



Final Environmental Impact Statement

Blackhall-McAnulty Analysis

Brush Creek/Hayden Ranger District

**MEDICINE BOW-ROUTT NATIONAL FORESTS &
THUNDER BASIN NATIONAL GRASSLAND**

Carbon County, Wyoming

T.12N., 13N. & 14N., R.81W., 82W. & 83W.

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BLACKHALL-MCANULTY ANALYSIS
Final Environmental Impact Statement
Carbon County, Wyoming

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Abstract: This Final Environmental Impact Statement (EIS) describes and evaluates the environmental effects of a proposal to reduce the spread of dwarf mistletoe and mountain pine beetle in lodgepole pine stands, increase patch size of forested areas that have had past harvest, improve the health and resiliency of areas forests, salvage fire damaged trees, and promote and maintain area aspen and ponderosa pine stands on National Forest System lands within the Blackhall-McAnulty Analysis Area, using a combination of clearcutting and partial cutting harvest treatments. The proposal also includes: prescribed fire to improve forage for big game and livestock, boundary treatments to reduce hazardous fuels on National Forest adjacent to private land, watershed restoration projects, improvement of the Big Creek Trailhead, and travel management within this portion of the Sierra Madre Range. Based on issues identified by the public and the Interdisciplinary Team, a No-Action alternative and four action alternatives have been developed.

Under the Proposed Action, an estimated 2,183 acres of forest would be treated with commercial timber sales, 2,604 acres of prescribed burn, 116 acres of boundary treatment, 1,000 acres of precommercial thinning, and 38.6 miles of road decommissioning. An estimated 12.8 miles of specified and temporary roads would need to be constructed/reconstructed to implement the proposal (9.9 miles of this total is reconstruction). Alternative 2 includes all the projects identified under the Proposed Action, except proposes fewer miles of road decommissioning (29.3 miles). Alternative 3 reduces the amount of timber harvest to 743 acres, reduces boundary treatment to 74 acres, and reduces specified and temporary road construction and reconstruction to 5 miles. This alternative drops all proposed clearcut and fire salvage acres, as well as precommercial thinning. It includes the prescribed burning and road decommissioning identified under the Proposed Action. Alternative 4 includes *only* the prescribed burn proposal and road decommissioning. Watershed restoration projects are included in all action alternatives. The Forest Service has selected **Alternative 2** as the preferred alternative.

SUMMARY

The Medicine Bow-Routt National Forests propose to use a variety of silvicultural treatments on National Forest Lands within the Blackhall-McAnulty Analysis Area in an effort to move the vicinity's vegetation towards the desired future condition. Under the Medicine Bow National Forest Land and Resource Management Plan (Forest Plan), much of the proposed project area is within a 7E Management Area, which places emphasis on wood production.

Based on Forest Plan direction and a comparison between the area's existing condition and the desired future condition, a proposal was developed to reduce the spread of dwarf mistletoe and mountain pine beetle in area lodgepole pine stands, increase patch size of forested areas that have had past harvest, improve resiliency and reduce susceptibility to future disease and insect attack, salvage fire damaged trees, and promote and maintain area aspen and ponderosa pine stands. The proposal also addresses the need to treat vegetation along the Forest boundary to reduce the wildfire hazard to adjacent private land and structures, and road densities that could be causing soil erosion and increased sediment in area creeks. The following series of events have contributed to the need for this proposal:

Wildfire suppression and subsequent natural succession in the area has allowed some relic ponderosa stands and many area aspen stands to convert to subalpine fir and lodgepole pine dominated stands, causing a loss of important wildlife habitat and a decrease in vegetative diversity.

Fire suppression, natural succession, and timber harvesting (strip clearcuts) have reduced the natural patch size of a number of stands in the vicinity, which have decreased their value for big game security and as potential habitat for dependent wildlife species.

Since 1997 there has been marked increase in mountain pine beetle activity and subsequent tree mortality in the eastern portion of the area. The presence of dense, overstocked lodgepole pine stands, lodgepole infected with mistletoe, and/or stands where yearly mortality exceeds growth greatly increases the probability of an insect epidemic occurring in the vicinity.

During the summer of 2002 the lightning-caused Bear Mountain South Fire burned approximately 500 acres in the northeastern portion of the area. The western portion of the fire burned into some of the harvest units proposed under the original McAnulty proposal, along with a number of stands classified as being suitable for timber production.

Early day logging, years of fire suppression, and lack of recent vegetation management on National Forest lands surrounding the private land in-holding Jerry Park and adjacent to private land in the Skyline Ridge area have resulted in forest conditions that have a high risk of uncontrollable, high intensity fires occurring.

There are a number of roads within the project area that have been identified as requiring maintenance or closure to reduce soil erosion and sediment entering area creeks. High open road densities in the eastern portion of the area could potentially be degrading wildlife security areas and habitat.

The Blackhall-McAnulty analysis combines several projects that were previously identified as separate proposals: The Blackhall Timber Sale, the McAnulty/Beaver Creek Timber Sale, the McAnulty 2 Fuels Management project, and the Sierra Madre Travel Management Analysis. Scoping had been done on both Blackhall and McAnulty/Beaver Creek Timber Sales in 1998 and 1999. Scoping was re-initiated on this expanded project on April 10, 2003. The Colorado portion of the McAnulty/Beaver Creek Timber Sale (Beaver Creek) will be analyzed separately at a later date. Because of the degree of controversy and possibility of significant effect of the project, it was decided that an Environmental Impact Statement would be prepared. The Notice of Intent (NOI) was published in the *Federal Register* on June 11, 2003. The NOI asked for public comment on the proposal from June 11 through July 10, 2003. Using the comments from the public, other agencies, and tribes, the interdisciplinary team developed the following significant issues to address: *Clearcutting; Cumulative Effects/Habitat and Wildlife Diversity/Fragmentation; Forest Insects and Diseases; and Watershed Restoration.*

These issues led the agency to develop a No-Action alternative and four action alternatives:

Proposed Action: A combination of clearcutting and partial cutting harvest treatments would be used to reduce the spread of dwarf mistletoe and mountain pine beetle in area lodgepole pine stands, increase patch size of forested areas that have had past harvest, thin area stands to improve resiliency and reduce susceptibility to future disease and insect attack, salvage fire damaged trees, and to promote and maintain area aspen stands. Harvest units would be situated predominantly within areas that have had past timber sale entries. Potential commercial silvicultural treatments include: clearcutting, overstory removal, fire/beetle salvage, sanitation/salvage, shelterwood, and commercial thinning.

Under this proposal, predominantly non-forested areas dominated by sagebrush and bitterbrush in the vicinity of Cunningham and Holroyd Parks would be broadcast burned during the spring to create a mosaic of shrub, forbs, and grass age classes, to improve forage for big game and livestock, and to encourage new aspen and ponderosa pine regeneration in areas where present.

Forested areas on the National Forest directly adjacent to private land and structures in the vicinity of Jerry Park and along the Forest boundary in the Skyline Ridge area would be treated through a combination of commercial and service contracts to reduce hazardous fuels.

Stands of predominantly lodgepole pine and aspen (seedling/sapling in size) within regenerated clearcuts that are experiencing a slowing of growth due to overcrowding would be hand-thinned with chainsaws to promote a healthier, faster growing, beetle and disease-resistant future stand.

A number of roads within the project area have been identified as requiring maintenance or closure to reduce soil erosion and sediment entering area creeks. Under this proposal, 38.6 miles of road decommissioning will take place.

The current western terminus of the Big Creek Trail would be moved to a better location, where a trailhead with adequate vehicle parking and signing would be established. The central trailhead on the 498.2A road would also be improved and a trail bridge would be installed over the Middle Fork of Big Creek and another over the South Fork Big Creek to facilitate horse, foot and mountain bike use.

A number of watershed restoration projects have been identified within the analysis area to address soil, water, native flora, and fauna concerns.

Alternative 1: Under the No Action alternative there would be no treatment to the vegetation in the area. Although annual road and periodic ditch maintenance would still occur under this alternative under normal program of work, the other watershed restoration projects identified for the area such as the removal of mine spoils and cheatgrass treatments would not occur. Other identified projects such as the Big Creek Trail improvements and Travel Management road decommissioning would not be implemented.

Alternative 2: Designed to directly address the same purpose and need as the Proposed Action, Alternative 2 includes all the projects identified under the Proposed Action, except proposes to decommission 29.3 miles of road versus 38.6 miles. Under this alternative, road decommissioning in the eastern portion of the analysis area has been reduced in response to comments received from the public during the scoping period.

Alternative 3: Designed to directly address the significant issues of clearcutting and past cumulative effects, Alternative 3 drops all proposed clearcutting and reduces the amount of timber harvest and associated specified and temporary road construction and reconstruction. This alternative also drops all proposed fire salvage within the Bear Mountain South Burn area. Though it still includes fuels reduction around Jerry Park (74 acres), Alternative 3 drops the Skyline boundary treatment and all precommercial thinning. Alternative 3 includes the entire prescribed burn proposal, road decommissioning, and all the proposed watershed restoration projects included under the Proposed Action.

Alternative 4: Designed to directly address the significant issues of cumulative effects and watershed restoration, Alternative 4 includes only the prescribed burn proposal, travel management—road decommissioning, and watershed restoration proposals included under the Proposed Action.

A Forest Plan consistency analysis was performed for all the alternatives. All action alternatives were found to be consistent with the Medicine Bow Forest Plan.

Based upon the effects of the alternatives, the responsible official will decide which alternative best addresses the purpose and need for the proposal and the significant issues and concerns for the Blackhall-McAnulty Analysis Area.

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CHAPTER 1. PURPOSE OF AND NEED FOR ACTION

Document Structure

The Forest Service has prepared this Environmental Impact Statement in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Impact Statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters:

- *Chapter 1. Purpose and Need for Action:* The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Chapter 2. Alternatives, including the Proposed Action:* This chapter provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Chapter 3. Affected Environment and Environmental Consequences:* This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area.
- *Chapter 4. Consultation and Coordination:* This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental impact statement.
- *Index:* The index provides page numbers by document topic.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Forest Service office in Saratoga, Wyoming.

