the installation of the firebreak, work would cease until clearance was granted by the BLM HazMat Officer and the Forest Service counterpart.
Native American Religious Concerns	X			American Indian Religious Freedom Act of 1978 (42 USC 1966)	There are no known sites or locales in the project area that are currently recognized to be of concern to modern day Native Americans.
Migratory Bird Species		X		Neotropical Migratory Bird Conservation Act	Project activities are not expected to negatively affect migratory bird species. In the long term, forest thinning would improve habitat conditions.
Noxious Weeds, Invasive Species			X	Lacey Act as amended, Federal Noxious Weed Act of 1974, as amended Endangered Species Act of 1973, as amended E.O. 13112, Invasive Species, 2/3/99	Implementing forest treatments may allow noxious weeds to become established or increase. Due to soil disturbances resulting from temporary road construction, equipment and vehicles, and thinning activities, the Proposed Action has the potential to increase the spread of weeds within the project area because soil disturbance provides excellent seedbeds for the germination of noxious weeds. Agency guidelines would be followed to minimize the potential for impacts.
Special Status Species			X	Endangered Species Act of 1973 as amended (16 USC 1531) Federal Land Policy and Management Act of 1976 (43 USC 1701 et seq.)	There are three Federally listed species that may potentially occur in the project area: gray wolf, grizzly bear, and Canada lynx. The Proposed Action "may affect, not likely to adversely affect" these species. In addition BLM and FS sensitive wildlife and FS MIS may also potentially occur in the project area. Short-term displacement of wildlife may result in the project area. There are no known BLM or FS sensitive plant species within the project area; however the Payson's milkvetch may occur in the area. Affects to this species if it is present are expected to be positive because it prefers disturbed areas.
Water Quality Concerns			X	Safe Drinking Water Act as amended (42 USC 300f et seq.) Clean Water	Soil erosion and chemical use could potentially impact water quality. Fuels projects conducted next to live

Table 3. Critical Elements of the Human Environment

Critical Element	Not Present	Present, No Effect	Present, May Affect	Governing Regulation	Rationale
				Act of 1977 (33 USC 1251 et seq.)	streams may cause a short-term impairment of water quality and an increase in run-off and sediment yield. However, no permanent surface water occurs in the project area so there is minimal risk to water quality from the Proposed Action. The Proposed Action would comply with Forest Service standards regarding buffer zones around all waterways and riparian habitat.
Wetlands/ Riparian Zones		X		E.O 11990, Protection of Wetlands, May 24, 1977	Forest Service and BLM guidelines regarding buffers around riparian areas would be adhered to and no treatments would occur in these zones.
Wild & Scenic Rivers	X			Wild and Scenic Rivers Act as amended (16 USC 1271)	There are no Wild & Scenic Rivers located within the project area.
Wilderness Study Areas	X			Federal Land Policy and Management Act of 1976 (43 USC 1701 et seq.) Wilderness Act of 1964 (16 USC 1131 et seq.)	There are no designated Wilderness Study Areas in the project area.
Wild Horse Herd Management Areas	X			Public Law 92-195 The Wild Free-Roaming Horse and Burro Act of 1971, Title 43 Code of Regulations Part 4700 Protection, Management, and Control of Wild Free-Roaming Horses and Burros	There are no Wild Horse Herd Management Areas in the project area.

Physical Factors

1. Soils

Soils on the Bridger-Teton are classified according to the Soil Taxonomy of the National Cooperative Soil Survey, United States Department of Agriculture (Forest Service 1990). Four soil types occur in the project area: hyattville, granile, Tongue River, and the venable-coutis complex (Reckner 2003). These soils are mainly characterized as gravelly sandy loams. Common trees associated with these types of sites are lodgepole pine, ponderosa pine, and Douglas fir.

No Action Alternative

Alternative One, the No Action Alternative, would have no direct effect on the soils resource. However, by not removing hazardous timber and thinning the existing dense timber stands, the likelihood of large-scale, intense fires may increase. The detrimental effects of such fires would result in impacts to the soil resource, including soil sterilization, exposure to erosive forces, increased stream sedimentation, and risk to water quality.

Alternative Two

Under Alternative Two, the Proposed Action, the greatest number of acres (3,726) would be harvested and construction of temporary roads would occur (11.3 miles). Ground disturbance that typically occurs during harvest activity may result in an increased risk of soil erosion and transport of sediment to stream channels. Due to the amount of tractor harvesting and soil disturbance from temporary road construction, construction equipment and vehicles, the Proposed Action poses the highest risk to the soils resource. Compaction can occur when heavy equipment, vehicles, or people make repeated trips over the same areas. Soil compaction can reduce root penetration, seedling establishment and soil hydraulic function. Compacted soils can cause a higher percentage of precipitation to runoff, which can, in turn, indirectly lead to increased erosion rates and a reduced soil moisture content. Minimal risk of increased erosion due to harvest activities can be acceptably mitigated using standard erosion control practices. Deep down and dead woody materials at the ground level would serve to “cushion” timber harvest equipment. Forest Plan and RMP standards for soils quality would be adhered to, and therefore this alternative is not expected to significantly affect the soils resource. Because no other projects are known for the project area no cumulative effects are expected.

Alternatives Three, Four, and Five

Effects from Alternatives Three, Four, and Five would be similar to but less than the Proposed Action because of the reduced number of acres treated. Effects under Alternative Three would be the most similar to Alternative Two. Approximately 1,150 acres less is proposed for harvest under this alternative and therefore the potential impacts would be less than Alternative Two.

Effects to the soils resource from Alternative Four would be less than both Alternatives Two and Three. Less ground disturbance would result because only 1,286 acres are proposed for harvest. No new road construction is proposed and only 5.7 miles or road are proposed for improvement under Alternative Four.

Alternative five has the least potential for impacts to the soils resource of all the action alternatives; no road construction is proposed and only 338 acres are proposed for fuels

treatment. All action alternatives with the potential for effects to the soils resource would include mitigations and BMPs.

2. Fuels/Fire Hazard

The dominant hazardous fuels in the project area are the overstocked mixed conifer stands with saplings as ladder fuels that occur on lands south and north of Hoback Ranches and on private land in the eastern sections of Hoback Ranches. Sagebrush/grass fuels that are present at Hoback Ranches can also present hazardous fuel conditions on slopes of the assessment area in late summer and fall (BLM 2002). The assessed mixed conifer fuel types will exhibit a high resistance to fire control and make initial attack difficult. Existing stand density on some slopes will enhance the possibility of a crown fire. The possibility of ignition in both lodgepole/mixed conifer and sagebrush/grass fuel types is high, due to vehicular traffic on roads in the assessment area and lightening strikes associated with summer thunderstorms. Numerous topographic features in the area such as steep slopes, gullies, and aspect will increase rates of spread and will allow fires to "roll out" beneath fire fighters or spot over roads (BLM 2002).

No Action Alternative

Natural processes would be responsible for the changes in fuels and flammability properties in the project area under the No Action Alternative. No action would exacerbate the current fuel-loading problem, increase forest health problems, increase potential wildfire intensity and severity, and increase the hazard potential for homeowners. Areas with high flammability properties would continue to accumulate higher volumes of dead and down fuels and other fuels would also continue to increase. Continued conifer encroachment into aspen areas would also increase the flammability properties in those areas. Over time, overall fuels characteristics of the project area would develop into stands with higher potential for problem fire behavior increasing the risk of catastrophic wildfires. Increased suppression efforts would be necessary and consequently a greater threat to private property and structures adjacent to the project area would result. Existing roads would not be improved and no new roads would be constructed therein inhibiting access by fire engines and other suppression vehicles.

Alternative Two

The greatest reduction in fuels would occur under the Proposed Action. The Proposed Action would result in thinning treatments to create fuels characteristics conducive to lower fire intensities. Thinning, tree removal, and creation of shaded fuel breaks between BLM, Forest Service and private lands would directly reduce the chance of wildland fire spreading from private to public land and from public to private land. In addition, this action would indirectly enhance firefighter access, increase fire fighter safety and improve effectiveness of aerial suppression techniques. Thinning of ladder fuels, dead and down fuels, and conifers encroaching into aspen stands, would change the fuels and flammability properties of the project area. Overall fuels characteristics would exhibit properties that would allow for increased chances of suppressing fires before problem fire behavior characteristics develop. Road construction and reconstruction under this alternative would result in improved access for fire suppression teams and vehicles. Minor fuels treatments have taken place on some private properties in Hoback Ranches. In terms of cumulative effects, this would also slightly reduce the fuels risk in the area.

Alternatives Three, Four, and Five

Alternatives Three, Four, and Five would have effects similar to the Proposed Action in terms of reduction of fuels but to a lesser degree because each of these alternatives treats a progressively smaller number of acres. Alternative Three would result in fuels reductions on 2,276 acres and

therefore would be the most similar to the Proposed Action. In terms of improved access, Alternative Three would provide the greatest benefit because it includes road construction and reconstruction.

Alternative Four may improve access to some degree because of the 5.7 miles of road reconstruction included in this alternative while Alternative Five would not impact access at all. Alternative Four would result in reduction of fuels on 1,286 acres. Alternative Five would reduce the least amount of fuels but creation of shaded fuel breaks would still provide an important buffer between BLM, Forest Service and private lands and would directly reduce the chance of wildland fire spreading from private to public land and from public to private land.

3. Visual Resources

The BLM portion of the project area is a Class III visual resource area (BLM 1988). According to the RMP, the objective of visual resource management (VRM) will be to maintain overall integrity of visual resources while allowing for modification and changes to occur to meet other resource objectives. The Forest Service portion of the project area is also in a Class III visual resource area. This visual quality area allows for modification, which allows management activities to be visually dominant. However, they must be harmonious with features of the natural landscape. Timber harvest units and roads are elements that may be found in a landscape that meets this VQO. Alterations to the landscape may not be in glaring contrast to natural forms. Partial Retention allows that alterations to the natural landscape may be apparent, but they are visually subordinate to natural features. Management activities such as timber harvesting and roading may occur, but they must be designed so they are not striking features (Forest Service 1990).

No Action Alternative

Alternative one would not directly impact current visual resources; processes outside the scope of the proposed fuels reduction would affect visual quality. With the No Action Alternative the possibility of increased fire risk could increase the risk of a severe crown fire, which would indirectly affect visual resources in the Hoback Ranches area.

Proposed Action Alternative

The Proposed Action would reduce the levels of hazardous fuels, which, in the short term, would have the direct effect of removing from view areas of overstocked forest that occur in the project area. In the long term, this activity would indirectly increase forest health, which in turn would keep the forest visually appealing. In general, fuel reduction would have nearly no visual effect on the landscape. The foreground view would potentially be perceptible in the short-term (one to five years). From middle and background views, effects are expected to be imperceptible. In the long-term, a high visual quality would result due to the improved forest health. Burning of slash piles may result in a short-term perceptible effect in color change in the immediate vicinity of the slash piles. Skid trails and landings would be rehabilitated to a natural appearance. The shaded fuel breaks, which would occur under all of the action alternatives, would be constructed in a visually appealing manner due to the close proximity of private homes and the objectives of the existing covenants. Alterations would be made within the constraints of the existing VQOs and all of the action alternatives would be in compliance with the VQO of Modification for this management area. Because no other activities are planned for the project area no cumulative effects are anticipated.

Alternatives Three, Four, and Five

These three action alternatives would reduce the levels of hazardous fuels to a lesser extent than the Proposed Action. Therefore the effects from these alternatives on the visual resources would similar to but less than those described above for the Proposed Action. Alternative Three would result in treatment on 2,576 acres and would have effects that are most similar to the Proposed Action. Fewer slash piles would need to be burned because fewer acres would be treated. Alternative Four would treat 1,286 acres and Alternative five would treat only 338 acres. The shaded fuel breaks would result in thinned areas along roads that would be constructed in a visually appealing manner.

4. Air Quality

The Bridger-Teton National Forest, with the exception of the Teton and Bridger Wildernesses, is a Class II area (Forest Service 1990). There are no non-attainment areas on the Bridger-Teton National Forest. Minor periodic occurrences of pollutants may occur during summer and fall wildfires, prescribed burning, and wood and coal smoke from home heating sources. Roads in the project area also contribute fugitive dust to the atmosphere. National Forest smoke management is coordinated with the State Air Quality Supervisor.

No Action Alternative

This alternative precludes the implementation of the fuels reduction and therefore no post-harvest burning would occur. Wildland fire suppression activities would continue as in the past. In the short term, the No Action Alternative would result in no change in smoke emissions but would maintain or increase potential wildland fire emissions for the long term. As the fuel loading increases, the incidence and intensity of wildland fires, and the smoke they produce, would increase. In addition, no temporary roads would be constructed and/or used under this alternative, and therefore fugitive dust would not be produced beyond the amount produced by existing activities.

Proposed Action Alternative

Project implementation related to the Proposed Action would include the burning of slash piles. This burning would take place in the fall and early winter months after the first accumulation of snow. Smoke produced from the post-harvest burning of slash piles under the action alternatives can have a direct effect on air quality and may impact local communities including residents of the Hoback Ranches and Bondurant. The impacts to air quality would be related to the amount of smoke produced, which varies with burning conditions and volume burned. The amount of smoke produced is influenced by the amount, type and timing of burning as well as weather conditions. Meteorological conditions, the type of vegetation present, the moisture content of the fuel, topography, and the total weight of consumable material available are all important variables.