Background

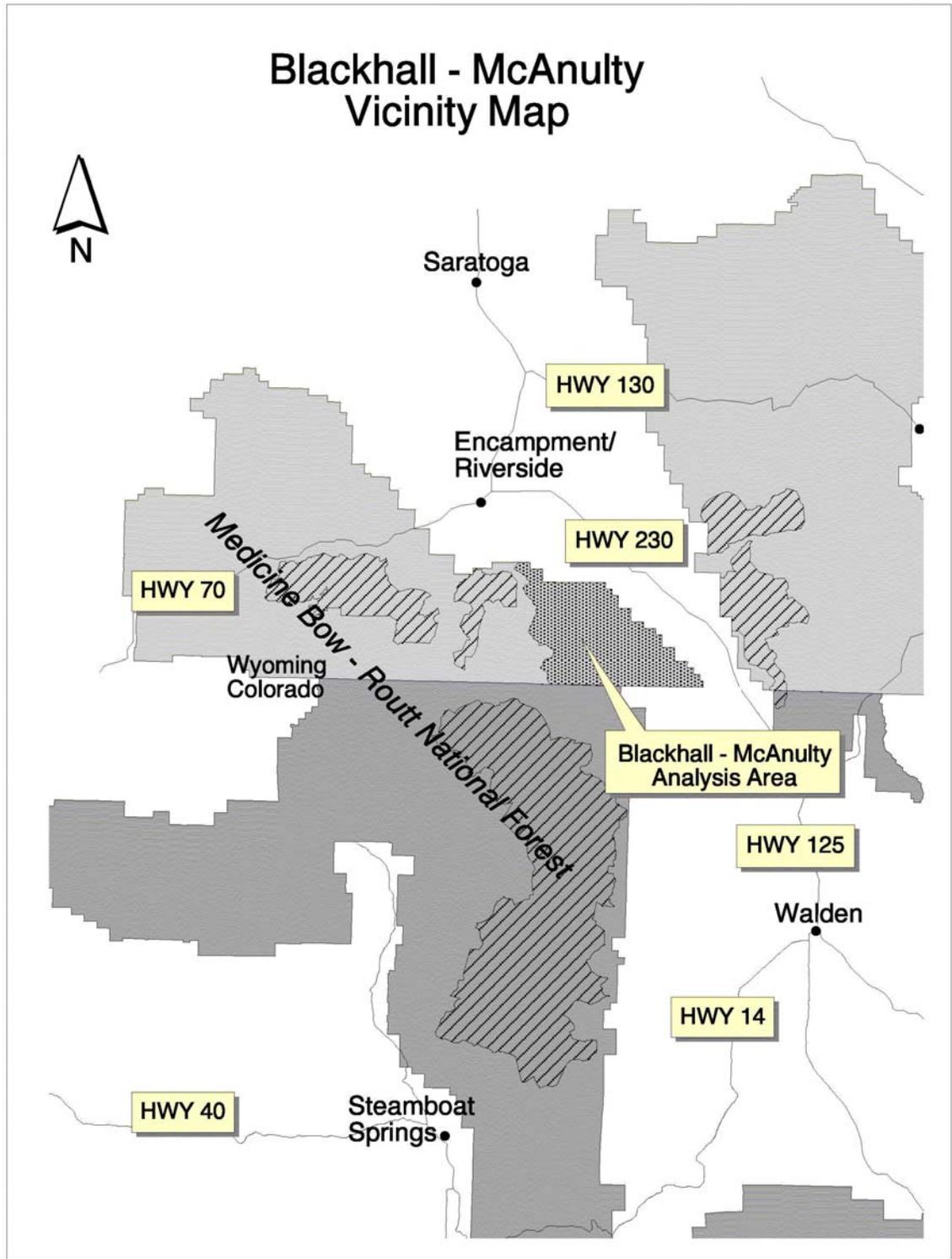
The Blackhall-McAnulty Analysis Area is located in the southeastern portion of the Sierra Madre Range. The analysis area encompasses approximately 47,000 acres, and is located on National Forest System lands approximately 10 miles southeast of Encampment, Wyoming, and 40 miles north of Walden, Colorado. There are an estimated 1,631 acres of private land in-holdings within the area. The analysis area is bounded by National Forest System Road (NFSR) #409 (the Blackhall Road) to the west, the Colorado state line to the south, and the Forest boundary to the east and north. Wyoming Highway #230 is approximately 4 miles north and east of the project area. A legal description for the area is T.12, 13, and 14N., R.81, 82, & 83W., Carbon County, Wyoming. (See Figure 1, Vicinity Map.)

The elevation of the analysis area ranges from 10,979' at Blackhall Mountain, to 8,000' on the Forest boundary along the southeastern edge of the analysis area. It is predominantly forested, with parks or meadows of various sizes scattered across the landscape. General vegetation zones present in the analysis area include lodgepole pine forests, Engelmann spruce-subalpine fir forests, alpine tundra, sagebrush-steppe, aspen, and riparian areas. Much of what is forested is dominated by stands of lodgepole pine pole timber and saw timber. Engelmann spruce and subalpine fir dominate the higher elevations along the northwestern boundary of the area, along with many north facing slopes and riparian areas. The very top of Blackhall Mountain is a mix of rock and alpine tundra. Descending in elevation to the east, the lodgepole pine becomes more mixed with aspen. These lower elevation stands are interspersed with a number of sizeable parks, including Big Creek, Jerry, Quimby, and Holroyd Parks, small meadows, sparsely forested, windswept ridges, and non-forested southerly facing slopes. Riparian areas dominated by willows border many of the streams at the lower elevations. At the lower treeline at about 8,200 feet and on southerly aspects the lodgepole pine and aspen become mixed with scattered limber pine, and unique, relic stands of Douglas-fir, along with ponderosa pine.

The analysis area has no developed picnic or campground recreation facilities within its perimeter. There is one National Forest System Trail, Trail # 471, locally known as the Big Creek Trail. The primary summer and fall recreation use in this area is dispersed recreation, which includes, but is not limited to, the following activities: driving for pleasure along the existing open roads, especially during the fall color season, hunting, fishing, four-wheel-drive use, hiking, backpacking, picnicking, mountain biking, camping, personal use firewood cutting, and riding horses. Hunting is the most popular activity, mainly in the form of big game hunting for deer and elk, but also including grouse and bear hunting. The winter use in the analysis area is very low. The remoteness of the area makes it out of reach for cross-country skiing, backcountry skiing, and snowshoeing. There are no designated groomed or un-groomed snowmobile trails in the immediate vicinity of the analysis area.

There are a variety of permitted special uses in this area. They include big game and fishing outfitted guiding, summer horse packing trips, some one-day recreation events, ditch, and reservoir easements.

Figure 1. Vicinity Map



Wildlife species occurring in the project area are typical of those occurring in similar habitats throughout the Medicine Bow-Routt National Forests. The analysis area contains big game winter range.

There are three cattle allotments within the project area: Big Creek, Beaver Creek, and a portion of the Wood Mountain Allotment. No treatments are proposed in the Wood Mountain Allotment.

The Blackhall-McAnulty Analysis Area includes Beaver Creek and Big Creek watersheds, which both flow into the North Platte River above the Encampment River. The major perennial streams in the Beaver Creek watershed are Beaver, Etna, Camp, and Little Beaver Creeks. The Big Creek watershed has three main forks: North, Middle and South Fork Big Creek. In the North Fork, McAnulty Creek, North Fork of Big Creek, Quimby Creek, and McNulty Creek are the major perennial streams. The Middle Fork of Big Creek watershed has two major perennial streams in Wyoming-- Middle Fork of Big Creek and Casteel Creek, in addition to Davis and Beaver Creek flowing into the Middle Fork from Colorado. South Fork Big Creek lies mainly in Colorado, with Holroyd Creek and an unnamed tributary being the major perennial tributaries. On the east side of the analysis area, Bear Creek flows into lower Big Creek, and has several tributaries, including Deer, Trent, and Little Bear Creeks. Henry Creek also flows into lower Big Creek just south of Bear Creek.

Past Timber Harvest

Many of the forested stands within the analysis area show evidence of tie hack and pre-1950 selective logging. Evidence of this late 19th and early 20th century logging, in the form of stumps and old overgrown logging roads, can be found throughout the area. The greatest effect this early day logging had on the project area was probably not the cutting, but the wildfires that these early day loggers may have caused. It is evident that the fires that burned much of the area between 1860 and 1909 were probably human-caused and fueled by slash from this early day logging. There was virtually no regulation of logging in the vicinity until after the Forest was created in 1905. Another major effect of this early logging and subsequent cutting up until around 1950 was to create forest conditions that promoted the spread of dwarf mistletoe within area lodgepole pine stands. Many of the openings created by this era's selective cutting regenerated to lodgepole pine, changing what were single-storied stands to the current multistoried stands. Dwarf mistletoe in the lodgepole overstory that was not cut has spread into much of the lodgepole regeneration within these stands.

Large-scale timber harvesting in the form of clearcutting began in the area in the mid to late 1950's. It was also during this time that much of the area's existing Forest roads were constructed or reconstructed to provide access for the timber sales. As with other parts of the Medicine Bow-Routt National Forests, early clearcut harvesting of a number of stands in the area was done with alternate strips. Since that time clearcut harvesting has been done with small, irregular shaped units. The District resource information system (RIS) database lists an estimated 8,571 acres of harvest treatments, or 24% of what is forested, have occurred in the analysis area since 1950. Out of this amount, approximately 4,646 acres were clearcut. Today these clearcuts have regenerated to young lodgepole pine and aspen stands.

Pre-commercial thinning, release and weed, and mistletoe control cutting has also occurred on some of the past treated acres. Since 1950 a number of lodgepole pine poletimber stands along NFSR 498 in the Holroyd Park area have been commercially thinned for post and poles. The Jerry Park #2 Timber Sale (1994) was the most recent timber sale in the area. Located northwest of Big Creek Park, this sale harvested a number of primarily clearcut units in and around the Jerry Park vicinity. Situated along the NFSR 498 corridor in the extreme southeastern portion of the area, the Holroyd Timber Sale (T.S.) is currently being implemented. This 1.1 MMBF sale is designed to promote area ponderosa pine and aspen, along with reducing the spread of mountain pine beetle and associated tree mortality in this portion of the area.

Vegetation Disturbance

In the central Rocky Mountain ecosystem, disturbance is the critical factor in maintaining co-existing species. Without disturbance, subalpine fir and Engelmann spruce would replace disturbance dependent species such as lodgepole pine, aspen, and ponderosa pine. The presence of these three species at the lower and middle elevations of the analysis area is reflective of disturbance in the form of fire. Natural and human-caused wildfires have been a major factor in forming the forests we see today in the analysis area. It is known that fire has periodically burned large portions of the area, playing an important role in the appearance of the landscape, and maintaining a mix of tree species in various successional stages.

Lower elevations that tend to be drier have a shorter fire return interval, while wetter, higher elevations have a longer fire return interval. Lodgepole, aspen, and ponderosa are very dependent on natural disturbance such as fire to propagate themselves. Lodgepole have serotinous seed cones (cones that do not open at maturity and persist on the tree). Serotinous cones open and release the stored seed when heated. Aspen typically resprout from their interconnected root system following being burned over by fire. While lodgepole and aspen use fire to directly regenerate new stands, ponderosa have adaptations in the form of thick, fire-resistant bark that allows it to survive being under burned by frequent fire. Lodgepole and aspen stand origin dates, estimated from tree ring growth data, provide a rough map of where and approximately when stand replacing/regenerating fires occurred.

Along with administering and regulating early day timber cutting and livestock grazing shortly after the creation of the Forest in 1902, the newly created Forest Service started a strict policy of wildfire suppression in the area. Early firefighting efforts in the Sierra Madre Range were assisted by the construction of a fire lookout tower on Blackhall Mountain. The greatest effect fire suppression has had in the area has been the noticeable conversion of many aspen stands to subalpine fir and lodgepole pine. Most of the aspen stands in the vicinity are considered overmature, with the vast majority being well over 100 years old.

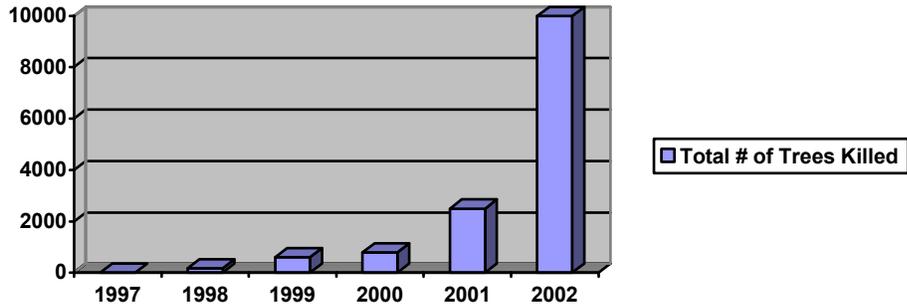
Bark Beetles

Bark beetles are always present in the forest in low endemic numbers. The various types of bark beetles are typically specific to a tree genus and/or species. Mountain pine beetle only attacks trees of the pine genus such as lodgepole, ponderosa, and limber. Western balsam bark beetle only attack trees in the abies genus such as subalpine fir, while spruce beetle is specific to the genus picea, which includes Engelmann and blue spruce. In attacking trees the beetles introduce a blue stain fungus into the tree's living tissues, interrupting the transport of water and nutrients, which eventually kills the tree. The tree's only defense against beetles is its sap, or resin, which the trees use to "pitch out," attacking beetles. Younger, healthier trees produce more sap, thus are better able to ward off attack. Trees growing in crowded conditions, or ones that are old, diseased, or weather/fire damaged, produce less sap, thus are more readily and successfully attacked by beetles. Under endemic conditions, the beetles cause periodic, very low amounts of single tree and small group mortality of what are typically the unhealthiest trees in the stand, providing important snag habitat to dependent wildlife. Endemic beetle populations are naturally regulated through cold winter temperatures and through predation by birds--such as woodpeckers, small mammals, and other insects.

Much like droughts, beetle epidemics are cyclic. When conditions are favorable, the beetle population increases to epidemic levels. Beetle epidemics were a part of the natural variation before settlement (Schmid and Mata 1996). A beetle epidemic is defined as the point in which annual tree loss is greater than annual tree growth, causing disturbances of normal relationships in the forest. Dense stands of trees have little or no defense against beetles, and are extremely susceptible when these insects reach epidemic levels. When beetle populations increase, even healthy trees are subject to infestation. Beetles often kill entire stands of trees during an epidemic. Fire often follows, taking "advantage" of the large accumulation of fuels and burning over the sites. Under dry conditions and with an ignition source such as lightning, tree mortality from bark beetles can provide a ready source of dead fuels for the inevitable wildfire. Fire can also occur without the predisposition created by bark beetles.

Since 1997, aerial surveys of the area conducted by the Forest Service have detected a marked increase in mountain pine beetle activity and subsequent mortality within stands dominated by lodgepole pine. The 2002 aerial survey of the area again verified much of the current beetle activity and spread is within forested areas that have been classified as being unsuitable for timber production, along the southern end of Bear Mountain Inventoried Roadless Area. The Holroyd Timber Sale (currently being implemented) is designed to help reduce beetle spread in mortality along the NFSR 498 corridor, further south of the roadless area. Table 1 displays the estimated tree mortality that has occurred in the area since 1997.

Table 1. Blackhall-McAnulty Mountain Pine Beetle Activity 1997-2002



Another bark beetle that has caused a noticeable increase in tree mortality within subalpine fir stands across the analysis area is western balsam bark beetle. Closely related to the mountain pine beetle, the balsam bark beetle, along with a root disease (armillaria), have caused scattered fir mortality from the lower forested elevations up to the highest elevation on Blackhall and Bear Mountains. There is evidence that scattered pockets of dead subalpine fir helped fuel the Bear Mountain South Fire during its crown fire run.

Another potentially damaging insect that may pose a threat to the Engelmann spruce within the analysis area in upcoming years is spruce beetle. Spruce beetle is similar to the pine beetle in that it is cyclic, and when conditions are favorable the beetle’s populations can increase to epidemic levels. Once an epidemic occurs, all spruce 5” in diameter and greater are susceptible to attack. There are indications that spruce blow-down that has occurred in recent years within watersheds to the west of the analysis area may provide a medium and/or epicenter for the start of a spruce beetle epidemic that could spread into the spruce dominated forests at the higher elevations of Blackhall Mountain.

Dwarf Mistletoe

Dwarf mistletoe is present in lodgepole pine in stands throughout the analysis area. Mistletoe is a parasitic plant that deforms trees, causes rot, and weakens a tree so that it is more susceptible to insects and disease. The RIS database estimates that 61% of the lodgepole stands within the Blackhall-McAnulty Analysis Area have low to high levels of mistletoe infestation. Associated with this, there are a number of forested stands where yearly tree mortality exceeds yearly tree growth. The presence of mature and overmature lodgepole pine with low to high levels of dwarf mistletoe provides a ready source of vulnerable trees for a growing mountain pine beetle epidemic to spread into.

Wildland-Urban Interface

The 2002 Bear Mountain South Fire alerted many landowners within and adjacent to the analysis area to the dangers wildfires present to private land and structures. Much of the 1,631 acres of private within the analysis area is undeveloped. One exception to this is the private inholding in the vicinity of Jerry Park in which a number of rustic cabins have been built over the years. Another area of concern directly adjacent to the analysis area that has a high number of structures on private land is the Skyline Ridge area. Both of these pieces of private could be described as communities at risk. More specifically, A community at risk is defined as a wildland-urban interface community in the vicinity of Federal lands that are at high risk from wildfire in which there are on-going and/or plans for projects to conduct fuels treatments.

Roads

Several road segments within the analysis area, both open and closed, have been poorly maintained or constructed. These segments contribute significantly to stream network expansion, and to the connected disturbed area depositing sediment into adjacent streams. A number of roads within the Blackhall-McAnulty Analysis Area have been designated for closure/decommissioning/obliteration as part of the Sierra Madre Travel Management roads analysis (completed as a result of Phase 2 of the Forest-wide Travel Management Decision, October 2000). Road repairs or upgrade maintenance to reduce erosion and sediment deposition have been identified, and could be included as part of the proposed and alternative actions.

Forest Plan Direction

Desired future condition refers to how an area would appear and function in the future under various management scenarios. A desired condition is developed based on what exists now, knowledge of how it got that way, what is ecologically possible, what is economically feasible, and what is socially desirable. A description of a desired future condition provides the management goals for an area. Goals for each resource are fairly broad under these descriptions and are based on the general desired condition discussed in the Forest Plan.

The 1985 Medicine Bow National Forest Land and Resource Management Plan (Forest Plan) includes the following management emphases for the Blackhall-McAnulty Analysis Area: 1A - Recreation Sites; 4B - Habitat for One or More Management Indicator Species; 4D - Aspen Management; 5A - Big Game Winter Range in Non-forested Areas; 5B - Big Game Winter Range in Forested Areas; 7C – Management of Forested Areas on Steep Slopes; 7E - Wood Fiber Production and Utilization; 9A - Riparian Area Management; and 9B - Water Yield.

There are no wilderness areas within the analysis area, the closest being Encampment River Wilderness, approximately a mile to the west of the northwest corner of the project area. The entire Bear Mountain Inventoried Roadless Area (IRA) is situated in the east-central portion of the area. A small portion of the East Fork of the Encampment IRA is situated in the extreme northwest portion of the area.

The Forest Plan contains the following direction that is pertinent to this analysis:

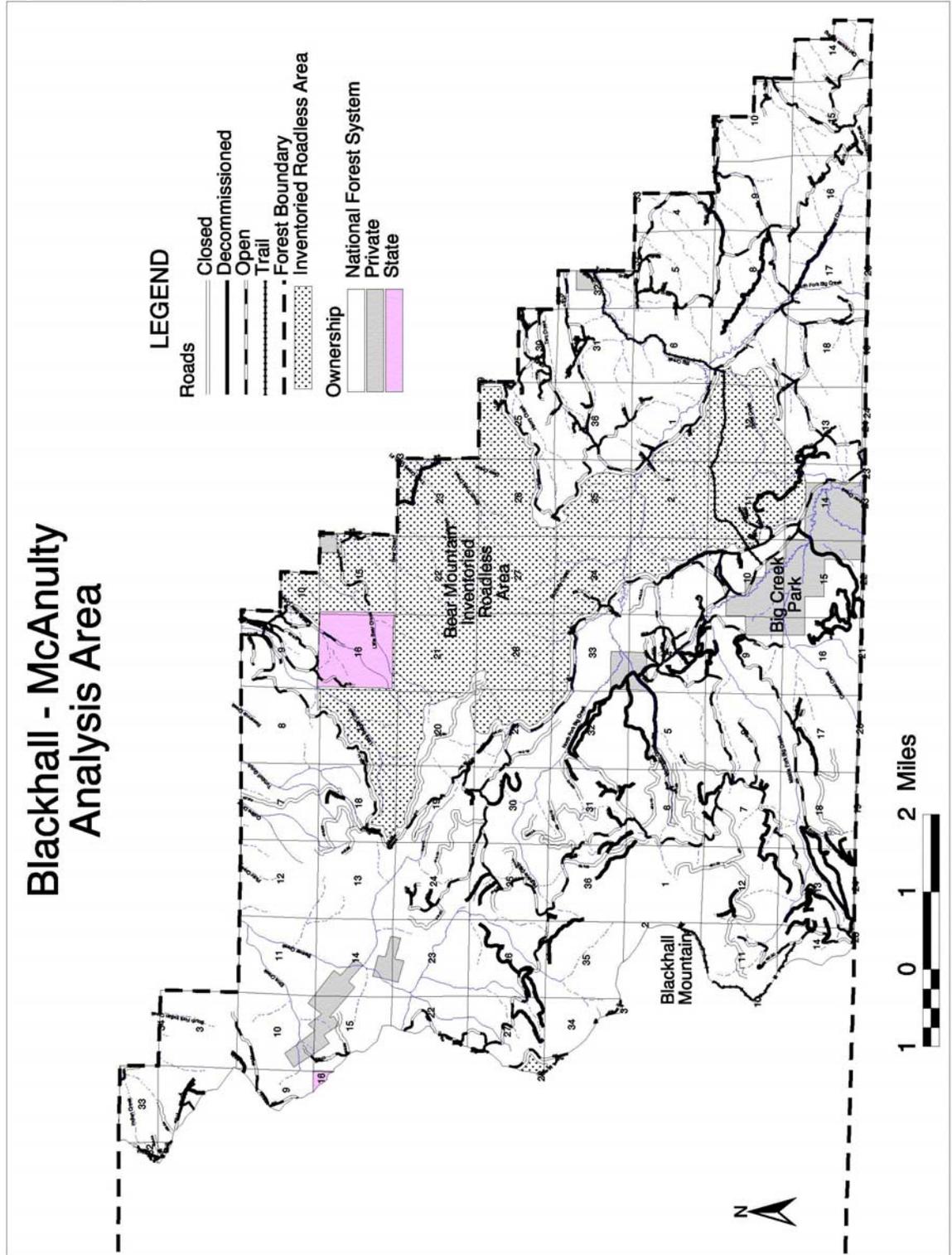
- Medicine Bow Forest Plan direction (p. III-4) is to manage fish and wildlife habitats, including plant diversity, to maintain viable populations.
- Medicine Bow Forest Plan (p. III-4) states as a goal: Provide for timber harvest to support local dependent industries and management of the many Forest resources in a manner that meets silvicultural needs of timber species, places timber stands under management, minimizes timber management costs, and supplies wood products to meet National needs.
- Medicine Bow Forest Plan (p. III-4) states as a goal: Treat vegetation to provide a Forest environment for the uses compatible with the Management Area Objectives.
- Medicine Bow Forest Plan direction (p. III-14) is to maintain structural diversity of vegetation.
- Medicine Bow Forest Plan general direction (p. III-16) (5) is to manage aspen for retention wherever it occurs.
- Medicine Bow Forest Plan direction (p. III-20) is to design and locate vegetation manipulation in a scale which retains the color and texture of the characteristic landscape.
- Medicine Bow Forest Plan general direction (p. III-34) (1) is to use both commercial and non-commercial silvicultural practices to accomplish wildlife habitat objectives.
- Medicine Bow Forest Plan general direction (p. III-36) (3) is to improve habitat capability through direct treatments of vegetation.
- Medicine Bow Forest Plan general direction (p. III-46) (3): Clearcuts may be applied to dwarf mistletoe infected stands of any forest cover type.
- Medicine Bow Forest Plan general direction (p. III-47) (6) lists commercial thinning as an appropriate practice.
- Medicine Bow Forest Plan general direction (p. III-74) is to maintain soil productivity, minimize man-caused soil erosion, and maintain the integrity of associated ecosystems.
- Medicine Bow Forest Plan direction (p. III-77) (3) for Management Area 7E is to maintain stands in a variety of age classes and sizes.
- Medicine Bow Forest Plan direction (p. III-84) is to protect life, property, and resources values from wildfire.
- Medicine Bow Forest Plan direction (p. III-84): Prescribed fire will be used as a vegetative and fuels management technique where it is the most cost-efficient and acceptable alternative to achieve management objectives.
- Medicine Bow Forest Plan direction (p. III-84) is to prevent or suppress epidemic insect and disease populations that threaten forested tree stands with an integrated pest management approach consistent with resource management objectives.