The size of a single slash pile would vary in size depending on the harvest equipment used. After the timber is cruised and a prescription for treatment is developed, the area used and the volume of slash generated would be provided to the Forest Service Air Quality Specialist for input into a model to determine the emissions. This burning would not all occur in one day and days would be selected on which atmospheric conditions are such that drift of emissions would be into the upper atmosphere and away from developed areas. Slash pile burning would be in adherence to Wyoming State guidelines related to smoke emissions and a burn permit would be secured from the State prior to any burning.

All of the action alternatives have the potential to effect air quality through increased fugitive dust produced by vehicular traffic, especially on unpaved roads, and logging operations. The effects of fugitive dust, for each action alternative, are directly related to the volume of timber to be removed, and include reduced visibility on and adjacent to roads and increased levels of PM2.5 and PM10. The silt content of the road surface layer, the distance traveled, the weight and speed of the vehicle, as well as weather conditions would influence the amount of dust produced (Ferguson et al. 1999). Potential differences in amount of fugitive dust produced between the alternatives are based on the distance of road traveled, the size of the area harvested, and whether the construction of temporary roads is proposed. Road use in the area is not expected to increase and therefore existing impacts from road traffic would remain the same in the long term resulting in no cumulative effects.

Under the Proposed Action, 11.3 miles of temporary road construction is proposed as well as improvement to 5.7 miles of existing roads. In the short term, these efforts would cause an increase in fugitive dust for the immediate area.

No long-term effects to air quality are expected from the Proposed Action Alternative. In terms of cumulative effects, public and private burning occurs in the area in addition to burning of methane and natural gas wells that exist downwind of the project site. These activities have not resulted in violations of the state standards or NAAQS and therefore no cumulative effects to air quality that would result in exceedances of the standards are expected.

Alternatives Three, Four, and Five

All of the action alternatives have the potential to affect air quality through increased fugitive dust produced by vehicular traffic and logging operations. The effects of fugitive dust, for each action alternative, are directly related to the volume of timber to be removed. Potential differences in amount of fugitive dust produced between the alternatives are based on the distance of road traveled, the size of the area harvested, and whether the construction of temporary roads is proposed. As such, Alternative Five would produce the least amount of fugitive dust from logging operations.

Under Alternative Three, 11.3 miles of temporary road construction is proposed as well as improvement to 5.7 miles of existing roads. In the short term, these efforts would cause an increase in fugitive dust for the immediate area. Under Alternative Four, no new road construction is proposed but 5.7 miles of existing roads would still require some degree of improvement. This alternative would therefore result in a smaller increase in fugitive dust than either Alternatives Two or Three. Alternative Five does not involve any road construction or improvement and therefore no increases in fugitive dust would occur from these sources. No long-term effects to air quality are expected from any of the action alternatives.

Slash pile burning would occur under each of these alternatives. Because fewer acres would be treated under each of these in comparison to the Proposed Action, fewer slash piles would be needed. Alternative Three would treat 2,576 acres and would result in effects most similar to the Proposed Action. Alternative Four would treat 1,286 acres and require fewer slash piles and thus result in a smaller amount of smoke emissions. Alternative Five would involve only treatment in

the areas identified for shaded fuels breaks. These 338 acres would require the least number of slash piles of any of the action alternatives and therefore would result in the smallest increase in smoke emissions.

5. Water Quality

Monitoring has taken place to monitor potential water quality effects from the major resource programs and activities on the Bridger-Teton Forest. With only a few minor exceptions, the varied uses of the National Forest have had little effect on the water quality in the Forest. Road building in the past has been one activity that has increased the amount of sediment being carried by the streams. The major changes in the quality of stream water take place naturally in the spring of the year with snowmelt (Forest Service 1990). Overall, the water quality monitoring of the natural resource programs on the National Forest has not uncovered any widespread reduction in water quality which can be attributed to wildlife and range improvement practices, herbicide use, exploration and development of oil and gas, recreational activities, or timber harvesting (Forest Service 1990). Fisherman Creek, South Fork Fisherman Creek, and Sled Runner Creek, are all in the project area. The streams are in a healthy condition and no DEQ water quality issues have been identified in the project area (Smith 2003).

No Action Alternative

This alternative would not directly affect water quality because sediment yield, road densities, and the number of road-stream crossings would not change as a result of harvest or road-related activities. Existing fuel loads would continue to increase indefinitely, and the potential for a high severity, stand-replacing fires would increase. Indirect effects could occur in the event of catastrophic fire such as sedimentation and loss of stream shade. If a severe fire occurred, there could be a reduction in ground cover, an increase in seasonal runoff, and an increase in sediment delivery to the aquatic system in both the short and long-term.

Alternative Two

Road construction, tree cutting and removal, and site preparation, may cause non-point pollution that could affect water quality. Primary sediment producing activities include new temporary road construction and road reconstruction. Implementation of soil BMPs would mitigate the potential impacts of harvest and road construction, reconstruction, and maintenance activities. The proposed logging systems are designed to reduce the risk of increased sedimentation in the short and long term. Design criteria and BMPs would be applied to these activities to minimize the risk of sediment delivery to stream channels. No harvest would occur in the stream corridor buffer areas, as recommended by PACFISH, so vegetative filtering and soil infiltration would occur between the units and stream channels minimizing potential sediment delivery. No fertilizer or pesticide applications are planned as part of any of the action alternatives. After implementation of BMPs minimal direct or indirect effects are expected. No other activities are planned for the project area and therefore no cumulative effects are expected.

Alternatives Three, Four, and Five

Alternatives three, four, and five would have effects similar to the Proposed Action but to a lesser degree because each of these alternatives treats a progressively smaller number of acres and involves fewer miles of road construction. The same considerations, discussed above under the Proposed Action, would be taken if any of these alternatives were selected in order to minimize the potential for impacts to water quality.

Alternative Three involves thinning on 2,576 acres, the same amount of road construction as the Proposed Action, and 5.7 miles of road improvement, slightly less than the Proposed Action. Alternative Four would thin timber on 1,286 acres, would have the same amount of road improvement as Alternative Three, but would require no new road construction. Because no road construction or reconstruction is proposed under Alternative Five, and it would treat only 338 acres, it would have the least potential for impacts to water quality.

6. Noise

The Hoback Ranches subdivision is a relatively secluded and quiet community. Most, if not all, of the houses are vacation or seasonal residences and as such are not used year round. There is minimal noise from traffic, which only consists of residential vehicles; commercial traffic is prohibited.

No Action Alternative

The No Action Alternative would not directly or indirectly affect the amount of noise in the project area.

Proposed Action Alternative

Under Alternative Two, increased noise would directly result from the presence of logging equipment in the area, including the use of helicopters for logging, and from road construction and improvement. Effects would be short term in nature. The exact length would depend on the operator, prescription, weather, etc. A large timber operation could accomplish the Proposed Action in six weeks to three months. No long-term direct or indirect effects are anticipated. No increases in noise are anticipated from other activities in the area and therefore no cumulative effects are expected.

Alternatives Three, Four, and Five

Alternatives Three and Four would result in fewer noise impacts than Alternative Two due to the absence of helicopter logging from the alternatives. Noise impacts would still result from logging and road construction and improvement under Alternative Three, and from logging and road improvement under Alternative Four. Alternative Five does not include the use of helicopters or any road construction or improvement and therefore would result in the least increase of noise. Effects from all of the action alternatives would be short term in nature. The exact length would depend on the operator, prescription, weather, etc. No long-term direct or indirect effects are anticipated.

7. Cultural Resources

Both prehistoric and historic sites are expected in the project area. Prehistoric sites will likely consist of open camps and lithic scatters, although tipi rings, cairns, rock alignments, or other rock features may be located on ridges, knolls, or other high spots. Historic sites will likely consist of stock-raising related sites, homesteads, or rendezvous-era sites. These may be trash dumps or scatters, buildings or structures, and possibly cairns, or ephemeral short-term campsites. A Class I cultural resource inventory (literature search) was conducted for the project area. The literature search consisted of a file search (No. 8848) from the Wyoming State Historic Preservation Office, homestead patents, and examination of General Land Office maps (Appendix E). The file search revealed that three projects have occurred in the area and one site was recorded. Additionally, 12 homesteads are located, either wholly or in part, within the project area (North Wind, Inc. 2003).

No Action Alternative

Alternative 1, the No Action alternative, would not result in direct effects to cultural sites but has the potential to indirectly affect cultural resources. The lack of firebreaks may lead to fire, which would damage or destroy sites that may be NRHP eligible; particularly wooden structures associated with homesteading in the area.

Proposed Action Alternative

The Proposed Action has the potential to affect NRHP-eligible sites if any are located in the project area. The action will be subject to Section 106 of the National Historic Preservation Act and subject to a Class III level cultural resource inventory. No effect is anticipated because implementation of the Proposed Action Alternative would avoid cultural resource sites near the proposed fuels reduction sites. In the event an inadvertent discovery is made during implementation, all activities would be stopped until the BLM or Forest Service Archaeologist could evaluate the finding and make a determination as to whether the project could continue or not. No other activities are anticipated that would result in cumulative effects to cultural resources.

Alternatives Three, Four, and Five

Effects to cultural resources from Alternatives Three, Four, or Five would be similar to the Proposed Action but less likely due to the decrease in the number of acres treated under each alternative. Mitigations as stated under the Proposed Action would also be implemented under each of these action alternatives. No effect is anticipated because implementation of the action alternatives would avoid cultural resource sites near the proposed fuels reduction sites.

Biological Factors

1. Invasive Species/Noxious Weeds

Invasive species and noxious weeds tend to quickly spread into and dominate disturbance openings where sunlight is high and competition from other plants low. Noxious weeds are a threat to native ecosystems because they out-compete and displace native vegetation. Disturbed sites throughout the Bridger-Teton Forest have established infestations of noxious weeds. Some of the more common species that are known to occur both on the Forest and in Sublette County are: Canada thistle (*Cirsium arvense*), musk thistle (*Carduus notans*), spotted knapweed (*Centaurea maculosa*), and leafy spurge (*Euphorbia esula*) (Forest Service 1990 and University of Wyoming 2003). According to the Hoback Ranches Weed Plan, residents of Hoback Ranches have been identifying and eradicating noxious weeds from the area for a few years. The main species known to be present are musk thistle, bull thistle (*Cirsium vulgare*), Canada thistle, spotted knapweed, and black henbane (*Hyoscyamus niger*) (Hoback Ranches 2003). On Federal lands in areas that are known for or have the potential for invasion or spread of noxious weeds, spraying would occur through a contract with Sublette County.

No Action Alternative

Alternative one, the No Action Alternative, would not directly affect the spread of noxious weeds because no ground disturbing harvest related activities would take place. However, by allowing hazardous fuel levels to continue to increase, the likelihood of a large-scale, intense fire would increase. The creation of large openings from stand replacing fires and fire suppression activities would indirectly increase the likelihood of weed invasion into new areas. Additionally,

large-scale, intense fire would prepare an ideal seedbed for weed seed and further establishment of invasive weed species.

Proposed Action Alternative

Thinning, removal, piling and burning, and shaded fuel breaks are expected to improve overall forest health, increase forest floor vegetative diversity, and provide additional forage for wildlife. Under Alternative two, the Proposed Action, approximately 11.3 miles of temporary roads would be constructed and 5.7 miles of roads would need reconstruction or minor maintenance. This alternative would harvest approximately 3,726 acres of trees and represents the greatest amount of acreage of the action alternatives that would be harvested. Due to soil disturbances resulting from temporary road construction, construction equipment and vehicles, and thinning activities, the Proposed Action has the potential to indirectly increase the spread of weeds within the project area and poses a moderate risk of invasion by noxious weeds. However, since harvest activities are mandated to follow the Region 4 Noxious Weed Management Guidelines, the possibility of large-scale infestation would be minimized. No other activities are planned that would lead to the spread of invasive species and therefore no cumulative effects are anticipated.

Alternatives Three, Four, and Five

Alternatives Three, Four, and Five would have effects similar to the Proposed Action but to a lesser degree because each of these alternatives treats a progressively smaller number of acres and involves fewer miles of road construction.

Alternative Three involves thinning treatments on 2,576 acres as well as road construction and improvement. Disturbance associated with this alternative could result in an increase of invasive species and noxious weeds. Alternative Four involves fewer acres of treatment (1,286) and fewer miles of road work (5.7 miles) than either Alternative Two or Three and therefore would result in fewer disturbances. Consequently, there would be less potential for spread of invasive species and noxious weeds. Alternative Five would have the least potential for effects because it involves the least ground disturbance; 338 acres of treatment and no road construction. Mitigations would be applied to all action alternatives to minimize the potential for spread of invasive species and noxious weeds.

2. Special Status Species

This section describes the special status species with the potential to occur in the project area. Special status species addressed in this EA included Federally listed threatened, endangered, and proposed species, Forest Service Sensitive and Management Indicator Species (MIS), and BLM Sensitive Species. These lists of species were reviewed for the project area to assess the potential habitat and occurrence of these species (Table 4). There are no known special status plants or aquatic species in the project area. Where habitat requirements are not met in the project area (as indicated in Table 4), no further consideration is given to those species in this EA. Based on habitat requirements, the potential exists for 13 special status species to occur within the habitat type present in the project area.