- Medicine Bow Forest Plan direction (p. III-138) for Management Area 4D is to maintain aspen clones and clearcut, prescribe burn, or treat aspen mechanically in order to promote suckering and revegetation of aspen patches.
- Medicine Bow Forest Plan direction (p. III-147) (3) for Management Area 5A is to manage grasslands and grassland shrub types to improve wildlife habitat. Improve habitat conditions by increasing forage available to wildlife and enhancing vegetation diversity.
- Medicine Bow Forest Plan direction (p. III-155) (2) for Management Area 5B is vegetation treatment of forested areas will be used to work towards a forest environment that provides effective forage and cover for wintering big game animals. Maintain at least 30% of the area in created or natural openings (p. III-153) (1a).
- Medicine Bow Forest Plan direction (p. III-189) for Management Area 7E: Emphasis is on wood fiber production and utilization.
- Medicine Bow Forest Plan direction (p. III-193) for Management Area 7E is to apply intermediate treatments to maintain growing stock levels.

Table 2. Management Area Prescriptions

	MANAGEMENT AREA PRESCRIPTION	Acres
1A	Recreation Sites	1
4B	Habitat for One or More Management Indicator Species	12,328
4D	Aspen Management	3,310
5A	Big Game Winter Range in Non-forested Areas	6,110
5B	Big Game Winter Range in Forested Areas	4,814
7C	Management of Forested Areas on Steep Slopes	20
7E	Wood-Fiber Production and Utilization	18,267
9A	Riparian Area Management	409
9B	Increased Water Yield Through Vegetation Manipulation	56
	TOTAL ACRES	45,315

Figure 2. Analysis Area



Purpose and Need for Action

As set forth in law, the mission of the Forest Service is to achieve quality land management under the sustainable multiple use management concept to meet the diverse needs of people. The Forest Service has responsibility for implementing the Forest Plan by completing analysis and evaluation of site-specific projects. The Forest Plan guides natural resource management activities and provides the Forest Service, forest users, and the public with an overall strategy for managing the Forest. The intent of these plans is to manage National Forest System lands for multiple-use and not for any single purpose.

The purpose of this project is to implement management direction from the Medicine Bow National Forest Land and Resource Management Plan to manage for ecosystem management needs.

Based on Forest Plan direction, National Fire Plan emphasis, the Forest-wide Travel Management Decision, and the analysis area's current existing condition versus the desired condition, the Forest Service has identified the following resource needs for the Blackhall-McAnulty Analysis Area:

Vegetative Diversity/Habitat Improvement

Wildfire suppression and subsequent natural succession in the area has allowed some relic ponderosa stands and many area aspen stands to convert to subalpine fir and lodgepole pine dominated stands, causing a loss of important wildlife habitat and a decrease in vegetative diversity.

- *There is a need to maintain and restore aspen and ponderosa pine to its historic prominence.*

Fire suppression, natural succession, and timber harvesting (strip clearcuts) have reduced the natural patch size of a number of stands in the vicinity, which have decreased their value for big game security and as potential habitat for dependent wildlife species.

- *There is a need to maintain and manage for a mosaic of larger patches of forested vegetation, to better emulate natural wildfire patterns and better reflect historic vegetative patterns.*

The non-native plant cheatgrass was found to be present in the vicinity of Cunningham and Holroyd Park. Cheatgrass out-competes native vegetation, reducing habitat for dependent wildlife.

- *There is a need to reduce non-native cheatgrass within the area.*

Forest Health/Resiliency

Since 1997 there has been marked increase in mountain pine beetle activity and subsequent tree mortality in the eastern portion of the area. The presence of dense, overstocked lodgepole pine stands, lodgepole infected with mistletoe, and/or stands where yearly mortality exceeds growth greatly increases the probability of an insect epidemic occurring in the vicinity.

- *There is a need to improve the health and resiliency of area forests to reduce the current outbreak of mountain pine beetle and to decrease their susceptibility to insects and disease.*

Timber Salvage/Wood Production

During the summer of 2002 the lightning-caused Bear Mountain South Fire burned approximately 500 acres in the northeastern portion of the area. The western portion of the fire burned into some of the harvest units proposed under the original McAnulty proposal, along with a number of stands classified as being suitable for timber production.

Much of the proposed project area is within a 7E Management Area, which places emphasis on wood production. Local and regional sawmills depend on timber supplies from federal lands for their operation.

- *There is a need to contribute to the Forest Plan goal of providing for timber harvest.*

Hazardous Fuels Reduction

Early day logging, years of fire suppression, and lack of recent vegetation management on National Forest lands surrounding the private land in-holding Jerry Park and adjacent to private land in the Skyline Ridge area have resulted in forest conditions that have a high risk of uncontrollable, high intensity fires occurring.

- *There is a need to treat area vegetation along portions of the Forest boundary to reduce the wildfire hazard to adjacent private land and structures.*

Soil Erosion/Sedimentation

Phase 2 of the Forest-wide Travel Management Decision (October 2000) requires completion of site-specific travel management analyses to decide the future status of the Forest Transportation System. There are a number of roads within the project area that have been identified as requiring maintenance or closure to reduce soil erosion and sediment entering area creeks. High open road densities in the eastern portion of the area could potentially be degrading wildlife security areas and habitat.

- *There is a need to improve the area's wildlife habitat capability and minimize human-caused soil erosion within the area.*

Proposed Action

The Proposed Action is a comprehensive proposal to reduce the spread of dwarf mistletoe and mountain pine beetle in area lodgepole pine stands, increase patch size of forested areas that have had past harvest, improve resiliency and reduce susceptibility to future disease and insect attack, salvage fire damaged trees, and promote and maintain area aspen and ponderosa pine stands within the Blackhall-McAnulty Analysis Area, using a combination of clearcutting and partial harvest treatments. The proposal also includes: prescribed fire to improve forage for big game and livestock, boundary treatments to reduce hazardous fuels on National Forest adjacent to private land, watershed restoration projects, improvement of the Big Creek Trailhead, and travel management within this portion of the Sierra Madre Range.

Decision Framework

Given the purpose and need, the deciding official reviews the proposed action, the other alternatives, and the environmental consequences in order to make the following decisions:

- Which alternative best addresses the purpose and need for the proposal and the significant issues and concerns for the Blackhall-McAnulty Analysis Area?
- What measures and/or mitigation would be necessary to adequately address concerns and meet Forest Plan direction for other resources, such as wildlife, aesthetics, soils, area streams, etc.?

Public Involvement

The Blackhall-McAnulty analysis combines several projects that were previously identified as separate proposals: The Blackhall Timber Sale, the McAnulty/Beaver Creek Timber Sale, the McAnulty 2 Fuels Management project, and the Sierra Madre Travel Management Analysis. Scoping had been done on both Blackhall and McAnulty/Beaver Creek Timber Sales in 1998 and 1999. Scoping was re-initiated on this expanded project on April 10, 2003. The Colorado portion of the McAnulty/Beaver Creek Timber Sale (Beaver Creek) will be analyzed separately at a later date. Because of the degree of controversy and possibility of significant effect of the project, it was decided that an Environmental Impact Statement would be prepared. The Notice of Intent (NOI) was published in the *Federal Register* on June 11, 2003. The NOI asked for public comment on the proposal from June 11 through July 10, 2003. The proposal was listed in the Schedule of Proposed Actions (SOPA) quarterly reports as one combined project, in January 2003, and each subsequent quarterly report.

Using the comments from the public, other agencies, and tribes, the interdisciplinary team developed a list of issues to address. On September 22, 2003, a Draft Environmental Impact Statement (EIS) was mailed to the appropriate Federal agencies and to those who had requested the document, and on September 22, 2003 was filed with the Environmental Protection Agency. A Notice of Availability (NOA) was published in the *Federal Register* on October 3, 2003, requesting public comment on the Draft EIS. A legal notice was published in the *Rawlins Daily Times* announcing the availability of the document and requesting public comment. Ninety-three responses were received. Responses to the comment letters can be found in Appendix B. No additional significant issues were identified. The significant issues of concern included those listed below:

Issues

The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing and/or not implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)." A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project record. As for significant issues, the Forest Service identified the following issues:

Clearcutting

There is concern over the use of the clearcut treatment and the cumulative effects past clearcutting, partial cutting, logging slash, and associated roads have had on other area resources such as water and wildlife.

Cumulative Effects/Habitat and Wildlife Diversity/Fragmentation

Portions of the analysis area provide winter range, calving, and security areas for elk.

Thermal cover for big game is below Forest plan standards for the area.

Portions of the area have been heavily harvested and had major road systems constructed in the past. Cumulatively area harvest and roads have negatively altered the aesthetics of the area, creating unnatural vegetation patterns, affecting area wildlife habitat effectiveness, and contributing sediment to area streams.

Forest Insects and Diseases

Aerial and on-the-ground surveys have found that there has been a recent increase in mountain pine beetle activity and associated lodgepole pine mortality in the vicinity.

Forested stand inventories have found that the parasitic plant, dwarf mistletoe, is infecting a high percentage of lodgepole pine stands in the analysis area.

Beetles and mistletoe are natural components of the area Forests that should be allowed to progress unchecked.

Watershed Restoration

There are a number of roads across the project area where poor alignment, lack of gravel, and poorly designed and maintained drainage structures are allowing sediment from these roads to enter area streams.

Other open roads and road densities may be affecting wildlife habitat effectiveness in the area, especially in areas identified as winter range.

CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Introduction

This chapter describes and compares the alternatives considered for the Blackhall-McAnulty Analysis. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. 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, social, and economic effects of implementing each alternative.

Alternatives Considered in Detail

The Forest Service developed five alternatives, including the No Action and Proposed Action alternatives, in response to issues raised by the public and the interdisciplinary team.

Alternative 1

No Action

Under the No Action alternative there would be no treatment to the vegetation in the area. In most environmental analyses the No Action alternative represents a static, relatively unchanging baseline of the analysis area's existing condition that can be used to compare the potential effects of the action alternatives. In the case of the Blackhall-McAnulty Analysis, the No Action alternative could have major implications to the timber resource in the area. Alternative 1 would do the least during this entry in moving the vicinity's forests towards the desired future condition for the area. By dropping all proposed timber harvest and prescribed burning, this alternative would allow to continue the conversion of low and middle elevation areas that were once dominated by aspen, and in some case ponderosa pine, to subalpine fir and lodgepole pine stands, reducing the biodiversity of these areas. Non-forested areas would continue to convert to heavy shrub communities, reducing forage opportunities for livestock and area wildlife.

By not moving forward with the proposed timber harvest, boundary treatment, and precommercial thinning, the parasitic plant dwarf mistletoe would continue to spread unchecked through the area's predominantly lodgepole pine stands and into adjacent regenerated clearcuts, infecting the existing sapling and poletimber size lodgepole, weakening trees, making them more susceptible to future disease and/or insect attack—such as mountain pine beetle. Mountain pine beetle would continue to spread unchecked through the area, causing mortality within the vicinity's lodgepole, ponderosa, and limber pine stands. As with pine beetle, western balsam bark beetle would be allowed to spread unchecked through the area, causing additional mortality to area subalpine fir. Tree mortality due to these bark beetles will increase wildfire potential in the area.

As shown by the 2002 Bear Mountain South Fire, under the right conditions and with an ignition source, a sizeable fire can occur in the area. If another wildfire were to occur, the presence of existing lodgepole pine and subalpine fir dead and dying trees would allow the fire to easily transition in to a crown fire or stand-replacing fire. In most cases fir exist as “ladder” fuels that would allow a potential wildfire to burn up into the crowns of the predominantly lodgepole pine stands. A future crown fire could be very detrimental to the few remaining ponderosa pine in the area, possibly killing them.

Although annual road and periodic ditch maintenance would still occur under this alternative under normal program of work, the other watershed restoration projects identified for the area such as the removal of mine spoils and cheatgrass treatments would not occur. Other identified projects such as the Big Creek Trail improvements and Travel Management road decommissioning would also not be implemented.

Proposed Action

Commercial Timber Sales

Situated almost entirely in a 7E timber emphasis Management Area, under this proposal a combination of clearcutting and partial cutting harvest treatments would be used to reduce the spread of dwarf mistletoe and mountain pine beetle in area lodgepole pine stands, increase patch size of forested areas that have had past harvest, thin area stands to improve resiliency and reduce susceptibility to future disease and insect attack, salvage fire damaged trees, and to promote and maintain area aspen stands. Harvest units would be situated predominantly within areas that have had past timber sale entries. Potential commercial silvicultural treatments include: clearcutting, overstory removal, fire/beetle salvage, sanitation/salvage, shelterwood, and commercial thinning. There are no proposed harvest treatments within inventoried roadless areas.

The existing road system of both open and closed roads, along with temporary road construction, would provide access for the proposal. To better address soil, water, and wildlife concerns, all specified and temporary road reconstruction and construction needed for the timber sale proposal would use minimum (ground-disturbing) standards for construction. To discourage use of these roads during project implementation, consideration would be given to gating these roads off the current open road system. Following the completion of the proposal, all temporary roads would be obliterated and closed. All specified roads currently closed would be physically closed to motorized vehicle use following project completion, retaining their templates for future management entries.

A preliminary analysis of the area has found that most of the acreage proposed for treatments would result in treating commercial-size trees (lodgepole greater than 5 inches in diameter). Past experience has shown that in such situations a multiproduct timber sale or a combination of commercial sales is the most efficient method to implement such treatments. Depending on size, each sale would take approximately 3 to 5 years to complete all treatments. Associated projects with the beetle treatments and multiproduct timber sale(s) would include: slash treatment, regeneration surveys, release and weed thinning, aspen enhancement for wildlife, interpretive signs, personal use firewood, noxious weed control, and native grass seeding.

Table 3. Proposed Action – Commercial Timber Sales Summary

Treatment	Est. Total Acres
Clearcut	234
Overstory Removal	35
Fire/Beetle Salvage	144
Sanitation/Salvage	613
Shelterwood - Preparatory Cut	866
Shelterwood - Seed Cut	155
Commercial Thinning	136
TOTAL ACRES	2,183

Table 4. Proposed Action - Roads

Type of Road	New Construction	Reconstruction Existing	Culverts	Total Miles
Specified	0.0 miles	6.2 miles	5	6.2 miles
Temporary	2.9 miles	3.7 miles	5	6.6 miles
TOTAL	2.9 miles	9.9 miles	10 culverts	12.8 miles

Description of Proposed Treatments

CLEARCUT - Under this analysis, the clearcut prescription has only been proposed in units that have lodgepole with high to moderate amounts of mistletoe adjacent to uninfected lodgepole stands or in stands where a new aspen stand is the objective. Consideration has also been given to using clearcutting to increase patch size of areas that have had past harvesting. Under this treatment all merchantable lodgepole pine, subalpine fir, and Engelmann spruce is harvested (100%). Portions that have existing healthy regeneration would be treated with an overstory removal harvest. If a site has good aspen potential, then consideration would be given to using prescribed fire to burn the logging slash following harvest. If not broadcast burned, depending on slash amounts, either scattering and/or piling and burning would be used to treat slash.

OVERSTORY REMOVAL - The overstory removal prescription has been proposed in units that have a predominantly lodgepole overstory with high to moderate amounts of mistletoe over a lodgepole, fir, and spruce seedling/sapling understory. Along with reducing the spread of mistletoe from the lodgepole overstory to the lodgepole understory, consideration has also been given to using overstory removals to increase patch size of areas that have had past harvesting. Due to inadequate existing regeneration in some portions of these units, there will be areas (most less than an acre in size) that will resemble a clearcut following harvest. Under this treatment all merchantable lodgepole, subalpine fir, and Engelmann spruce is harvested (80%). Slash is lopped and scattered.

FIRE/BEETLE SALVAGE – Proposed for portions of the Bear Mountain South Fire area that are suitable for timber management, under this treatment, 20-30% of the existing overstory that has been damaged by the fire or with known active pockets of beetles would be salvaged to improve the health of the stand, reduce the build-up of forest fuels, and to create conditions for new regeneration. It is anticipated that this treatment would concentrate on trees not killed outright by the fire. Most of the trees killed by the fire would be left as snags for dependent wildlife. Slash is typically lopped and scattered.

SANITATION/SALVAGE - Under this treatment, 20-30% of the existing overstory would be salvaged to improve the health of the stand. Proposed for areas of forest that have had past pre-1950 partial harvest with known active pockets of beetles, an emphasis is made on harvesting merchantable lodgepole that is either dead, beetle infested, with moderate to high amounts of mistletoe, and/or of poor form. Consideration will be given to treating portions of these units non-commercially in areas with low commercial volume. Slash is typically lopped and scattered.

SHELTERWOOD – PREPARATORY CUT - Under this first step of an anticipated three-step shelterwood, 20 to 30% of the existing overstory would be salvaged to improve the health of the stand, improve wind firmness of stands, and to begin opening up stands for new and existing regeneration. Proposed for areas of forest that are dominated by mixed conifer or spruce-fir, an emphasis is made on harvesting merchantable lodgepole that is either dead, beetle infested, with moderate to high amounts of mistletoe, and/or of poor form. Slash is typically lopped and scattered.

SHELTERWOOD – SEED CUT - Under this second step of a three-step shelterwood, 40 to 50% of the overstory is removed, retaining the healthiest trees with the best form to act as a seed source. An emphasis is made on harvesting merchantable lodgepole that is either dead, beetle infested, with moderate to high amounts of mistletoe, and/or of poor form. Along with improving the resiliency of the stand to insects and disease, this treatment provides growing space for new and existing regeneration in the understory. Slash is lopped and scattered.

COMMERCIAL THINNING - Proposed for younger lodgepole pine post and pole stands, under this treatment, 40% of the existing lodgepole overstory is thinned to promote a healthier stand and to produce future sawtimber. Thinning will be designed to promote and/or maintain stands as potential goshawk nesting or foraging habitat. Slash is typically lopped and scattered.

Prescribed Fire

Under this proposal, predominantly non-forested areas dominated by sagebrush and bitterbrush in the vicinity of Cunningham and Holroyd Parks would be broadcast burned during the spring to create a mosaic of shrub, forbs, and grass age classes, to improve forage for big game and livestock, and to encourage new aspen and ponderosa pine regeneration in areas where present. It is anticipated that only a minimal amount of fire line would be required using area two-track roads and forested areas, with snow serving as the primary firebreaks for the burn. A small portion of this proposal falls within the Bear Mountain Inventoried Roadless Area. The objective of the burn is to create (maximum) 50% mix mosaic between unburned and burned areas. Areas with cheatgrass and/or areas that were already burned in the recent past within the identified burn polygons will be reconned, mapped, and incorporated into the final burn plan.

Table 5. Proposed Action – Prescribed Fire Summary

Treatment	Est. Total Acres
Broadcast Burn	2,604
TOTAL ACRES	2,604

Reduce Hazardous Fuels Adjacent to Private Land

The 2002 Bear Mountain South Fire alerted many landowners within and adjacent to the analysis area to the dangers wildfires present to private land and structures. Under this proposal, forested areas on the National Forest directly adjacent to private land and structures in the vicinity of Jerry Park and along the Forest Boundary in the Skyline Ridge area would be treated through a combination of commercial and service contracts to reduce hazardous fuels. Best described as a boundary treatment, under this treatment, diseased, dead standing (20-30% of overstory), down dead trees, ladder fuels, and slash within 100 to 200’ of the National Forest boundary adjacent to private land where there are existing structures would be cleared to create a fuelbreak that would increase the controllability of a potential wildfire burning from Forest onto private land and/or from private land onto the Forest.

The end result of this treatment will be an area forested with scattered live trees with little or no slash or dead trees present. Plans are to require whole tree skidding in all proposed fuels treatment units. Cut trees in these boundary areas will be yarded to landings where the unmerchantable slash will be piled. Piles generated by whole tree skidding and/or unit piling would subsequently be burned during fall and winter months after there is adequate snowfall. In the case of the Skyline Ridge proposal, due to the current access, all or most access for treatments on the National Forest would require the adjacent private landowners permission and the granting of temporary access to the Forest Service and/or contractors across the private land to areas identified for treatment. Without this permission and access, it is doubtful this portion of the project would ever take place.

Table 6. Proposed Action – Hazardous Fuels Reduction Summary

Treatment	Est. Total Acres
Boundary Treatment	116
TOTAL ACRES	116

Precommercial Thinning

There are many second-growth stands of predominantly lodgepole pine and aspen (seedling/sapling in size) within regenerated clearcuts that are experiencing a slowing of growth due to overcrowding. If left unaltered, this overstocked condition would result in stands with reduced vigor, increased mortality, and greater susceptibility to insects. The stands would be hand-thinned with chainsaws to promote a healthier, faster growing, beetle and disease-resistant future stand. All proposed thinning units are outside of areas mapped as Lynx Analysis Unit (LAU). It is anticipated that this thinning project would be accomplished through service contracts.

Table 7. Proposed Action – Precommercial Thinning Summary

Treatment	Est. Total Acres
Precommercial Thinning	1,000
TOTAL ACRES	1,000

Travel Management

Another project considered under this analysis is the implementation of Phase 2 of the *Forest-Wide Travel Management Environmental Assessment* (October 16, 2000) within the project area. Phase 2 analysis includes determinations on whether or not unplanned and unmanaged user-created roads and trails will be added to the Forest Transportation System, whether or not additional motorized opportunities should be developed, or if existing Forest Transportation System routes should be opened or closed. A roads analysis of the area has found that there are a number of roads within the project area that have been identified as requiring maintenance or closure to reduce soil erosion and sediment entering area creeks. High open road densities in the eastern portion of the area could be degrading wildlife security areas and habitat effectiveness in big game winter range areas. The Proposed Action includes 38.6 miles of road decommissioning (see Figure 4).

Table 8. Proposed Action – Road Decommissioning Summary

Treatment	Est. Total Miles
Road Decommissioning	38.6
TOTAL MILES	38.6

Big Creek Trail

The current western terminus of this non-motorized trail would be moved to a better location, where a trailhead with adequate vehicle parking and signing would be established. The central trailhead on the 498.2A road will also be improved and a trail bridge will be installed over the Middle Fork of Big Creek and another over the South Fork Big Creek to facilitate horse, foot and mountain bike use.

Watershed Restoration

A number of watershed restoration projects have been identified for possible implementation within the analysis area to address soil, water, native flora, and fauna concerns. These projects include:

- Increase ditch relief pipes along sections of the area's major open roads to reduce routing of sediment to stream channels.
- In the McAnulty drainage on existing **closed** roads: waterbar roads where needed to reduce erosion and sedimentation of McAnulty Creek. Remove log culverts, several of which have already failed. Remove sawdust piles on the streambanks and associated wetlands area along McAnulty Creek in the vicinity of an old mill site. All activities would be implemented after receiving approval from the State Historic Preservation Office.
- Remove mine spoils, re-establish and stabilize stream channel and revegetated disturbed area adjacent to the stream channel at the head of Turnbull Gulch.
- Erosion problems along Highline Ditch are being addressed through routine special use permit administration and repair work was initiated during the summer of 2003.
- Treatment and restoration of areas currently infested with non-native cheatgrass.