A biological assessment (BA) examining the impacts of the proposed action on Federally listed species was prepared. The proposed project area does not contain suitable habitat for the black-footed ferret, mountain plover, yellow-billed cuckoo, whooping crane, Kendall Warm Springs dace, Colorado pikeminnow, bony-tailed chub, humpback chub, razorback sucker, or the Ute ladies'-tresses. Potential habitat exists for Canada lynx, grizzly bear, gray wolf, and bald eagle

and these species were addressed in the BA. The determinations are listed in Table 4 for all of these species and the detailed examination in the BA can be reviewed in the project file at the Pinedale Field Office.

Canada Lynx

The proposed project area contains potential suitable habitat for Canada lynx. The most recent sighting of a lynx within the project area was over 34 years ago and the most current sighting in the areas surrounding the project areas was 2 years ago. Currently there are no individuals known to inhabit the project area. However, due to the presence of suitable habitat and known past occurrences, there is the potential for lynx and/or their prey species to be present in the project area when fuels reduction activities take place, which would cause these species to avoid the project area. The noise and human activities do not reduce the suitability of the site for lynx.

Grizzly Bear

The proposed project area contains suitable habitat for grizzly bears, however the proposed project is located on the southern extent of the GYE, and a viable grizzly bear population has not been reestablished in this area. It is unlikely, but possible that a grizzly bear could be found within the project area.

Gray Wolf

The project area is within suitable wolf habitat, and wolves are known to use the area around Black Butte and south around Horse Creek. However, there are no denning or rendezvous sites known to occur within the project area. There is a vast area of habitat available adjacent to the project area for the primary prey species of wolves.

Table 4. Special Status Species List

Bald eagle *Haliaeetus leucocephalus*	Listed Threatened	Forest areas adjacent to lakes, rives, and large bodies of water that provide an ample prey base	Not likely	No effect
Grizzly bear *Ursus arctos horribilis*	Listed Threatened	Montane forests	Potentially	No effect
Gray wolf *Canis lupus*	Listed Experimental	Greater Yellowstone Ecosystem	Potentially	No effect
Black-footed ferret *Mustela nigripes*	Listed Endangered	Prairie dog towns	Not likely	No effect
Canada lynx *Lynx canadensis*	Listed Threatened	Montane forests	Potentially	May affect, not likely to adversely affect
Ute ladies'-tresses *Spiranthes diluvialis*	Listed Threatened	Seasonally moist soils and wet meadows of drainages below 7,000 feet elevation	Not likely	No effect
Colorado pikeminnow *Ptychocheilus lucius*	Listed Endangered	Lower Colorado watershed	Not likely	No effect
Bonytailed chub *Gila elegans*	Listed Endangered	Lower Colorado watershed	Not likely	No effect
Humpback chub *Gila cypha*	Listed Endangered	Lower Colorado watershed	Not likely	No effect
Razorback sucker *Xyrauchen texanus*	Listed Endangered	Lower Colorado watershed	Not likely	No effect
Kendall Warm Spring dace *Rhinichthys osculus thermalis*	Listed Endangered	Lower Colorado watershed	Not likely	No effect

Mountain plover *Charadrius montanus*	Proposed	Grassland and prairie dog towns	Not likely	No effect
Yellow-billed cuckoo *Coccyzus americanus*	Candidate, BLM Sensitive	Open woodlands, streamside willow and alder groves	Not likely	No effect
Dwarf Shrew *Sorex nanus*	BLM Sensitive	Mountain foothill shrub, grasslands	Potentially	No effect
Long-eared myotis *Myotis evotis*	BLM Sensitive	Conifer and deciduous forests, caves and mines	Potentially	May affect, not likely to adversely affect
Townsend's big eared bat *Plecotus townsendii*	USFS Sensitive	Conifer forests, caves, homes, and mines	Potentially	May affect, not likely to adversely affect
Spotted bat *Euderma maculatum*	USFS Sensitive	Conifer forests, caves and mines	Potentially	May affect, not likely to adversely affect
Pygmy Rabbit *Brachylagus idahoensis*	BLM Sensitive	Basin-prairie and riparian shrub	Not likely	No effect
White-tailed prairie dog *Cynomys leucurus*	BLM Sensitive	Basin-prairie shrub, grasslands	Not likely	No effect
Wolverine *Gulo gulo*	USFS Sensitive	Montane forests, conifer and deciduous forests, remote mountainous habitat with little disturbance	Not likely	No effect
Fisher *Martes pennati*	USFS Sensitive	Mature forests and riparian areas	Potentially	May affect, not likely to adversely affect
Idaho pocket gopher *Thomomys idahoensis*	BLM Sensitive	Shallow stony soils	Not likely	No effect
Three-toed woodpecker *Picoides tridactylus*	USFS Sensitive	Mature forests with bug-killed trees	Not likely	No effect
White-faced ibis *Plegadis chihi*	BLM Sensitive	Marshes, wet meadows	Not likely	No effect
Trumpeter swan *Cygnus buccinator*	BLM Sensitive USFS Sensitive	Lakes, ponds, rivers	Not likely	No effect
Northern goshawk *Accipter gentiles*	BLM Sensitive USFS Sensitive	Conifer and deciduous forests	Potentially	May affect, not likely to adversely affect
Harlequin duck *Histrionicus histrionicus*	USFS Sensitive	Undisturbed, low gradient mountain streams with healthy riparian components	Not likely	No effect
Common loon *Gavia immer*	USFS Sensitive	Lakes, ponds	Not likely	No effect
Ferruginous hawk *Buteo regalis*	BLM Sensitive	Basin-prairie shrub, grassland, rock outcrops	Not likely	No effect
Peregrine falcon *Falco peregrinus*	BLM Sensitive USFS Sensitive	Tall cliffs	Not likely	No effect
Greater sage-grouse *Centrocercus urophasianus*	BLM Sensitive	Basin-prairie shrub, mountain foothill shrub	Not likely	No effect
Long-billed curlew *Numenius americanus*	BLM Sensitive	Grasslands, plains, foothills, wet meadows	Not likely	No effect
Burrowing owl *Athene cunicularia*	BLM Sensitive	Grasslands, basin-prairie shrub	Not likely	No effect
Flammulated owl *Otus flammeolus*	USFS Sensitive	Mature conifer forests	Potentially	No effect
Great gray owl *Strix nebulosa*	USFS Sensitive	Mature forest and meadow openings	Not likely	No effect
Boreal owl *Aegolius funereus*	USFS Sensitive	Boreal coniferous forest	Not likely	No effect

Flammulated owl *Otus flammeolus*	USFS Sensitive	Mature Douglas fir forest	Not likely	No effect
Sage thrasher *Oreoscoptes montanus*	BLM Sensitive	Basin-prairie shrub, mountain foothill shrub	Not-likely	No effect
Loggerhead shrike *Lanius ludovicianus*	BLM Sensitive	Basin-prairie shrub, mountain foothill shrub	Not-likely	No effect
Brewer's sparrow *Spizella breweri*	BLM Sensitive USFS MIS	Basin-prairie shrub	Not-likely	No effect
Sage sparrow *Amphispiza billineata*	BLM Sensitive	Basin-prairie shrub, mountain foothill shrub	Not-likely	No effect
Northern leopard frog *Rana pipiens*	BLM Sensitive	Beaver ponds, permanent water in plains and foothills	Not-likely	No effect
Boreal toad (Northern Rocky Mountain population) *Bufo boreas boreas*	BLM Sensitive	Ponds margins, wet meadows, riparian areas	Not-likely	No effect
Spotted frog *Ranus pretiosa (lutieventris)*	BLM Sensitive USFS Sensitive	Ponds, sloughs, small streams	Not-likely	No effect
Meadow pussytoes *Antennaria arcuata*	BLM Sensitive	Moist, hummocky meadows, seeps or springs surrounded by sage/grasslands 4,950-7,900 feet	Not-likely	No effect
Trelease's milkvetch *Astragalus racemosus var. treleasei*	BLM Sensitive	Sparsely vegetated sagebrush communities on shale or limestone outcrops & barren clay slopes at 6,500-8,200 feet	Not-likely	No effect
Cedar Rim thistle *Cirsium aridum*	BLM Sensitive	Barren, chalky hills, gravelly slopes, & fine textured, sandy shaley draws 6,700-7,200 feet	Not-likely	No effect
Large-fruited bladderpod *Lesquerella macrocarpa*	BLM Sensitive	Gypsum-clay hills & benches, clay flats, & barren hills 7,200-7,700 feet	Not-likely	No effect
Beaver rim phlox *Phlox pungens*	BLM Sensitive	Sparsely vegetated slopes on sandstone, siltstone, or limestone substrates 6,000-7,400 feet	Not likely	No effect
Tufted Twinpod *Physaria condensata*	BLM Sensitive	Sparsely vegetated shale slopes & ridges 6,500-7,000 feet	Not likely	No effect
Pink agoseris *Agoseris lackschewitzii*	USFS Sensitive	Subalpine wet meadow, saturated soils at elevations ranging from 8500-10600 Flowering/Fruiting July-August	Not likely	No effect
Sweet-flowered rock jasmine *Androsace chamaejasme* ssp. *carinata*	USFS Sensitive	Montane rock crevices in rocky limestone or domolite soils at elevations ranging from 8500-10800, Flowering/Fruiting May-July	Not likely	No effect
Soft aster *Aster mollis*	USFS Sensitive	Sagebrush grasslands and mountain meadows in calcareous soils at elevations ranging from 6400-8500, Flowering/Fruiting July-September	Not likely	No effect
Payson's milkvetch *Astragalus paysonii*	USFS Sensitive	Disturbed areas and recovering burns on sandy soil at elevations ranging from 6700-9600, Flowering/Fruiting Jun-Aug/Jul-Oct	Potentially	May have positive or beneficial impacts
Wyoming tansymustard *Descuraania torulosa*	USFS Sensitive	Sparely vegetated sandy slopes at base of cliffs of volcanic breccia or sandstone at elevations ranging from 8300-10000, Flowering/fruiting July-September	Not likely	No effect

Boreal draba *Draba borealis*	USFS Sensitive	Moist north-facing limestone slopes and cliffs and shady stream sides at elevations ranging from 6200-8600, Flowering/Fruiting Jun-Aug/Jul-Sep	Not likely	No effect
Narrowleaf goldenweed *Haplopappus macronema* var. *linearis*	USFS Sensitive	Semi-barren, whitish clay flats and slopes, gravel bars, and sandy lake shores at elevations ranging from 7700-10300, Flowering/Fruiting July-September	Not likely	No effect
Payson's bladderpod *Lesquerella paysonii*	USFS Sensitive	Rocky, sparcely-vegetated slopes, often calcareous substrates at elevations ranging from 6000-10300	Not likely	No effect
Creeping twinpod *Physaria integrifolia* var. *monticola*	USFS Sensitive	Barren, rocky, calcareous hills and slopes at elevations ranging from 6500-8600, Flowering/Fruiting Jun-Jul/Jun-Aug	Not likely	No effect
Greenland primrose *Primula egaliksensis*	USFS Sensitive	Wet meadows along streams and calcareous montane bogs at elevations ranging from 6600-8000, Flowering/Fruiting May-Jul/Jun-Aug	Not likely	No effect
Pine Marten *Martes americana*	USFS MIS	Conifer and deciduous forests	Potentially	May affect, not likely to adversely affect
Elk *Cervus elaphus*	USFS MIS	High mountain pastures, conifer and deciduous forests and grasslands	Potentially	May affect, not likely to adversely affect
Mule deer *Odocoileus hemionus*	USFS MIS	Conifer and deciduous forests and grasslands, sagebrush communities	Potentially	May affect, not likely to adversely affect
Moose *Alces alces*	USFS MIS	Conifer and deciduous forests and grasslands, swamps and riparian habitat	Potentially	May affect, not likely to adversely affect
Bighorn sheep *Ovis canadensis*	USFS MIS	Semi-open steep rocky slopes, cliffs, and rugged canyons	Not likely	No effect

The following BLM and Forest Service Sensitive species have the potential to occur in the project area based on habitat requirements identified in Table 4. BLM and Forest Service sensitive wildlife species are discussed first followed by Management Indicator Species (MIS).

Northern Goshawk

Northern goshawks can be found in dense coniferous and deciduous forests. They prefer to nest in mature forests consisting of a combination of old growth trees with intermediate canopy coverage and small open areas that are used for foraging. The northern goshawk is carnivorous with a primary prey base of birds, mammals, and invertebrates. Goshawks that breed in the north and northwest part of North America typically migrate to warmer climates during the winter months (Hayward 1988). The project area contains potential roosting and foraging habitat for the northern goshawk. A survey for this species was conducted concurrently with the stand exam. While species were observed flying overhead, no nests were encountered in the areas surveyed. If nesting birds are encountered during fuels treatment activities, buffer zones will be established in consultation with the BLM and/or Forest Service wildlife biologist.