Figure 3. Proposed Action and Alternative 2

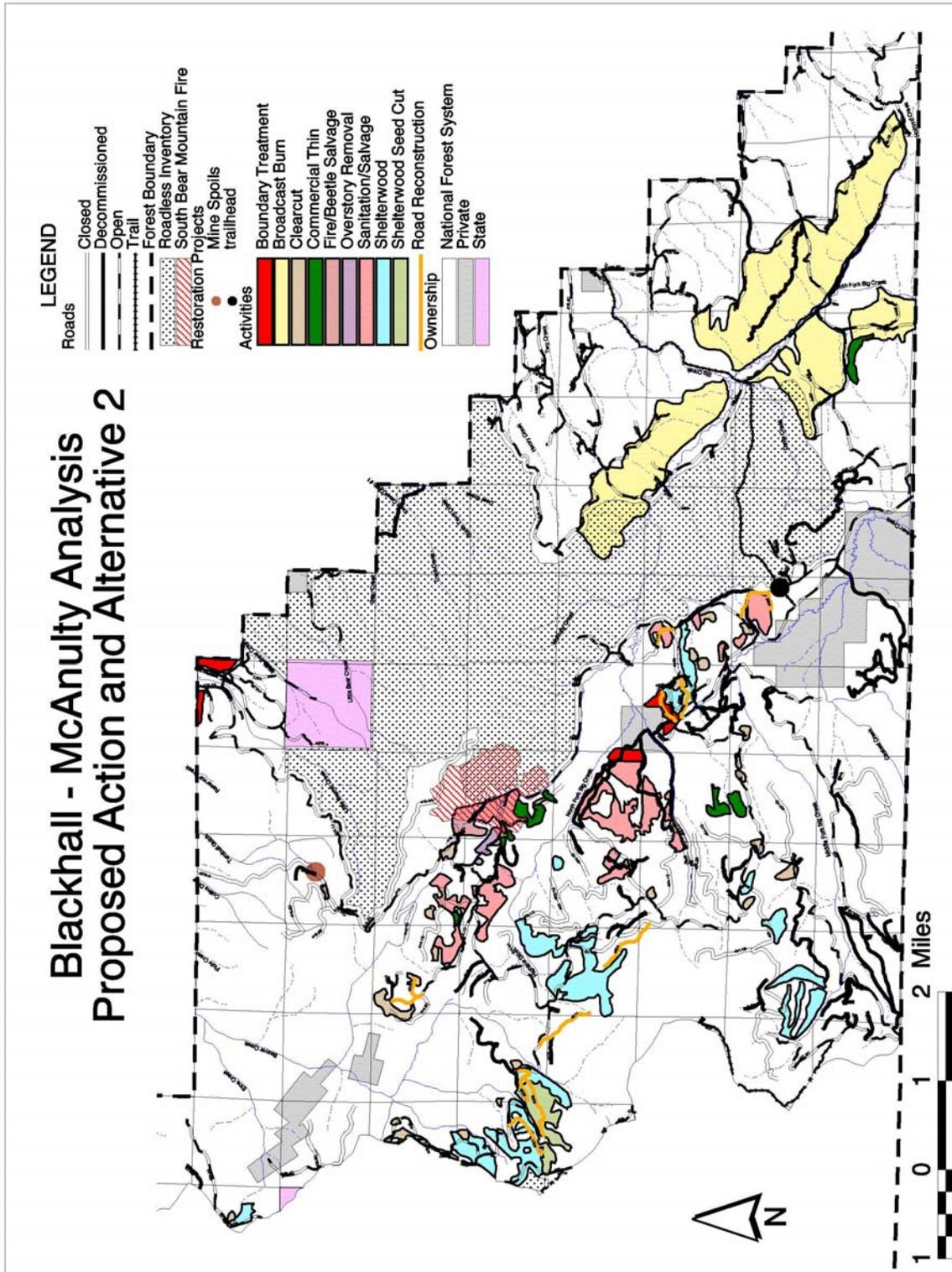
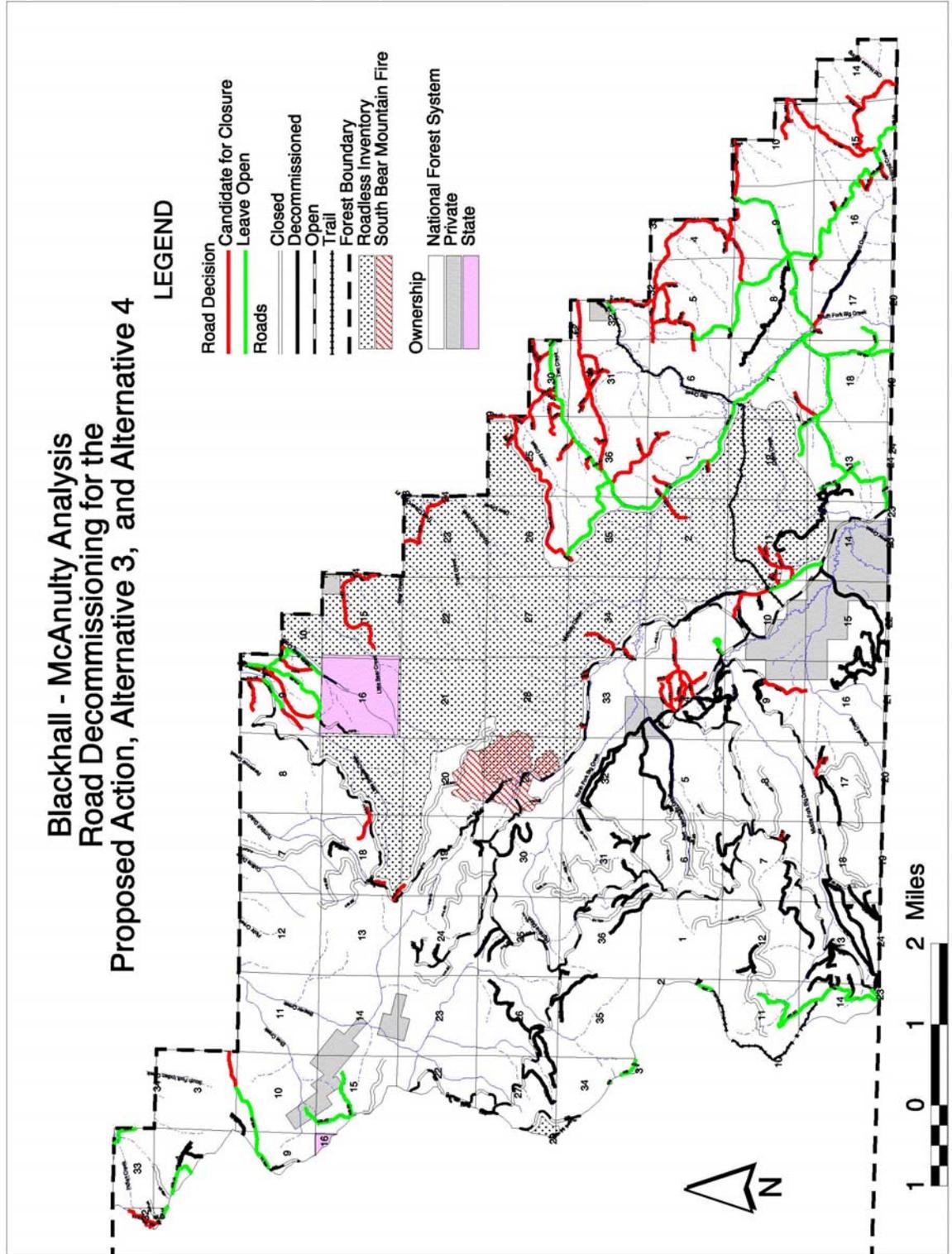


Figure 4. Road Decommissioning – Proposed Action, Alternative 3 and Alternative 4



Alternative 2

Designed to directly address the same purpose and need as the Proposed Action, Alternative 2 includes all the projects identified under the Proposed Action, except proposes to decommission 29.3 miles of road versus 38.6 miles (see Figure 5). As previously stated, Phase 2 of the Forest-wide Travel Management Decision “requires the completion of site-specific travel management analyses to decide the future of the Forest Transportation System.” Under this alternative, road decommissioning in the eastern portion of the analysis area has been reduced in an effort to respond to requests received during scoping, as well as on the Forest-wide Travel Management EA, for specific roads to remain open. **See Proposed Action** for a discussion of other proposed projects, including slash treatments, road decommissioning, project implementation, and associated projects.

Table 9. Alternative 2 – Treatment Summary

Commercial Treatment	Est. Acres
Clearcut	234
Overstory Removal	35
Fire/Beetle Salvage	144
Sanitation/Salvage	613
Shelterwood - Preparatory Cut	866
Shelterwood - Seed Cut	155
Commercial Thinning	136
Total	2,183
Other Treatment Acres	
Broadcast Burn	2,604
Boundary Treatment	116
Precommercial Thinning	1,000

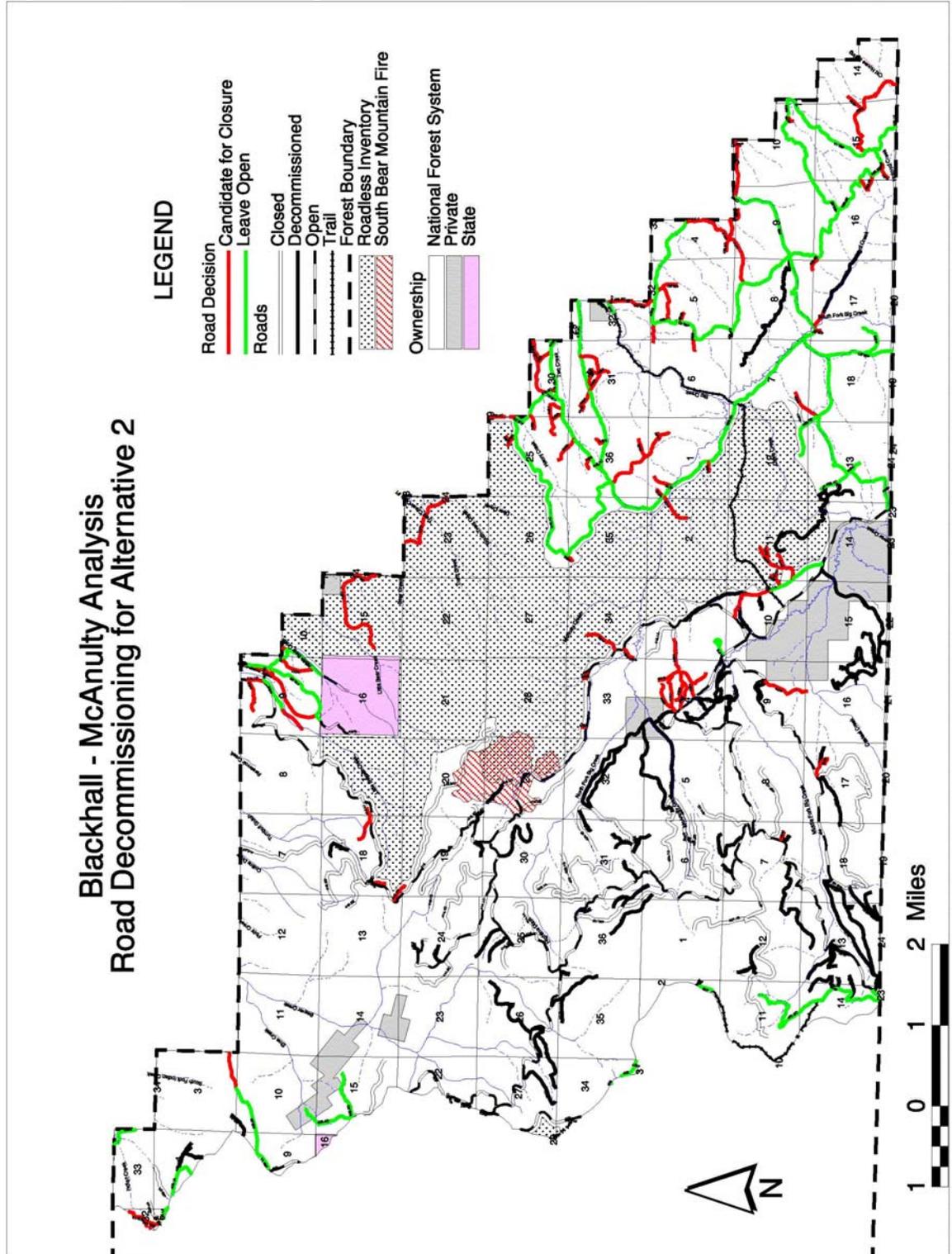
Table 10. Alternative 2 - Roads

Type of Road	New Construction	Reconstruction Existing	Culverts	Total Miles
Specified	0.0 miles	6.2 miles	5	6.2 miles
Temporary	2.9 miles	3.7 miles	5	6.6 miles
TOTAL	2.9 miles	9.9 miles	10 culverts	12.8 miles

Table 11. Alternative 2 – Road Decommissioning Summary

Treatment	Est. Total Miles
Road Decommissioning	29.3
TOTAL MILES	29.3

Figure 5. Road Decommissioning –Alternative 2



Alternative 3

Designed to directly address the significant issues of clearcutting and past cumulative effects, Alternative 3 differs from the Proposed Action and Alternative 2 in that it drops all proposed clearcutting and reduces the amount of timber harvest and associated specified and temporary road construction and reconstruction. This alternative also drops all proposed fire salvage within the Bear Mountain South Burn area. Though it still includes fuels reduction around Jerry Park (74 acres), Alternative 3 drops the Skyline boundary treatment and all precommercial thinning. Alternative 3 includes the entire prescribed burn proposal, road decommissioning, and all the proposed watershed restoration projects included under the Proposed Action. **See Proposed Action** for a discussion of other proposed projects, slash treatments, road decommissioning, project implementation, and associated projects.