Fisher

Fishers are primarily solitary animals that have been found to use most forest cover types within the northern coniferous forests, but have been considered to favor late successional forests in the Pacific Northwest. Riparian areas are also considered important for fishers in Idaho (Ruggiero et al. 1994). Denning, resting, and foraging habitat consists of old growth communities with snags

or live trees with hollows that can be used for resting. Fishers are also known to use dense, young stands of lodgepole pine during the winter months. Potential habitat for the fisher exists within the project area; however, the fisher is not known to occur in Sublette County (Fertig and Beauvais 1999).

Long-eared Myotis, Townsend's Big-eared Bat, and Spotted Bat
These two bats and the myotis species are known to use buildings, rocky cliffs, caves, and occasionally trees, for roost sites. The long eared myotis is primarily found in coniferous forests. They roost in tree cavities and beneath exfoliating bark, and in live and dead snag trees. Pregnant females of this species may roost at ground level in rock crevices, fallen logs, and sawed off stumps. However, they cannot rear young in such vulnerable locations. Long-eared myotis bats capture prey in flight, but also glean stationary insects from foliage or the ground. Their main diet appears to consist of moths, and their relatively quiet echolocation calls are used to stock prey, as well as for maneuvering through cluttered habitats (Bat Conservation International 2004).

The Townsend's big eared bat roosts in desert scrub and pine forest habitats in the spring and summer. These bats forage after dark, using echolocation calls to hunt moths and other insects. Females form maternity colonies in mines, caves, or buildings. Males roost individually. In the winter males and females roost in colonies in hibernacula caves and abandoned mines. These bats are extremely sensitive to disturbance at their roosting sites and have suffered severe population declines throughout much of the U.S. (Bat Conservation International 2004).

Initially the spotted bat was thought to be extremely rare, now it is known to occupy a rather large range throughout central western North America from southern British Columbia to northern Mexico. The spotted bat roosts high in cliff crevices making it difficult to observe and unlikely to be harmed by humans (Bat Conservation International 2004). This bat has also been observed in pine forests at high elevations (7,475 feet), pinyon pine juniper habitats, and open scrub desert habitats (Allen 2004). This bat appears to feed almost exclusively on moths, which it captures high above the ground. This is one of the few bats that use echolocation frequencies low enough to be audible by humans (Bat Conservation International 2004).

There are no buildings, cliffs, or caves located within the proposed project area. However there are residential structures located on private land adjacent to the areas proposed for treatment. There is potential habitat for these species within the project area, but of these three species only the long-eared myotis is known to occur within Sublette County (Fertig and Beauvais 1999).

Dwarf Shrew
This species is primarily found in montane areas and has been collected from areas ranging from rockslides in subalpine and alpine zones to dry, shortgrass prairies. The proposed project area contains potential habitat for the dwarf shrew, however there has been no documented occurrence of the dwarf shrew in Sublette County (Fertig and Beauvais 1999).

Payson's milkvetch
Payson's milkvetch is an early successional stage plant requiring disturbance to persist. Surveys by the Nature Conservancy have located populations of Payson's milkvetch on the Pinedale and

Big Piney Ranger Districts. Areas where populations are located have been intensively managed for timber since the 1960's, providing the required disturbance. Based on available data, Payson's milkvetch favoring disturbance, it's likely that over the long-term there will be a "positive or beneficial impact".

Management Indicator Species

Pursuant to the National Forest Management Act, the Forest Service must maintain viable populations of native and desired non-native species. The vast number of wildlife species found on the Bridger-Teton National Forest precludes special consideration of every species. Instead, select species were identified in the Forest Plan as MIS. The use of MIS allows reasonable assessments on the impacts of land management activities to wildlife resources. The current Federal ESA-listed species are used as MIS species on the Bridger-Teton National Forest (these species were discussed in the BA). Elk, deer, and moose are also listed as MIS because of their economic importance as game species. The pine marten and Brewer's sparrow are MIS for ecological indicator species for old growth forests and sagebrush communities. (The Brewer's sparrow is listed as a BLM sensitive species and was addressed in Table 4). More detail about each of these other species is provided below. Surveys for additional raptors were also carried out and are discussed below.

Ungulates (Elk, Deer, and Moose)

These species are known to use a wide variety of habitats ranging from forested areas (cover) to grasslands (foraging) to riparian areas, swamps, rivers and the edge of lakes (foraging). The proposed project area is known to be within a deer and elk migratory corridor, which is used to travel from high elevation summer habitat to low elevation winter range. There is a hunting season for each of these animals that provides a great economic value to the surrounding communities and agencies.

Pine Marten

Martens are limited to conifer-dominated forests and nearby vegetation types. In most studies of marten habitat use, martens were found to prefer late-successional stands of mesic coniferous forests, especially those with complex physical structures near the ground. Down logs and snags provide refuge and den sites (Buskirk and Ruggerio 1994). In the northern Rocky Mountains, martens have been found to prefer stands dominated by mesic subalpine fir, Douglas fir, and lodgepole pine if the appropriate dense understory complex is present. Even though the project area contains potential habitat, there have been no pine martens identified within Sublette County (Fertig and Beauvais 1999).

Raptors

As part of this study, surveys for Swainson's hawks (Buteo swainsoni), Ferruginous hawks (Buteo regalis), and flammulated owls (Otus flammeolus) were conducted concurrently with the stand exam activities. While suitable habitat for these species exists within the survey area, no individuals or nests were encountered during the surveys.

No Action Alternative

Existing habitat conditions would be maintained under the No Action Alternative. Natural changes (from fire, insects, disease, and aging) and human-caused changes (fire suppression) would continue to affect the project area. In the absence of fire, an older, more structurally

complex stand would result, possibly improving or maintaining habitat for mature forest species, with eventual elimination of existing openings due to forest encroachment. There would be direct and indirect effects associated with Alternative one. These would result from the continued fuel buildup from natural succession, leaving the potential for stand replacing fires that could destroy potential habitat for northern goshawk, fisher, snowshoe hare, pine martens, and other wildlife species. Crown fires would result in habitat loss for cavity nesters, would reduce security cover for big game, and would reduce foraging and habitat for lynx and other wildlife. Another indirect effect would be further closure of the canopy, which would reduce light reaching the forest floor. This would limit the growth of the understory vegetation that is used as forage for ungulates. Under the No Action Alternative, existing habitat would remain the same for raptors, although the risk of a large wildfire that could destroy much of the habitat would be higher.

Proposed Action Alternative

Potential effects to special status species could result from habitat alteration and disturbance or displacement due to implementation of the Proposed Action Alternative. The areas of the proposed project associated with fuel breaks will have the greatest impact on lynx habitat. The removal of the brush in these areas removes potential habitat for the snowshoe hare. The thinning and harvest activities within the project area would open the canopy increasing the amount of light that reaches the forest floor which would promote increased growth of the understory vegetation and shrub communities, increasing potential habitat for lynx prey. The initial implementation of the project may have an negative affect; however these impact are not anticipated to be long lived and overall the increased forest health would eventually increase suitable lynx habitat within the project area.

The following conservation measures are intended to conserve the lynx, and to reduce or eliminate adverse effects from the spectrum of management activities on federal lands. Complete a comparison of historical and current ecological processes and vegetation patterns, such as age-class distributions and patch size characteristics on a broad-scale assessment of landscape patterns. In the absence of guidance developed from such an assessment, limit disturbance within each lynx analysis unit (LAU) as follows: if more than 30 percent of the habitat within a LAU is currently in unsuitable condition, no further reductions of suitable conditions shall occur as a result of vegetation management activities by federal agencies. Management actions (e. g., timber sales, fuels treatments) shall not change more than 15 percent of lynx habitat within a LAU to an unsuitable condition within a 10-year period. Within a LAU, maintain denning habitat in patches generally larger than 5 acres, comprising at least 10 percent of lynx habitat. Where less than 10 percent denning habitat is currently present within a LAU, defer any management actions that would delay development of denning habitat structure. Connectivity of habitat shall be maintained wherever possible, within and between LAUs. In aspen stands within lynx habitat harvest prescriptions shall favor regeneration of aspen.

Important habitat components such as snags and riparian zones would be retained at levels necessary to preserve the value of the habitat, but at concentrations that are low enough to meet fuels reduction objectives. Temporary disturbance of wildlife would occur during tree removal and creation of the firebreaks. The increased noise and human activity would cause gray wolves (and their prey base), grizzly bear, and other sensitive species to avoid the project area during harvest activities.

Scattered large standing dead trees may be left on sight as raptor perches and possible nest areas. Trees with observed nests would be left in place and where possible a buffer of trees would also be left around the nest site. Snags would be left at a number above that required and would be clustered as much as possible. Some down and dead material would be left to benefit species such as the pine marten. Road clearing and harvest activities would create areas of early seral stage vegetation, particularly along skid trails and landings. The early seral habitat and stand thinning would increase ungulate forage habitat and potentially increase prey base for wolves in the project area. This project is not expected to have a measurable negative effect on bird populations because of the limited extent of the habitat removal. Generalist species would be minimally affected especially by displacement during project implementation. Some cover would be lost which may affect fall and winter habitat due to the thinning of trees. In the fuel breaks areas in addition to the thinning of trees understory would be removed resulting in a loss of this type of cover as well. The action alternatives would meet all applicable Standards and Guidelines from the Forest Plan and the RMP. Species-specific effects are described below.

The Proposed Action could change habitat quality or suitability but would not render habitat unsuitable for the sensitive species with the potential to occur in the project area. Removal of snags could result in reduced availability of perch and roost trees, potential nest sites, and foraging opportunities. However, mitigations related to snags should ensure that an adequate number remain where available. Coarse woody debris, which is important for cover, feeding, resting, and denning sites, would be reduced, but again mitigation would ensure that some downed material is retained. Additionally any nest/den sites that are found would be protected. It is unlikely that the Proposed Action would result in any long-term adverse impacts to sensitive species associated with this type of mature forest.

The project area contains potential roosting and foraging habitat for the northern goshawk. The thinning of trees associated with the proposed project would increase openings, which would increase the foraging area. The increased noise and human activity associated with the thinning and harvesting activities would likely cause individuals to avoid the area, but this would only be temporary while the actual thinning and harvesting activities are occurring, and would be limited to those immediate areas where activities are occurring. No other activities are planned for the project area and therefore no cumulative effects are expected. The proposed action may affect, but is not likely to adversely affect the northern goshawk.

Even though potential habitat for the fisher exists within the project area, the fisher is not known to occur in Sublette County (Fertig and Beauvais 1999). The thinning and harvesting activities would indirectly reduce potential habitat by reducing the general age of the forest stands resulting in less favorable denning habitat. However it would promote young lodgepole pine stands that have been identified as winter foraging habitat. No other activities are planned for the project area and therefore no cumulative effects are expected. The proposed action may affect, but is not likely to adversely affect the fisher.

There is potential habitat for the long-eared myotis, Townsend's big-eared bat, and spotted bat within the project area, however the Proposed Action is not anticipated to directly or indirectly affect these species due to their foraging methods and preferred roost habitat. No other activities

are planned for the project area and therefore no cumulative effects are expected. The proposed action may affect, but is not likely to adversely affect the long-eared myotis, Townsend's big-eared bat, and spotted bat.

The proposed project area contains potential habitat for the dwarf shrew, however there has been no documented occurrence of the shrew in Sublette County (Fertig and Beauvais 1999). Because the dwarf shrew is not expected to occur in the project area, the proposed activities are not anticipated to directly or indirectly affect the dwarf shrew. No other activities are planned for the project area and therefore no cumulative effects are expected. The proposed action will have no effect on the dwarf shrew.

The proposed project area contains potential habitat for the Payson's milkvetch. No Payson's milkvetch are known to occur in the project area and therefore no direct effects to the species are expected. However, the ground disturbance associated with the proposed activities would increase potential habitat for this species. Therefore, the proposed project may have a positive and/or beneficial indirect effect by increasing suitable habitat for the Payson's milkvetch.

In the short-term the proposed actions are anticipated to cause direct disturbance to ungulates and other MIS species resulting in avoidance of the activity area due to increased human activity and increased noise due to harvest and thinning activities. The loss of cover may directly affect fall and winter habitat for these species. However, the reduction in canopy cover would increase the amount of light that reaches the forest floor, promoting an increased growth rate of understory vegetation that is used as foraging material. This increased vegetative diversity and forage would indirectly benefit elk, deer, and moose in the long term. The increased complexity of the understory would also increase potential habitat for the pine marten. The pine marten has not been documented to occur in Sublette County (Fertig and Beauvais 1999) and the Proposed Action may affect potential habitat but it is not anticipated to directly affect any individuals. No other activities are planned for the project area and therefore no cumulative effects are expected. The proposed action may affect, but is not likely to adversely affect MIS species.

If nesting raptors are encountered during fuels treatment activities, buffer zones would be established in consultation with the BLM and/or Forest Service wildlife biologist(s). Under each of the action alternatives, portions of the forest would be treated and dense areas would be opened up. Removal of trees would reduce available perches and nesting habitat, however, snags and trees with cavities would be left standing and clustered where possible. The presence of open spaces would create a more favorable hunting habitat for these species and would enhance habitat for the prey base of these species. No other activities are planned for the project area and therefore no cumulative effects are expected. The proposed action may affect, but is not likely to adversely affect the swainson's hawk, ferruginous hawk, and the flammulated owl.

Alternatives Three, Four, and Five

Effects under Alternatives Three, Four, and Five would be similar to those from the Proposed Action Alternative but slightly less because these three alternatives involve fewer acres of treatment. Alternative Three would eliminate some of the areas of harvest because of the omission of helicopter logging and would therefore leave some areas with a more complex understory. Areas with a complex understory could potentially provide denning habitat for Canada lynx and other species. Additionally, the omission of helicopter logging would reduce

the potential for noise disturbance. Noise levels would still increase because of the presence of logging equipment in other areas but there would be less of an effect in the specific activity area where the helicopter logging is proposed under Alternative Two.

Alternative Four, which also eliminates the use of helicopters, would result in even less habitat disturbance because fewer acres are proposed for treatment and no temporary road construction would occur. Alternative Five proposes only 338 acres of treatment and therefore involves the least disturbance. However, by decreasing the harvest area, the potential for a catastrophic, stand-replacing fire that could potentially affect all wildlife species within the area is greater than with the other action alternatives.

Socioeconomic Factors

1. Cost

The cost of the treatment would depend upon the extent of the area treated and the implementation method(s) selected. Helicopter logging is more expensive than the ground-based systems that are proposed. However, because of increased demand, there are more helicopter logging companies operating in the Inland Northwest than in the past resulting in increased competition and lower logging costs. Currently, helicopter logging costs generally run from a minimum of $250/MBF to well over $300/MBF and are usually three to five times higher than traditional logging costs. These figures include all costs associated with harvesting logs and delivering them to a nearby sawmill. Commercial loggers from outside of the immediate area, most likely from Idaho or Montana, would likely remove the timber.

No Action Alternative

There is no cost of implementation associated with the No Action Alternative. Due to the increased risk of a large wildland fire however, high suppression costs could be an indirect result. There is also the potential for loss of houses on private property, which are of great economic value to the community.

Proposed Action Alternative

The cost of the Proposed Action Alternative would be higher than the other action alternatives. The Proposed Action involves the greatest number of acres for harvest, including acres proposed for harvest with helicopter logging, and the greatest amount of road construction and improvement. Although helicopter logging has its limitations and is expensive, costs are lower than in the past and there is virtually no soil disturbance because timber is lifted vertically and flown out rather than being skidded across the forest floor. No cumulative effects are anticipated.

Alternatives Three, Four, and Five

Alternatives Three, Four, and Five would cost less than the Proposed Action because each of these alternatives treats a progressively smaller number of acres and involves fewer miles of road work. In addition no helicopter logging is proposed under any of these alternatives. Costs associated with Alternative Three would be the same as Alternative two with the exclusion of the costs of helicopter logging because those areas are not included. Alternative Four would cost even less because it removes additional acres from potential treatment and excludes any new road construction. Because only 338 acres would be treated and no road construction or

reconstruction is proposed under Alternative Five, it would cost the least of any of the action alternatives.

Cumulative Effects and Effects Summary

Cumulative effects result from incremental impacts of the proposed action and other past, present, and reasonably foreseeable future actions. Road building, residential development, human activities, recreation, fire control, livestock grazing, and other multiple use activities to different degrees have previously affected portions of the proposed project area. Recreation activities within the project area, such as hunting, OHV use, and camping, may result in the disturbance of Federally listed, BLM and Forest Service special status wildlife species. Incidental mortalities of these species may result from shooting or vehicle strikes, while the project area is used for recreational activities.

The invasion of non-native species and subsequent noxious weed treatment, prescribed fire and fire suppression, timber harvest activities, and recreation use could affect the vegetation and wildlife species within the project area. Currently, fuels treatment activities are occurring on some private lands between the BLM and Forest Service lands in the general area. A private land grant through the State Forestry Office has resulted in the development of some fuel reduction activities around homes in the Hoback Ranches community. Opportunities under that grant ended in September 2003. There is also a Forest Land Enhancement Program with funds available to help homeowners implement fuels reductions around their homes. It is anticipated that this would result in minimal or no changes in the area (Halbeck 2003).

The effects of this project are expected to be negligible. The planned activities would not result in any irreversible or irretrievable commitment of resources that would foreclose the formulation or implementation of reasonable and prudent alternatives under Section 7 of the ESA. Because no other projects are planned for the project area, no cumulative effects are anticipated.

Ground disturbance that typically occurs during harvest activity may result in an increased risk of soil erosion and transport of sediment to stream channels. Soil compaction may result from project activities and can cause a higher percentage of precipitation to runoff, in turn, increasing erosion rates and reducing soil moisture content. This would be mitigated using standard erosion control practices and therefore the Proposed Action is not expected to significantly affect the soils resource.

Thinning, tree removal, and creation of shaded fuel breaks between BLM, Forest Service and private lands would directly reduce the chance of wildland fire spreading from private to public land and from public to private land. In addition, firefighter access would be enhanced, firefighter safety would be increased and effectiveness of aerial suppression techniques would be improved.

In general, fuel reductions would have no long-term visual effect on the landscape. Burning of slash piles may result in a short-term perceptible impact in color change in the immediate vicinity of the slash piles. Skid trails and landings would be rehabilitated to a natural appearance.

All of the action alternatives have the potential to impact air quality through fugitive dust increases and post-harvest burning of slash piles in the short term. No long-term effects to air quality are expected from any of the action alternatives. In terms of cumulative effects, public and private burning occurs in the area in addition to burning of methane and natural gas wells that exist downwind of the project site. These activities have not resulted in violations of the state standards or NAAQS and therefore no cumulative effects to air quality that would result in exceedances of the standards are expected.

Implementation of BMPs would mitigate the potential for impacts to water quality from the forest treatment and road construction, reconstruction, and maintenance activities. No harvest would occur in riparian areas, so vegetative filtering and soil infiltration would occur between the units and stream channels minimizing potential sediment delivery. After implementation of BMPs, minimal direct or indirect effects are expected.

Increased noise would directly result from the presence of logging equipment in the area, including the use of helicopters for logging, and road construction and improvement, during the implementation of the project. Effects from all of the action alternatives would be short term in nature. No long-term direct or indirect effects are anticipated.

No effect is anticipated to cultural resources because cultural resource sites near the proposed fuels reduction sites would be avoided. In the event an inadvertent discovery is made during implementation, all activities would be stopped until the BLM or Forest Service Archaeologist could evaluate the finding and make a determination as to whether the project could continue or not.

Thinning, removal, piling and burning, and shaded fuel breaks are expected to improve overall forest health, increase forest floor vegetative diversity, and provide additional forage for wildlife. Due to soil disturbances resulting from temporary road construction, construction equipment and vehicles, and thinning activities, the Proposed Action has the potential to indirectly increase the spread of weeds within the project area and poses a moderate risk of invasion by noxious weeds. However, since harvest activities are mandated to follow the Region 4 Noxious Weed Management Guidelines, the possibility of large-scale infestation would be minimized.

Potential effects to special status species could result from habitat alteration and disturbance or displacement due to implementation of the Proposed Action Alternative. Temporary disturbance of wildlife would occur during tree removal and creation of the firebreaks. Some cover would be lost which may affect fall and winter habitat for some species. The action alternatives would meet all applicable Standards and Guidelines from the Forest Plan and the RMP. The Proposed Action could change habitat quality or suitability but would not render habitat unsuitable for the sensitive species with the potential to occur in the project area and would not adversely affect special status species.

LIST OF PREPARERS/PUBLIC/AGENCIES CONSULTED

The following individuals were consulted during the development of this EA:

ID TEAM MEMBERS:
Nick Schultz, BLM COR
Curt Yanish, BLM COR
Paul Hutta, USFS COR
Kierson Crume, BLM Archeologist
Neil Schiche, BLM Forester
Pauline Schuette, BLM Wildlife Biologist
Lisa Solberg, BLM Wildlife Biologist
Dave Vlcek, BLM Archeologist
John Westbrook, BLM Wildlife Biologist

OTHER BLM AND USFS STAFF:
George Aitchison, BLM
Keith Andrews, BLM
Ken Bailey, USFS
Dennis Barron, USFS
Levi Broyles, USFS
Steve Harmon, USFS
Jennifer Johnson, USFS
Tom Johnston, USFS
Sherrill King, BLM
Steve Laster, BLM
Bob Means, BLM
Doug Powell, BLM
Karen Rogers, BLM
Jamie Schoen, USFS
Wes Smith, USFS

FEDERAL, STATE, AND LOCAL AGENCIES:
Ann Belleman, U.S. Fish and Wildlife Service
Chris Halbeck, Wyoming State Forestry
Ron Reckner, USDA Soil Conservation Service
Scott Smith, Wyoming Game and Fish

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APPENDIX A – Glossary

- **Aspen release treatments** – actions designed to promote regeneration of declining aspen stands. Actions may include prescribed fire, mechanical, and hand techniques.
- **Commercial thinning** – all or part of the felled trees are extracted for useful products.
- **Compartment** - a geographic unit defined for the purposes of forest administration and inventory. The boundaries follow permanent physical features or legal demarcation where appropriate.
- **Conventional logging** - any combination of mechanical or hand felling and rubber-tired or tracked skidding equipment. In the interior, cable logging is not considered conventional; on the coast, it is.
- **Cutting cycles** - the planned, recurring interval of time between successive cuttings in a stand.
- **Cut period** - the interval between major harvesting operations in the same stand.
- **Desired future stand condition** - a description of the characteristics of the future stand.
- **Fuel management** - the planned manipulation and/or reduction of living or dead forest fuels for forest management and other land use objectives (such as hazard reduction, silvicultural purposes, wildlife habitat improvement) by prescribed fire, mechanical, chemical, or biological means and/or changing stand structure and species composition.
- **Ground-based systems** - logging systems that employ ground-based equipment such as feller-bunchers, hoe chuckers, skidders, and forwarders.
- **Harvest schedule** - a document listing the stands to be harvested for a year or period, usually showing types and intensities of harvests for each stand, as well as a timetable for regenerating currently non-productive areas.
- **Highlead system** - logging system that uses cables rigged to a spar high above the ground so that one end of the logs can be lifted during yarding.
- **Improvement cutting** - the removal of trees of undesirable species, form, or condition from the main canopy of the stand to improve the health, composition, and value of the stand.
- **Ladder fuels** - fuels that provide vertical continuity between the surface fuels and crown fuels in a forest stand, thus contributing to the ease of torching and crowning. Note: Arrangement of natural fuels is an important factor affecting the type of fire that could occur in an area. This includes not only the amount of forest litter and the density of the trees, but also the heights and adjacent fuels. Grass fires do not easily ignite tree canopies. But so-called ladder fuels can allow flames to escalate from grass to bushes to lower tree limbs.
- **Limbing** (or pruning) – the removal of limbs on the lower bole to reduce risk of fire spreading from the ground surface to the tree crown.
- **Marking guides –** specified guidelines for marking the timber to achieve a desired future condition**.**

- **Mechanical treatments** - use of heavy equipment, power or hand tools to modify fuels in a treatment area.
- **Merchantable timber** - a tree or stand that has attained sufficient size, quality, and/or volume to make it suitable for harvesting.
- **Merchantable volume** - the amount of sound wood in a single tree or stand that is suitable for marketing under given economic conditions.
- **Prescription** - a course of management action prescribed for a particular area after specific assessments and evaluations have been made.
- **Prescribed fire** - the knowledgeable application of fire to a limited land area under controlled conditions by forest management experts to accomplish specific objectives. In addition to removing litter, prescribed fires may also be intended to thin out competing vegetation or to prepare an area for the natural growth of vegetation more resistant to ignition and fire spread.
- **Pre-commercial thinning** - the removal of excess and undesirable trees from a stand before the thinnings have any commercial value.
- **Regeneration** - the renewal of a tree crop through either natural means (seeded on-site from adjacent stands or deposited by wind, birds, or animals) or artificial means (by planting seedlings or direct seeding).
- **Residuals** (residual trees) - trees left standing after harvesting.
- **Road location line** - the marked location of proposed roads.
- **Road deactivation** - measures taken to stabilize roads and logging trails during periods of inactivity, including the control of drainage, the removal of sidecast where necessary, and the re-establishment of vegetation for permanent deactivation.
- **Salvage harvesting** - logging operations specifically designed to remove damaged timber (dead or in poor condition) and yield a wood product. Often carried out following fire, insect attack or windthrow.
- **Sanitation treatment** - tree removal or modification operations designed to reduce damage caused by forest pests and to prevent their spread.
- **Shaded fuel breaks** - 15 to 20 feet crown spacing with a width twice the height of the tallest trees growing at the margins of the break (150 and 250 feet).
- **Shelterwood silvicultural system** - a silvicultural system in which trees are removed in a series of cuts designed to achieve a new even-aged stand under the shelter of remaining trees.
- **Short span skyline** – skyline yarding system with a relatively short distance of operability. Usually 4-500 feet slope distance.
- **Silviculture treatment** - any silviculture activity on forest stands to meet stand-specific objectives.