Table 12. Alternative 3 – Treatment Summary

Commercial Treatment	Est. Acres
Clearcut	0
Overstory Removal	0
Fire/Beetle Salvage	0
Sanitation/Salvage	426
Shelterwood - Preparatory Cut	268
Shelterwood - Seed Cut	0
Commercial Thinning	49
Total	743
Other Treatment Acres	
Broadcast Burn	2,604
Boundary Treatment	74
Precommercial Thinning	0

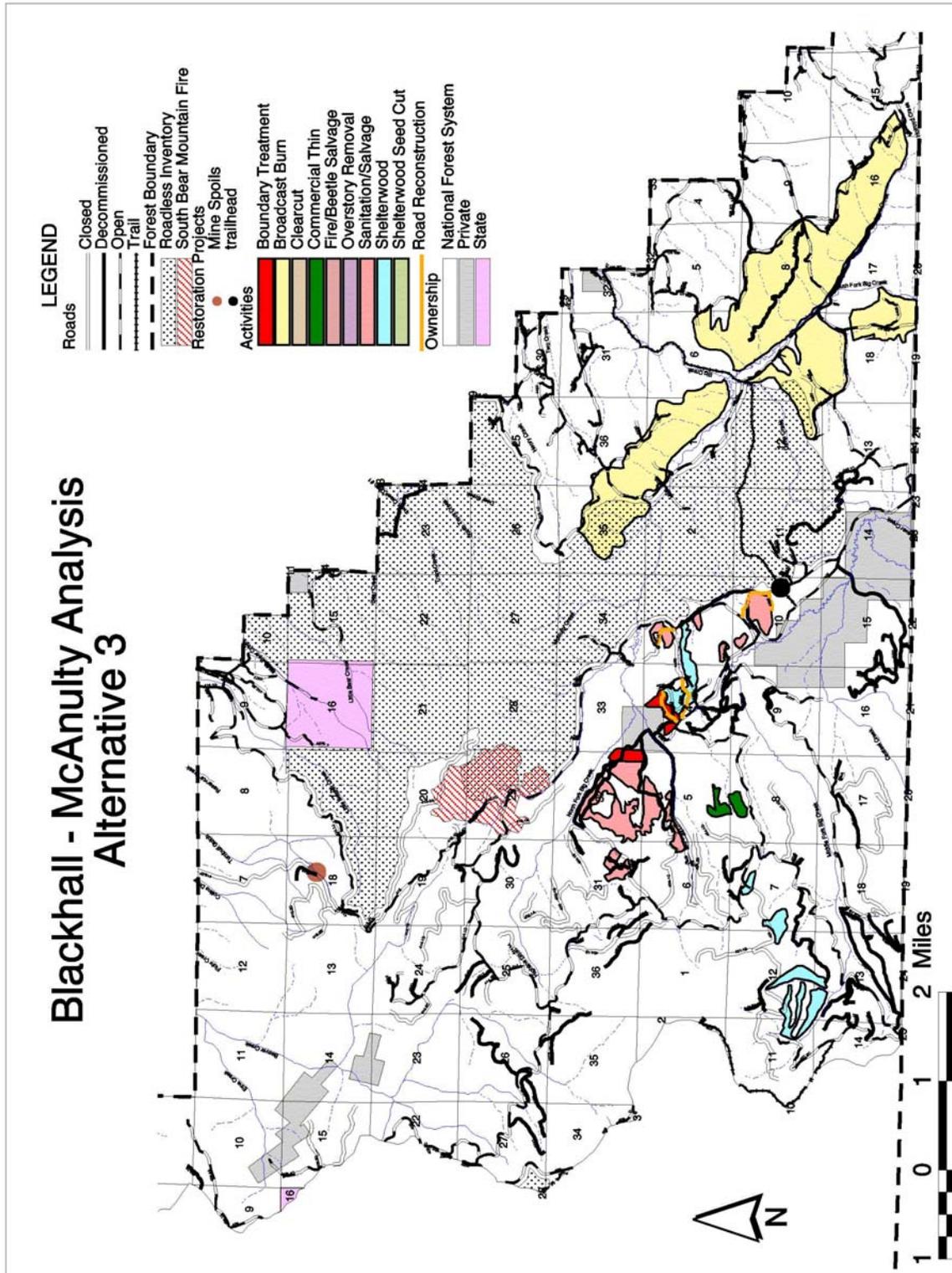
Table 13. Alternative 3 - Roads

Type of Road	New Construction	Reconstruction Existing	Culverts	Total Miles
Specified	0.0 miles	2.0 miles	2	2.0 miles
Temporary	0.9 miles	2.1 miles	2	3.0 miles
TOTAL	0.9 miles	4.1 miles	4 culverts	5.0 miles

Table 14. Alternative 3 – Road Decommissioning Summary

Treatment	Est. Total Miles
Road Decommissioning	38.6
TOTAL MILES	38.6

Figure 6. Alternative 3



Alternative 4

Designed to directly address the significant issues of cumulative effects and watershed restoration, Alternative 4 only includes the entire prescribed burn proposal, travel management—road decommissioning, and watershed restoration proposals included under the Proposed Action. **See Proposed Action** for a discussion of these proposed projects.

Table 15. Alternative 4 – Treatment Summary

Commercial Treatment	Est. Total Acres
Clearcut	0
Overstory Removal	0
Fire/Beetle Salvage	0
Sanitation/Salvage	0
Shelterwood - Preparatory Cut	0
Shelterwood - Seed Cut	0
Commercial Thinning	0
Total	0
Other Treatment Acres	
Broadcast Burn	2,604
Boundary Treatment	0
Precommercial Thinning	0

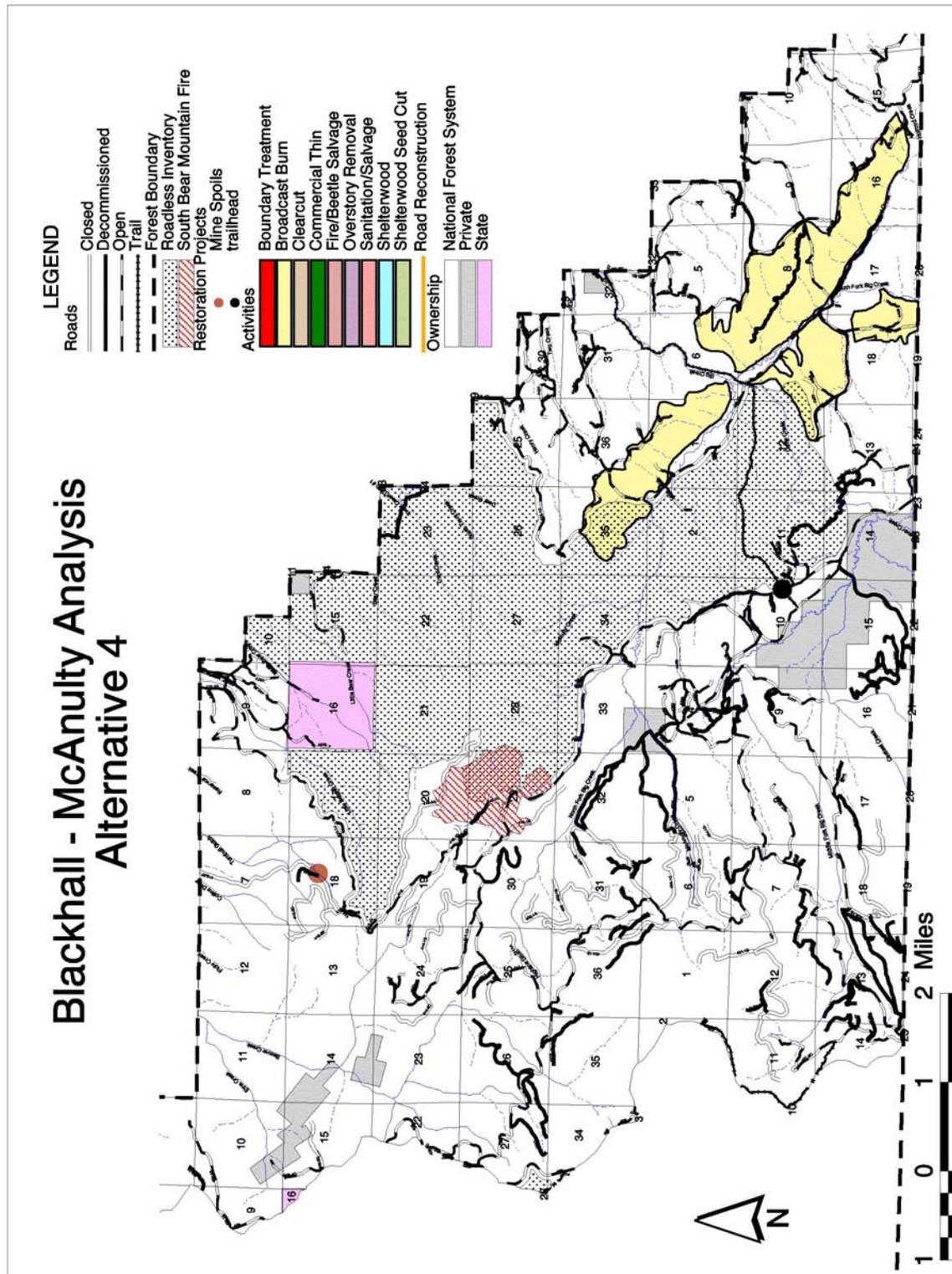
Table 16. Alternative 4 - Roads

Type of Road	New Construction	Reconstruction Existing	Culverts	Total Miles
Specified	0 miles	0 miles	0	0 miles
Temporary	0 miles	0 miles	0	0 miles
TOTAL	0 miles	0 miles	0 culverts	0 miles

Table 17. Alternative 4 - Road Decommissioning Summary

Treatment	Est. Total Miles
Road Decommissioning	38.6
TOTAL MILES	38.6

Figure 7. Alternative 4



Mitigation Common to All Action Alternatives

The Forest Service also developed the following mitigation measures to be used as part of all of the action alternatives.

Soils, Water, and Fisheries

The Watershed Conservation Practices (WCP) Handbook (FSH 2509.25) provides the Standards as well as the Guidelines or Design Criteria for the Forest Plan. Mandatory Best Management Practices per 33 CFR 323.4 (a)(6) to meet the requirements of the Clean Water Act will be implemented, with the following specific mitigations to protect the soil, water, and riparian resources during project implementation.

Timber Harvest

- Ground cover will be established or maintained on disturbed areas (native surface roads, landings, skid trails, etc.). These actions will be current with purchaser's operations and will be completed immediately preceding seasonal periods of precipitation or runoff to reduce erosion and the spread of noxious weeds.
- At logging sites, adequate amounts of coarse woody debris will be left at the site, especially in units that have very little to begin with. A variety of diameters will be left. Whole tree skidding will not be allowed, except for fuel reduction projects.
- Rip all main skid trails and landings. Lift ripper teeth every 75-100 feet so as not to have a continuous furrow. Scatter slash on skid trails to provide groundcover and minimize surface erosion. Ensure at least 50% groundcover on skid trails following completion of use. Close all skid trails in the same season of use.
- Rip all temporary roads. When ripping roads, lift the ripper teeth every 100 feet so as not to have continuous furrows. Construct water bars where necessary. Do not drain water bars into ephemeral draws on dissected slopes.
- Designate all crenulated channels as protected stream courses, unless a watershed specialist determines that this level of protection is not necessary.
- Designate all intermittent and perennial stream channels as protected stream courses.
- Keep all equipment and timber harvest at least 100 feet from streams, wetlands and riparian areas. Minimize temporary road stream crossings and construct stream crossings perpendicular to stream channels.
- Burn piles for fuel reduction and excess slash in a timber harvest (if necessary) will be limited to approximately 300 square feet. After the piles are burned, they will be spread out and the site will be reseeded. This size limit will prevent excessive soil heating from the burn piles. The seeding will help prevent noxious weeds from spreading.