- **Skid road** - a bladed or backhoe-constructed pathway where stumps are removed within the running surface as necessary. Skid roads are suitable only for tracked or rubber-tired skidders bringing trees or logs from the felling site to a landing.
- **Skid trail** - a random pathway traveled by ground skidding equipment while moving trees or logs to a landing. A skid trail differs from a skid road in that stumps are cut very low and the ground surface is mainly untouched by the blades of earth moving machines.
- **Slash disposal** - method by which slash is arranged.**Slash** - the residue left on the ground as a result of forest and other vegetation being altered by forest practices or other land use activities.**Stand** - a community of trees sufficiently uniform in species composition, age, arrangement, and condition to be distinguishable as a group from the forest or other growth on the adjoining area, and thus forming a silviculture or management entity.
- **Thinning** - a cutting made in an immature crop or stand primarily to accelerate diameter increment but also, by suitable selection, to improve the average form of the trees that remain.
- **Timber** - trees, whether standing, fallen, living, dead, limbed, bucked or peeled.
- **Travel management plan -** system of roads and skid trails needed to accomplish management objectives.
- **Treatment prescription** - operational details required for carrying out individual silviculture activities such as site preparation and planting.
- **Utilization standards** - the dimensions (stump height, top diameter, base diameter, and length) and quality of trees that must be cut and removed from land during harvesting operations.
- **Viewshed** - a physiographic area composed of land, water, biotic, and cultural elements which may be viewed and mapped from one or more viewpoints and which has inherent scenic qualities and/or aesthetic values as determined by those who view it.
- **Waterbar** - a shallow ditch dug across a road at an angle to prevent excessive flow down the road surface and erosion of road surface materials.
- **Yarding** (yarding systems) - in logging, the hauling of felled timber to the landing or temporary storage site from where trucks (usually) transport it to the mill site. Yarding methods include cable yarding, ground skidding, and aerial methods such as helicopter and balloon yarding.

APPENDIX B – Standards and Guidelines

- **Slash piles -** Piles will be placed in openings at least 150 feet from forest areas. Piles will be tightly compacted to ensure a complete burn. Piles will be burned after two seasons when a 12-inch snow layer is on the ground and cold temperatures are predicted for the next several days.

- **Riparian Area Buffer** - U.S. Forest Service standards will be observed when determining buffer distance for harvest activities near riparian and wetland areas.

- **Skid trails** - Use designated skid trails and design skid trails to be as straight as possible to avoid scarring trees on the inside of turns.

- **Limbing -** Removing branches at the tree bole (trunk) up 16 feet from the ground. (Avoid injury to the main stem by cutting branch ½ inch out from the bole).

- **Standard fuel break** - Openings usually as wide as twice the length of the tallest trees. Openings completely cleared of woody vegetation.

- **Shaded fuel break** - Usually created adjacent to roads or openings. Trees adjacent to roads are spaced widely apart. Spacing of trees decreases as the fuel break moves away from the road into the forest. All surface woody vegetation is removed. All tree limbs and other ladder fuels are removed to a height of 12 to 16 feet above ground surface. Shaded fuel breaks should be 100 to 150 feet on either side of the road.

APPENDIX C – BLM Fuels Treatment Recommendations

1.1 Forestland

Considerations include topographic location, slope steepness, predominant wind direction, and the amount and arrangement of surface, ladder, and crown fuels when developing fuels treatment prescriptions. Prescriptions for forested compartments within the project area incorporate the following components: legal access, travel management (skid roads and trails excluded), silvicultural system, landing locations, species composition, basal area (merchantable timber species >7.9 inches diameter at breast height (DBH)), total average tree height and diameter (all species), average tree age (by species), marking guides, yarding system, slash disposal, cutting cycle (entry schedule), and additional information (see Appendix A – Glossary).

1.1.1 Ground-Based Yarding

Compartment A – This 242.6 acre compartment contains stands with an average basal area (BA) of 140 square foot/acre (sq. ft./ac). Few if any insect or disease problems were seen in this compartment.

Travel management – Access from the north through Capron property. Existing road will need to be improved for approximately 1/3 mile where road will fork to the east Road A1 (R-A1) and to the southwest Road A2 (R-A2). Both R-A1 and R-A2 will be newly developed roads.

Silvicultural system – Individual tree selection.

Landings – (L-A1 and L-A2) will be established at the ends of R-A1 and R-A2.

Species composition – 35% Douglas-fir; 35% Lodgepole Pine; 25% Sub-alpine fir; 5% Engelmann Spruce.

Average tree height – 78 feet (ft.); Average tree diameter: 16 inches (in.).

Average age – Douglas-fir 198 years; Engelmann spruce 150 years; Lodgepole pine 94 years.

Marking guides – leave tree mark. Select Douglas-fir and Engelmann spruce as leave trees when health and form class allows. Avoid retention of sub-alpine fir and encourage the removal of this species if possible. Lodgepole pine is reaching the end of its rotation age and should be selected for harvest when possible.

Slash disposal will involve limbing and bucking at the landing and piling slash including tops and limbs in openings (See Appendix B for Standards and Specifications).

Cutting cycle – harvest timber to 100 square feet basal area per acre. Commercial thin from below leaving dominant, healthy trees making up the residuals (After initial entry, monitor residual stands for windthrow and insect and disease problems. Modify cutting cycle to allow for salvage and sanitation cuts if necessary). A second entry is recommended in ten years that

would leave a residual stand of 80 square feet basal area per acre. In the event successful regeneration is occurring, a third and final entry will occur in 15 years leaving a residual stand of no less than 40 square feet basal area per acre of dominant, healthy trees.

Additional information - Care should be taken to protect regeneration during harvest activities.

Compartment B – This 107.1 acre compartment contains stands with an average BA of 150 sq. ft./ac. Few insect or disease problems were seen in this compartment except for some western balsam fir beetle in the sub-alpine fir.

Travel management plan - access from the northeast through Capron property. A creek crossing will need to be made below Capron's home at the fork with Road-A upstream from his well location. The road (R-B) will then proceed southwest following the existing ATV trail, and will need to be improved.

Silvicultural system – Individual tree selection.

Landings – (L-B1 and L-B2) will be established along R-B1 and R-B respectively.

Species composition – 25% Douglas-fir; 17% lodgepole Pine; 58%; sub-alpine fir.

Average tree height – 71 feet (ft.); Average tree diameter: 14 inches (in.).

Average age – Douglas-fir 159 years; Engelmann spruce 96 years; lodgepole pine 92 years.

Marking guides – leave tree mark.

Slash disposal will involve limbing and bucking at the landing and piling slash including tops and limbs in openings. (See Appendix B for Standards and Specifications.)

Cutting cycle – Harvest timber to 110 square feet basal area per acre. Commercial thin from below leaving dominant, healthy trees making up the residuals (After initial entry, monitor residual stands for windthrow and insect and disease problems. Modify cutting cycle to allow for salvage and sanitation cuts if necessary). After initial harvest a second entry is recommended in ten years leaving a residual stand of 80 square feet basal area per acre. In the event successful regeneration is occurring, a third and final entry will occur in 15 years leaving a residual stand of no less than 40 square feet basal area per acre of dominant, healthy trees.

Additional information - after initial entry, monitor residual stands for windthrow and insect and disease problems. Modify cutting cycle to allow for salvage and sanitation cuts if necessary. Care should be taken to protect regeneration during harvest activities.

Compartment C – This 104.7 acre compartment contains stands with an average BA of 120 sq. ft./ac.

Insects and diseases – Douglas-fir beetle was found in 20% of the Doulas-fir in this compartment; western balsam fir beetle was found in 50% of sub-alpine fir.

Travel management – R-B will proceed northwest on a contour to the draw bottom in the northeast corner of section 7 (all descriptions for BLM administered lands are in Township 36 North, Range 112 West). R-B then follows an existing ATV trail up the draw and across to the high area in the middle of section 7. A spur road (R-C1) branches to the north and out to the far north of the compartment.

Silvicultural system – Individual tree selection. Group selection will be used where sanitation and salvage harvests are required to remove insect infested trees.

Landings – L-C1 will be located in the middle of the compartment and L-C2 at the end of R-C1.

Species composition – 60% Douglas-fir; 35% sub-alpine fir; 5% Engelmann Spruce.

Average tree height – 74 ft.; Average tree diameter: 13 in..

Average age – Douglas-fir 142 years; Engelmann spruce 130 years; sub-alpine fir 130 years.

Marking guides – leave tree mark. Select Douglas-fir and Engelmann spruce as leave trees when health and form class allows. Avoid retention of sub-alpine fir.

Slash disposal - will involve limbing and bucking at the landing and piling slash including tops and limbs in openings. (See Appendix B for Standards and Specifications.)

Cutting cycle – harvest timber to 80 square feet basal area per acre. Commercial thin from below leaving dominant, healthy trees making up the residuals (After initial entry, monitor residual stands for windthrow and insect and disease problems. Modify cutting cycle to allow for salvage and sanitation cuts if necessary). A second entry is recommended in ten years that would leave a residual stand of 60 square feet basal area per acre. In the event successful regeneration is occurring, a third and final entry will occur in 15 years leaving a residual stand of no less than 40 square feet basal area per acre of dominant, healthy trees.

Salvage and sanitation cuts will take place where Douglas-fir beetle and western balsam fir beetle infestations are occurring.

Additional information - Care should be taken to protect regeneration during harvest activities.

Compartment D – This 316 acre compartment contains stands with an average BA of 40 sq. ft./ac. There is a high composition of lodgepole pine with an average age of 67 years. Low severity dwarf mistletoe occurs and where present should be removed. No harvest is recommended within this compartment at present. Individual removal of dwarf mistletoe trees is recommended if this can occur without new road construction (see slash disposal remarks below). Re-evaluate in 20-25 years.

Pre-commercial thin lodgepole to reduce spacing of less-than-four inches DBH trees to approximately 300 trees-per-acre (TPA). Thin trees in the five to eight inch diameter class to 80-120 TPA.

Insects and diseases – Spruce budworm with low severity was seen in a small percentage of trees. Dwarf mistletoe at a moderate severity was seen in a small percentage of trees.

Travel management – No travel plan is recommended at this time.

Silvicultural system – none recommended.

Landings – None recommended at this time.

Species composition – 90% lodgepole pine; 5% Douglas-fir; 5% limber pine.

Average tree height – 52 ft.; Average tree diameter: 11 in.

Average age – Lodgepole pine 67 years.

Marking guides – Cut-tree mark spruce budworm and dwarf mistletoe infested trees. GPS coordinates should be recorded for later location.

Slash disposal – Spruce budworm and dwarf mistletoe infested trees will be cut on site, bucked into sizes easily handled, and piled in openings. Piles should be disposed of by mechanical treatment or burning at the earliest opportunity.

Cutting cycle – Remove spruce budworm infested trees as soon as possible.

Compartment Q – This 115.5 acre compartment contains stands with an average BA of 100 sq. ft./ac. Lodgepole pine in this stand is reaching the end of its rotation age and could sustain a "light" harvest to improve forest health and reduce horizontal fuel continuity.

Travel management - Access from the east on R-D. Road R-Q (R-Q) will branch due south at ridge crest in the north half of the southwest corner of section 10. Road R-Q1 (R-Q1) branches west and follows a contour to L-Q1. Road Q-2 (R-Q2) branches southeast and follows a contour to L-Q2. All would be newly constructed roads.

Insect and diseases – Few if any insect or disease problems were seen in this compartment.

Silvicultural system – Individual tree selection.

Landings (L-Q1 and L-Q2) will be established at the ends of R-Q1 and R-Q2 respectively.

Species composition –90% lodgepole pine; 10% aspen.

Average tree height – 62 ft.; Average tree diameter: 12 in.

Average age – Lodgepole pine 89 years.

Marking guides – cut-tree mark.

Slash disposal – will involve limbing and bucking at the landing and piling slash including tops and limbs in openings. (See Appendix B for Standards and Specifications.)

Cutting cycle – Harvest to 80 square feet basal area per acre during the initial entry. This would serve to reduce risk of crown fire and improve forest health. A second entry is recommended in ten to 15 years that would leave a residual stand of 60 square feet basal area per acre. In the event successful regeneration is occurring, a third and final entry will occur ten to 15 years later with an overstory removal. Select dominant, well-formed trees as residuals. Harvest all trees containing dwarf mistletoe. Create shaded fuel breaks along roads.

Compartment R – This is a 71.3 acre compartment. Past harvesting and pre-commercial thinning has occurred in the north portion of this compartment. Stands have an average BA of 20-40 sq. ft./ac.* Few if any insect or disease problems were seen in this compartment. Lodgepole pine on the north-facing slope in this compartment is reaching the end of its rotation age. Declining and poorly formed trees should be harvested in order to open up stand to regeneration.

Travel management - Access from the south on Road R (R-R). Road-R1 (R-R1) branches northwest and follows a ridge to L-R1. Road R-2 (R-R2) branches northwest approximately 1/4 –mile farther north on R-R and follows a shallow draw to the top of East Rim. A private cabin site is 100 yards to the northeast. Timber will be landed to L-R2 at mid-slope along R-R2.

Insect and diseases - Few if any insect or disease problems were seen in this compartment.

Silvicultural system – Individual tree selection.

Landings – (L-R1 and L-R2) will be established at the ends of R-R1 and along R-R2 to the west respectively.

Species composition – 100% lodgepole pine.

Average tree height – 50 ft.; Average tree diameter: 15 in.

Average age – Lodgepole pine 75 years.

Marking guides – cut-tree mark.

Slash disposal – will involve limbing and bucking at the landing and piling slash including tops and limbs in openings (See Appendix B for Standards and Specifications).

Cutting cycle – A single entry with an improvement cut. This entry will remove all disease and insect infested trees as well as all trees with poor form or in a state of decline. This will serve to reduce risk of crown fire and improve forest health. Additional entries not anticipated. Re-evaluate in 20 to 25 years.

*Based on one sample point.

Compartment S – This is a 57.9 acre compartment. Stands have an average BA of 80 sq. ft./ac. A significant percentage (50%) of the lodgepole pine in the compartment is infested with dwarf mistletoe. Infested trees as well as declining and poorly formed trees should be harvested in a sanitation cut. Lodgepole pine in this compartment is reaching the end of its rotation age.

Thirty percent of species composition is Douglas-fir. Select Douglas-fir as the leave trees making up the residual stand.

Travel management - Access from the south on Road R (R-R). Skid timber to the main road (R-R).

Insect and diseases – dwarf mistletoe with moderate to high severity is present in 50% of the lodgepole pine sampled.

Silvicultural system – Individual tree and group selection.

Landings – landings will be located at the south and north ends of R-R on the east side of the road.

Species composition – 35% lodgepole pine; 35% sub-alpine fir; 30% Douglas-fir.

Average tree height – 45 ft.; Average tree diameter: 12 in.

Average age – Lodgepole pine 100 years.

Marking guides – leave-tree mark.

Slash disposal – will involve limbing and bucking at the landing and piling slash including tops and limbs in openings. (See Appendix B for Standards and Specifications.)

Cutting cycle – A single entry with an improvement cut. This entry will remove all disease and insect infested trees as well as all trees with poor form or in a state of decline. This will serve to reduce risk of crown fire and improve forest health. Additional entries not anticipated. Re-evaluate in 20 to 25 years.

1.1.2 Helicopter Yarding/Inoperable

Compartments -E, P, V, W, and X – These compartments consist of the following acreages respectively: 169.7, 86.6, 39.7, 46.2, and 30.3. These compartments contains stands with an average BA of 60 to 200 (Compartment E has a BA of 140 sq. ft./ac.). Due to the steep slopes,

ground based yarding systems are not practical in these compartments. (High lead or short span skyline yarding are possibilities though the adverse visual impact is a concern.)

In the event helicopter or highlead yarding systems are not feasible options these compartments may be considered inoperable. Where these compartments border prescribed fuel breaks, hand-cut fuels modifications in the form of thinning, limbing, and clearing of down and dead woody material should occur.

Travel management – not applicable.

Insect and disease – Douglas-fir beetle with moderate severity present in some areas. Spruce budworm was also detected in this compartment.

Silvicultural system – Individual tree selection.

Landings – helicopter yarded timber could be landed at L-A1, L-A2, L-A3, and L-B2.

Species composition – 20% Douglas-fir; 50% Engelmann spruce; 30% sub-alpine fir.

Average tree height – 88 ft.; Average tree diameter: 17 in..

Average age – Douglas-fir 200 years; Engelmann spruce 150 years.

Marking guides – leave tree mark. Select Douglas-fir and Engelmann spruce as leave trees when health and form class allows. Avoid retention of sub-alpine fir.

Slash disposal – will involve lopping and scattering slash at the site of felling. Whole trees (minus limbs) will then be yarded to landing(s) where tops will be cut and piled. (See Appendix B for Standards and Specifications.)

Cutting cycle – harvest timber to 60-100 square feet basal area per acre (depending on initial BA and not removing more than ½ of the total timber volume). Commercial thin from below leaving dominant, healthy trees making up the residuals (after initial entry, monitor residual stands for windthrow and insect and disease problems. Modify cutting cycle to allow for sanitation cuts if necessary). A second entry is recommended in ten years that would leave a residual stand of 40-80 square feet basal area per acre. In the event successful regeneration is occurring, a third and final entry could take place in 15 years leaving a residual stand of no less than 20 square feet basal area per acre of dominant, healthy trees.

Additional information – helicopter yarding may be impractical due to the high cost. The timber quality and high value may make the use of this yarding system practical.

1.1.3 Short span skyline yarding

Compartment F – This 190.6 acre compartment contains stands with an average BA of 10 sq. ft./ac. Due to the steep slopes, ground based systems are not practical in this compartment. High lead or skyline yarding would be economical and practical in this area. The difficulty may be

locating an operator in the area with the equipment. Helicopter yarding would be another option for the removal of timber in this compartment.

Travel management – Access will be from the east on Road D, which travels in an east/west direction for one mile at the top of South Rim. A skyline system could be set up along this distance.

Insect and disease – Western balsam fir beetle is present and increasing causing moderate to severe damage to the sub-alpine fir.

Silvicultural system – short span skyline.

Landings – timber could be landed in several locations along R-D.

Species composition – 25% Douglas-fir; 20% Engelmann spruce; 50% sub-alpine fir; 5% lodgepole pine.

Average tree height – 81 ft.; Average tree diameter: 13 in.

Average age – Douglas-fir 200 years; Engelmann spruce 125 years; sub-alpine fir 105 years; lodgepole pine 150 years.

Marking guides – leave tree mark. Select Douglas-fir and Engelmann spruce as leave trees when health and form class allows. Avoid retention of sub-alpine fir.

Slash disposal – will involve lopping and scattering slash at the site of felling. Whole trees (minus limbs) will then be yarded to landing(s) where tops will be cut and piled along R-D. Piled tops can be later utilized for firewood. (See Appendix B for Standards and Specifications.)

Cutting cycle – harvest timber to 60-80 square feet basal area per acre (depending on susceptibility of windthrow). Commercial thin from below leaving dominant, healthy trees making up the residuals. (After initial entry, monitor residual stands for windthrow and insect and disease problems. Modify cutting cycle to allow for sanitation cuts if necessary.) A second entry is recommended in ten to 15 years that would leave a residual stand of 40-60 square feet basal area per acre.

Additional information – ***Compartment G*** will follow the same prescription as Compartment F. Access for Compartment G will be via R-R to R-R1. No tree data is available for Compartment G. Compartment G is 9.4 acres.

1.1.4 Hand-cut fuel break

Compartments H, I, J, K, L, M, N, O, and Y – These compartments are comprised of the following acreages respectively: 17.2, 7.7, 1.9, 5.2, 260.3, 21.1, 21.4, 10.3, and 21.3. These compartments will be modified into fuel breaks 150 feet in width. Where compartments adjoin roads or other natural or man made openings, shaded fuel breaks are recommended. In areas with no adjoining openings, standard fuel breaks are recommended. (See Appendix B for

Standards and Specifications.) It is critical that all woody surface materials and ladder fuels be cleared within this fuel break area.

Travel management – variable.

Insect and disease – No data.

Silvicultural system – variable. A combination of ground-based, helicopter, and skyline systems may be utilized.

Landings – utilize existing landings where practical. Contact manager before locating new landings.

Species composition – variable.

Average tree height – no data

Average age – no data.

Marking guides – leave tree mark. Select Douglas-fir and Engelmann spruce as leave trees when health and form class allows. Avoid retention of sub-alpine fir.

Slash disposal – most slash will be disposed of in small piles in nearby openings or within adjacent compartments. *No slash will remain within fuel breaks*.

Cutting cycle – after initial entry, fuel breaks **must** undergo periodic maintenance at least every 5 years to clear all understory woody species as well as any down and dead material.

1.1.5 Prescribed fire

Fuels reduction can be effectively accomplished with controlled burning. Due to the risks involved burn plans must be developed by qualified personnel before any controlled burning is attempted.

1.2 Non-forestland

Considerations include topographic location, slope steepness, predominant wind direction, and the amount and arrangement of surface, ladder, and crown fuels when developing fuels treatment prescriptions. Prescriptions for non-forested compartments within the project area incorporate the following components: legal access, travel management (road access), ecological site requirements, slash disposal, entry schedule, and additional information (see Appendix A – Glossary).

Non-forestland makes up a small percentage of land within the Hoback Ranches project area. The non-forestland area that does exist is primarily associated with riparian area cover types. These sites characteristically are at a low risk of fire. Riparian areas will be managed according to the silviculture standards and guidelines (Appendix B).

APPENDIX D – Forest Service Fuels Treatment Recommendations

1.1 Forestland

Considerations include topographic location, slope steepness, predominant wind direction, and the amount and arrangement of surface, ladder, and crown fuels when developing fuels treatment prescriptions. Prescriptions for forested compartments within the project area incorporate the following components: legal access, travel management (skid roads and trails excluded), silvicultural system, landing locations, species composition, basal area (merchantable timber species >7.9 inches diameter at breast height (DBH)), total average tree height and diameter (all species), average tree age (by species), marking guides, yarding system, slash disposal, cutting cycle (entry schedule), and additional information (see Appendix A – Glossary).

The harvesting schedule, included in the fuels treatment recommendations, assumes that equipment access to Wyoming Highway 189 is secured. A further assumption is that tractor-trailer trucks will be permitted to haul log loads over the main access road in the Hoback Ranches project area.

1.1.1 Ground-Based Yarding

Compartment DD – This 89.5 acre compartment contains stands with an average BA of 40 square feet per acre (sq. ft./ac.). There is a high composition of lodgepole pine with an average age of 77 years. Low severity dwarf mistletoe occurs and where present should be removed. No harvest is recommended within this compartment at present. Removal of dwarf mistletoe infested trees is recommended if this can occur with a minimum of new road construction (see slash disposal remarks below). Re-evaluate in 20-25 years.

Pre-commercial thin lodgepole up to 8 inch DBH to reduce spacing of trees to approximately 300 trees-per-acre (TPA). Thin trees in the five to eight inch diameter class to 80-120 TPA.

Insects and diseases – Dwarf mistletoe at a low severity was seen in a moderate percentage of trees. Wind damage was seen in areas within this compartment.

Travel management – Wyoming Highway 189 to Forest Service Road 30691 south on R-DD to R-DD1. Access is through private land and must be secured before travel is possible.

Silvicultural system – sanitation treatment with individual tree and group selection.

Landings – L-DD1 at junction of R-DD and R-DD1.

Species composition – 100% lodgepole pine.

Average tree height – 65 ft.

Average tree diameter – 12.5 in.

Average age – lodgepole pine 77 years.

Marking guides – cut-tree mark mistletoe infested trees. GPS coordinates should be recorded for later location.

Slash disposal – if access is gained for harvest equipment, slash will be piled at L-DD1 and L-DD2 and burned at the earliest opportunity when full consumption of slash is ensured and risk of escape is low. (See Appendix B for Standards and Specifications.) If treatments will be made by hand crews dwarf mistletoe infested trees will be cut on site, bucked into sizes easily handled, and piled in openings. Piles should be disposed of by mechanical treatment or burning at the earliest opportunity.

Cutting cycle – remove dwarf mistletoe infested trees as soon as possible.

Compartment EE – This 73.3 acre compartment contains stands with an average BA of 40 sq. ft./ac. This stand contains predominately lodgepole pine with an average age of 110 years. Trees are reaching the end of their rotation age. Low severity dwarf mistletoe occurs and where present should be removed. Low basal area measurements make timber harvest questionable from an economic standpoint. Removal of dwarf mistletoe infested trees is recommended if this can occur with little or no new road construction (see slash disposal remarks below). Re-evaluate in 20-25 years.

Pre-commercial thin lodgepole up to 8 inch DBH to reduce spacing of trees to approximately 300 trees-per-acre (TPA). Thin trees in the five to eight inch diameter class to 80-120 TPA.

Hand-cut fuel breaks will be constructed along the property boundary to the south.

Aspen release treatments will occur within and to the west of this compartment. Prescribed fire should follow aspen release treatments if possible. Fire will encourage aspen re-sprouting.

Insects and diseases – dwarf mistletoe at a low severity was seen in a moderate percentage of trees.

Travel management – Wyoming Highway 189 then south on Forest Service Road 30691 south on R-DD. From R-DD, turn east for 0.1 mile then south on R-EE. Turn east on R-EE1 to access west portion of compartment.

Silvicultural system – sanitation cut with individual tree and group selection.

Landings – L-DD1 at junction of R-DD and R-DD1 and L-EE1 at the terminus of R-EE1.

Species composition – 100% lodgepole pine.

Average tree height – 55 ft.

Average tree diameter – 20.0 in.

Average age – 110 years.

Marking guides – cut-tree mark mistletoe infested trees. GPS coordinates should be recorded for later location.

Slash disposal – if access is gained for harvest equipment, slash will be piled at L-DD1 and L-EE1 and burned at the earliest opportunity when full consumption of slash is ensured and risk of escape is low. (See Appendix B for Standards and Specifications.) If treatments will be made by hand crews dwarf mistletoe infested trees will be cut on site, bucked into sizes easily handled, and piled in openings. Piles should be disposed of by mechanical treatment or burning at the earliest opportunity.

Cutting cycle – remove dwarf mistletoe infested trees as soon as possible. Aspen release treatments and hand-cut fuel breaks should occur at the earliest opportunity.

Compartment FF – This compartment is approximately 239 acres in size. Stands have an average BA of 40 sq. ft./ac. A significant percentage (85%) of the lodgepole pine in the compartment is infested with dwarf mistletoe. Infested trees as well as declining and poorly formed trees should be harvested in a sanitation treatment.

A hand-cut fuel break should be constructed south of the junction of FS Road 30687 and R-FF. A lower priority is to construct a shaded fuel break in the relatively open areas along R-FF1 to the north.

During harvest remove all wind damaged and poorly formed trees.

Travel management – access from the south on Forest Service Road 30687, then west on R-FF. R-FF will fork 1.2 miles west accessing north and south forested areas.

Insect and diseases – dwarf mistletoe with low to moderate severity is present in 85% of the lodgepole pine sampled.

Silvicultural system – sanitation treatment with individual tree and group selection where sanitation and salvage harvests are required to remove insect infested trees.

Landings - landings will be located at the junction of FS Road 30687 and R-FF and at the fork on R-FF.

Species composition – 100% lodgepole pine.

Average tree height – 70 ft.

Average tree diameter – 12.5 in.

Average age – 75 years.

Marking guides – leave-tree mark. Because of the high composition of infested trees selection of the high quality, healthy trees to be marked as leave trees will maximize efficiency during the timber sale preparation.

Slash disposal – will involve limbing and bucking at the landing and piling slash including tops and limbs in openings. (See Appendix B for Standards and Specifications.)

Cutting cycle – A single entry with a sanitation treatment. This entry will remove all disease and insect infested trees as well as all trees with poor form or in a state of decline. This will serve to reduce risk of crown fire and improve forest health. Additional entries are not anticipated. Re-evaluate in 20 to 25 years.

Compartment GG – This compartment is 392.6 acres in size. Stands have an average BA of 50 sq. ft./ac. A significant percentage (75%) of the lodgepole pine in the compartment is infested with dwarf mistletoe. Infested trees as well as declining and poorly formed trees should be harvested in a sanitation treatment.

There have been past timber stand improvement (T.S.I.) treatments within this compartment.

A hand-cut fuel break should be constructed along the north edge of the compartment in association with the road and creek bottom. A second break should be constructed along the southern edge of the compartment.

An aspen release treatment is recommended in the southeast portion of the compartment.

During harvest remove all wind damaged and poorly formed trees.

Travel management – Access from the north on Forest Service Road 30680. Follow FS30680 west along the north boundary of compartment then south on FS30687. R-GG turns east allowing access to R-GG1, R-GG2 and R-GG3.

South of the junction of FS30687 and R-GG Forest Service signage specifies no vehicle travel over creek crossing. A temporary bridge should be constructed at this crossing to allow access to R-GG4 and R-GG5, which provide access to the southern portion of the compartment.

The island of forestland east of the main compartment will be accessed by R-JJ1. Timber should be skidded to L-HH2.

Insect and diseases – dwarf mistletoe with moderate severity is present in 75% of the lodgepole pine sampled.

Silvicultural system – sanitation treatment with individual tree and group selection cutting to remove insect infested and poorly formed trees.

Landings – L-GG4 will be located along FS Road 30680. Timber in this area can be pulled downhill to the main road. Other landings will be located as shown on map.

Species composition – 95% lodgepole pine; 3% sub-alpine fir; 2% Douglas fir.

Average tree height – 70 ft.

Average tree diameter – 11.0 in.

Average age – 75 years.

Marking guides – leave-tree mark. Because of the high composition of infested trees selection of the high quality, healthy trees to be marked as leave trees will maximize efficiency.

Slash disposal – will involve limbing and bucking at the landing and piling slash including tops and limbs in openings. (See Appendix B for Standards and Specifications.)

Cutting cycle – A single entry with a sanitation treatment. This entry will remove all disease and insect infested trees as well as all trees with poor form or in a state of decline. This will serve to reduce risk of crown fire and improve forest health. Additional entries not anticipated. Re-evaluate in 20 to 25 years.

Compartment HH – This 80.7 acre compartment contains stands with an average BA of 120 sq. ft./ac.

A hand-cut fuel break and aspen release treatment will occur along the north and south edges of the compartment respectively.

Insects and diseases – few insect or disease problems were seen.

Travel management – R-JJ turns south from Highway 189. Turn northwest on R-JJ1 to access compartment HH.

Silvicultural system – Individual tree selection.

Landings – L-HH1 will be located along Highway 189 where timber will be skidded from the slope to the south. L-HH2 will be located along R-JJ1.

Species composition – 70% sub-alpine fir; 30% Engelmann Spruce.

Average tree height – 84 ft.

Average tree diameter – 22.0 in.

Average age – 90 years.

Marking guides – leave-tree mark. Select Douglas fir and Engelmann spruce as leave trees when health and form class allow. Avoid retention of sub-alpine fir when possible while still retaining 2/3rds of the stand. Removal of greater than 2/3rds could result in blowdown of residual stand.

Slash disposal – will involve limbing and bucking at the landing and piling slash including tops and limbs in openings. (See Appendix B for Standards and Specifications.)

Cutting cycle – harvest timber to 80 square feet basal area per acre. Commercial thin from below leaving dominant, healthy trees making up the residuals (after initial entry, monitor residual stands for windthrow and insect and disease problems. Modify cutting cycle to allow for salvage and sanitation cuts if necessary). A second entry is recommended in ten years that would leave a residual stand of 60 square feet basal area per acre. In the event successful regeneration is occurring, a third and final entry will occur in 15 years leaving a residual stand of no less than 40 square feet basal area per acre of dominant, healthy trees.

Salvage and sanitation cuts will take place where Douglas fir beetle, spruce budworm, and western balsam fir beetle infestations are occurring.

Additional information – Care should be taken to protect regeneration during harvest activities. Operators should be informed of the transmission line transecting this compartment and briefed on safety concerns associated with working around transmission lines.

Compartment II – This compartment is approximately 79.8 acres. Stands have an average BA of 35 sq. ft./ac. A significant percentage of the lodgepole pine (50% of trees sampled) in the compartment is infested with dwarf mistletoe. Infested trees as well as declining and poorly formed trees should be harvested during a sanitation treatment. Lodgepole pine in this compartment is reaching the end of its rotation age.

Twenty percent of species composition is Douglas fir. Select Douglas fir as the leave trees making up the residual stand.

Travel management – R-JJ turns south from Highway 189. The road continues 0.5 miles to the south property boundary where a newly constructed R-JJ2 would turn due west providing access to the compartment.

Insect and diseases – dwarf mistletoe with low severity is present in 100% of the lodgepole pine sampled.

Silvicultural system – Individual tree and group selection.

Landings – a landing will be located along R-II.

Species composition – 50% lodgepole pine; 30% sub-alpine fir; 20% Douglas fir.

Average tree height – 75 ft.

Average tree diameter – 12.5 in.

Average age – lodgepole pine 100 years; Douglas fir 125 years; sub-alpine fir 87 years.

Marking guides – leave-tree mark.

Slash disposal – will involve limbing and bucking at the landing and piling slash including tops and limbs in openings. (See Appendix B for Standards and Specifications.)

Cutting cycle – A single entry with a sanitation cut. This entry will remove all disease and insect infested trees as well as all trees with poor form or in a state of decline. This will serve to reduce risk of crown fire and improve forest health. Additional entries are not anticipated. Re-evaluate in 20 to 25 years.

Compartment JJ – This compartment is 76.9 acres. Stands have an average BA of 75 sq. ft./ac. Twenty-five percent of the lodgepole pine sampled in the compartment is infested with dwarf mistletoe. Infested trees as well as declining and poorly formed trees should be harvested in a sanitation treatment.

Thirty percent of species composition is Douglas fir. Select for Douglas fir as the leave trees making up the residual stand.

Travel management – R-JJ turns south from Highway 189. Approximately .25 miles south R-JJ2 branches to the southeast.

Insect and diseases – dwarf mistletoe with low severity is present in 25% of the lodgepole pine sampled.

Silvicultural system – Individual tree and group selection.

Landings – a landing will be located near the highway at the north end of the compartment.

Species composition – 30% lodgepole pine; 35% sub-alpine fir; 35% Douglas fir.

Average tree height – 68 ft.

Average tree diameter – 14.0 in.

Average age – 105 years.

Marking guides – leave-tree mark.

Slash disposal – will involve limbing and bucking at the landing and piling slash including tops and limbs in openings. (See Appendix B for Standards and Specifications.)

Cutting cycle – A single entry with a sanitation cut. This entry will remove all disease and insect infested trees as well as all trees with poor form or in a state of decline. This will serve to reduce risk of crown fire and improve forest health. Additional entries are not anticipated. Re-evaluate in 20 to 25 years.

1.1.2 Inoperable

Compartment AA – This 172.2 acre compartment contains stands with an average BA of 40 sq. ft./ac. Due to low basal area, steep slopes, and uncertain access this area is considered inoperable. In the event access is secured and funds are available for management, a sanitation treatment should occur to improve health of stands within this compartment. A hand-cut fuel break should be constructed along the southeast and east edges of this compartment.

Insect and diseases – fifty percent lodgepole pine mortality of unknown cause; fifty-percent mortality of sub-alpine fir (likely western balsam fir beetle).

Travel management – access to this area difficult. Access from the Hoback Ranches private land would allow management opportunities in this area. Public access would require a prohibitive amount of new road construction.

Silvicultural system – none recommended..

Landings – none recommended.

Species composition – 100% lodgepole pine (sub-alpine fir present but not in plots).

Average tree height – 45 ft.

Average tree diameter – 14.0 in.

Average age – 110 years.

Marking guides – none recommended.

Slash disposal – will involve limbing and bucking and hand piling in openings. (See Appendix B for Standards and Specifications.)

Cutting cycle – construct hand-cut fuel break at the earliest opportunity.

Compartment BB – This 61.4 acre compartment contains stands with an average BA of 35 sq. ft./ac. Poor access opportunities and inoperable terrain offer few management opportunities. If access is gained, aspen treatments and a hand-cut fuel break along the east and south sides of compartment are recommended.

Insect and diseases – small percentage of fir broom rust at a low severity.

Travel management plan – a jeep trail accesses the compartment through private land along the south edge. The road comes in from Wyoming Highway 189 from the northwest and from the Hoback Ranches private land from the southeast.

Silvicultural system – none recommended.

Landings – none recommended.

Species composition – 100% sub-alpine fir.

Average tree height – 50 ft.

Average tree diameter – 16.0 in.

Average age – 50 years.

Marking guides – not applicable.

Slash disposal – will involve limbing and bucking and hand piling in openings. (See Appendix B for Standards and Specifications.)

Cutting cycle – treat aspen stands and construct hand-cut fuel breaks at the earliest opportunity.

Compartment-CC – This 506.7 acre compartment contains stands with an average BA of 10 sq. ft./ac. Poor access opportunities and inoperable terrain make management opportunities low. If access is gained construct a hand-cut fuel break along the east side of compartment.

Insect and diseases – western balsam fir beetle is causing mortality in sub-alpine fir in much of the area in the center of section 4, T. 36 N., R. 113 W.

Travel management plan – forest maps show a road accessing the east boundary of this compartment from the Hoback Ranches private land. No other access opportunities known.

Silvicultural system – none recommended.

Landings – none recommended.

Species composition – 100% sub-alpine fir.

Average tree height – unknown.

Average tree diameter – unknown.

Average age – unknown.

Marking guides – not applicable.

Slash disposal – will involve limbing and bucking and hand piling in openings. (See Appendix B for Standards and Specifications.)

Cutting cycle – construct hand-cut fuel breaks along the east boundary of compartment at the earliest opportunity.

1.1.3 Hand-cut fuel break

Where compartments adjoin roads or other natural or man made openings, shaded fuel breaks are recommended. In areas with no adjoining openings, standard fuel breaks are recommended. Fuel breaks would be constructed to be 150 to 300 feet in width. (See Appendix B for Standards and Specifications.)

It is critical that all woody surface materials and ladder fuels be cleared within this fuel break area.

Travel management – variable.

Insect and disease – No data.

Silvicultural system – variable. A combination of ground-based, helicopter, and skyline systems may be utilized.

Landings – utilize existing landings where practical. Contact manager before locating new landings.

Species composition – variable.

Average tree height – no data

Average age – no data.

Marking guides – leave-tree mark. Select Douglas fir and Engelmann spruce as leave trees when health and form class allows. Avoid retention of sub-alpine fir.

Slash disposal – most slash will be disposed of in small piles in nearby openings or within adjacent compartments. *No slash will remain within fuel breaks*.

Cutting cycle – after initial entry, fuel breaks **must** undergo periodic maintenance at least every 5 years to clear all understory woody species as well as any down and dead material.

1.1.4 Prescribed fire

Fuels reduction can be effectively accomplished with controlled burning. Due to the risks involved burn plans must be developed by qualified personnel before any controlled burning is attempted.

1.2 Non-forestland

Considerations include topographic location, slope steepness, predominant wind direction, and the amount and arrangement of surface, ladder, and crown fuels when developing fuels treatment prescriptions. Prescriptions for non-forested compartments within the project area incorporate the following components: legal access, travel management (road access), ecological site requirements, slash disposal, entry schedule, and additional information (see Appendix A – Glossary).

Non-forestland makes up a small percentage of land within the Hoback Ranches project area. The non-forestland area that does exist is primarily associated with riparian area cover types. These sites characteristically are at a low risk of fire. Riparian areas will be managed according to agency standards and specifications (Appendix B).

APPENDIX E – Class I Cultural Resource Inventory

(separate file)