- Add new ditch relief culverts as needed on ditched roads below timber sale units to prevent increased flow from routing sediment to stream channels. NFSR 414 currently needs additional ditch relief culverts; other roads would need to be evaluated.
- The intensity of the prescribed fire, as it affects the ground layer, will be in the low to moderate range. The soils should be in a moist condition.

General Road Stream Crossings

- Any culvert installations, removals, or other in-channel construction activities on flowing streams require a site-specific erosion control plan in order to reduce turbidity and fine sediments. These projects will be evaluated to determine if a waiver to the state water quality rule is necessary [which allows a maximum turbidity increase of 10 NTU (Nephelometric Turbidity Units)].

Road Decommissioning

- Road decommissioning will include adequate drainage (waterbars or drain dips) on roads to prevent erosion and/or failure of the road surface.
- Stream crossings will be removed and the road fill removed to restore stream channel width. Fill material will be removed from the floodplain as well. Site-specific erosion control will be developed jointly between the engineering and watershed staff for each culvert removal on flowing streams.
- Erosion control such as straw mulch or erosion blanket will be used to reduce erosion of newly disturbed soil adjacent to all stream channels and floodplains. These areas will be seeded with native seeds (as feasible) to increase rate of revegetation.
- Portions of decommissioned roads that currently encroach on the stream channel and/or floodplain will be removed to restore stream channel and floodplain width and to reduce future erosion of road fill.

Mine Spoil Removal

- Mine spoils at the head of Turnbull Gulch should be chemically analyzed for contamination properties prior to removal from the drainage as part of the watershed improvement. Appropriate remediation plans will be developed as needed.

Cheatgrass Herbicide Application

- Apply herbicide using hand or backpack sprayers to allow better control of herbicide. Do not apply within 100 feet of stream channels, riparian areas, or wetland vegetation.

Recreation

- Post warning signs on area roads during periods of logging operation.
- The logging company's employees will be required to camp within the sale area boundary in approved sites.

- Effectively close any roads opened for the timber harvest or temporary roads within the same operating season as applicable units are logged.

Lands, Minerals, & Special Uses

- The boundary between the private lands and National Forest System lands will be verified as adequately posted, especially in the areas of boundary treatment units.
- Route of haul for material removed from the boundary treatments units in Section 9, T.13N., R.82W. is dependent on the acquisition of temporary road use easements from the private landowners.

Range

- Protect fences during harvest and prescribed burning activities, including keeping them up while livestock are on the allotment or pasture. Part of the Holroyd/Cunningham pasture division fence is within the proposed burn unit within Cunningham Park. Harvest units around Jerry Park straddle or are adjacent to allotment fences.
- Design harvest units along fences so as to minimize wind-throw potential.
- Schedule prescribed burning in the Big Creek Allotment, where possible, so as to minimize the number of consecutive years the permittee will have to forego use of the Holroyd and Cunningham pastures. This should take into account the planned Holroyd Project burns as well.
- Where possible/practical, roads that access range improvements and are scheduled for closure will be closed with gates instead of being obliterated so that permittees can continue to access those improvements via motorized vehicles.
- Seed disturbed sites with certified weed free seed of desirable herbaceous plant species **where needed** to reduce the potential for establishment or spread of noxious weeds and to reduce soil erosion potential. Sterile hybrid or non-persistent annuals such as “Regreen,” white oats or cereal ryes, or native plant species, are recommended where site conditions are appropriate. Seed from non-native plant species should NOT be used. Areas where duff or slash cover the ground or where natural revegetation is expected to occur quickly do not need to be seeded.
- Require logging and other types of heavy equipment to be steam cleaned before it is moved into the project area. This is to remove weed seeds or mud that might contain noxious weed seeds.
- Rest prescribed burns for at least the first grazing season after treatment. Rest for two growing seasons after burning is recommended where promotion of grasses and forbs is desirable or soil stability is a concern.
- Locate landings and long-term camping associated with logging and road building in forest areas rather than in meadows, grasslands, or sagebrush areas. Due to soil compaction, it is difficult to revegetate these natural openings and there is more threat of noxious weed establishment since most weeds are adapted to sunny locations.

- Eliminate those areas already burned from 1980 to the present, and consider not burning in or adjacent to cheatgrass infestations until/unless a treatment program to reduce cheatgrass and prevent its spread has been implemented. This could involve one or more years of cheatgrass treatment prior to burning or burning to remove plant litter, followed by herbicide application to kill cheatgrass. Depending upon how many surviving native species remain within cheatgrass infested areas, seeding may also be needed after herbicide treatment.

Roads

- Whenever possible, roads shall be relocated or reconstructed out of draw bottoms to improve drainage and protect soil and water resources. Abandoned roadbeds shall be re-vegetated and returned to a state as natural as possible.
- Most temporary roads and newly reconstructed system roads will be physically closed immediately upon construction and restricted to administrative use by the Forest Service and the timber purchaser for sale related activities. The temporary physical closures (usually gates) will be removed once the permanent closures are in effect.
- Where sod has effectively stabilized existing roadbeds, efforts will be made to minimize disturbance to the sod layer during maintenance and reconstruction activities.
- Roadside brushing along arterial and collector roads (especially NFSR 404, 407, and 414) is a critical health and safety deferred maintenance item that needs correction before any haul can occur.
- Road 407.1B to the proposed trailhead will need to be reconstructed to a Level III standard if and when dollars become available. Approximate length would be 0.75 mile.
- Road 498.2A to the proposed trailhead will need to be reconstructed to a Level III standard if and when dollars become available. Also, 2 new footbridges would be constructed at that time. Approximate length would be 1.0 mile.

Rare and Sensitive Plants

- Identify on the ground and buffer all known populations of Colorado tansy aster associated with timber harvest activities or prescribed burning activities that would directly or indirectly impact plant habitat or populations.
- Identify on the ground and buffer core populations (>50 stems) or other important occupied sites of clustered lady's slipper orchid associated with timber activities or prescribed burning activities that would directly or indirectly impact plant habitat or populations.
- The Forest Service maintains discretion to modify projects or contracts if other PETS (proposed endangered, threatened, or sensitive) plant species are found in the analysis areas.

- The protection buffers for core populations of clustered lady's slipper orchid will be a minimum of 100 feet in radius from population boundaries. The protection buffer will maintain shading and micro-site conditions at the managed sites by retaining sufficient shrub and/or canopy cover so that plants are not exposed to more than intermittent direct solar radiation.
- Fell trees away from buffered populations.
- Exclude mechanized equipment from identified buffered sites.
- Do not place or burn slash piles or broadcast burn slash on identified TES plant locations.

Wildlife

- Include appropriate contract provisions to ensure protection of threatened, endangered, proposed, and Forest Service sensitive species.
- Prohibit any disturbance activity from March 1st through July 31st within ¼ mile of an active goshawk nest.
- Designate the following stands as old growth (timber component 871) to meet old growth requirements in 9A Management Area: 2051170028, 2051170009, and 2051170010.
- Designate the following stand as old growth (timber component 871) to replace old growth harvested in boundary treatment unit #3, minimize reduction in vertical diversity, and meet old growth requirement in 4B Management Area (III-125): 2050030026.
- All specified roads reconstructed for timber harvest will be gated as identified in the Proposed Action, in order to effectively provide the quantity and quality of wildlife habitat that was analyzed in this document.
- Rather than strictly homogeneous slash treatments in clearcuts, incorporate into the design some places where slash piles would be left to provide more diversity of habitats and connectivity for species such as pine marten and a variety of small mammals. This would be done in a manner so as not to impede movements of big game animals. Piles for pine marten should be high enough to be above the snow (e.g., 8 feet high or more) and near the edges of clearcuts (within 100 feet). The District wildlife biologist will assist in identifying piles to be left after the slash treatment is completed.
- Do not broadcast burn slash in clearcut units unless aspen was present in the stand or immediately adjacent to the stand.
- Snags retained to meet Forest Plan requirements will be identified in groups at the edges of clearcuts where they are less susceptible to loss by strong winds.
- Provide additional snags within 116 acres of other harvest units to replace those snags removed in boundary treatments, in order to meet Forest Plan standards for snag retention in the analysis area. A good candidate is Shelterwood prep unit #14.

- Include the following snag retention and coarse woody debris criteria in harvest units to benefit cavity-nesting wildlife:

For Snag Retention:

Cover Type	Snags/acre	Size	Snag recruits*/acre
Spruce/Fir	6-10	Over 10” if available	8-12
Lodgepole pine	0-2	Over 10” if available	8-12
Ponderosa pine	1-2	Snags over 10” if available. Retain largest available	2-4
Aspen	0		0

*Preferred recruits are live trees with nest holes, broken tops, dead branches, or decay, relatively free from mistletoe.
 *If insufficient snags are available to meet the minimum diameter level in this table, retain the largest snags available. If insufficient snags are available, retain more recruits to compensate.
 *In selecting snags and recruits for retention: retain the largest snags that are present, retain a range of all degrees of decay that are present on the site.
 *Maintain snag components and snag recruits well distributed across harvested units.

For Coarse Woody Debris:

Downed Wood (tons/acre in decay classes 1 and 2 (i.e., low decay). Diameter > 3” and >25 feet in length)		
Spruce/fir	10-15 tons/acre	80% over 10”
Lodgepole pine	10-15 tons/acre	80% over 6”
Ponderosa pine	5-10 ton/acre	100% over 10”

When using prescribed fire, it will be acceptable that coarse woody debris standards may not be met. Avoid crushing large downed wood with machinery.

Monitoring Common to All Action Alternatives

Fisheries and Aquatics

- Best Management Practices and mitigation outlined in the mitigation measures should be monitored for implementation and effectiveness, particularly after any significant precipitation events during harvest or temporary road construction activities. If monitoring reveals unexpected effects in any of the drainages, additional monitoring for sediment deposition, turbidity, impacts to fish or amphibian population or habitats may be initiated. Steps should then be initiated to reduce effects detrimental to water quality, species habitats, or populations.
- No amphibians were selected for specific monitoring in this project, because they are relatively small populations where they exist within the analysis area. These small amphibian populations would not lend themselves to suitable monitoring protocols for effective analysis. When they are observed during other monitoring activities they would be noted.
- Selected “common trout” populations will be monitored as Management Indicator Species (MIS) one year following the completion of harvest to determine any changes in relative abundance. Should monitoring reflect an abnormal downturn in relative abundance, additional monitoring would be performed three years following harvest completion. Specific management evaluations would be completed at that time. However, project monitoring for effects on fish populations will be accomplished on a watershed basis rather than on individual streams. Specific monitoring points are established in the Specialists Report.
- The effectiveness of road decommissioning on reducing sediment delivery to stream channels will be monitored. A sample of the decommissioned roads will be visually evaluated, with photo documentation, to determine the effectiveness of this project. A minimum of two roads will be chosen that are currently contributing sediment to stream channels, with inspection and photo documentation prior to decommissioning activities, at the end of the first season after decommissioning, and at 1, 3, and 5 years after road decommissioning, or until the road has stabilized and revegetated.
- A minimum of one culvert removal on a flowing stream will be monitored for turbidity increases during culvert removal and stream channel restoration. This will increase our knowledge of how to reduce sediment during activities occurring within stream channels and document compliance with State of Wyoming Water Quality Standards.

Range

- Monitor harvest units, prescribed burns, and any other sites where native vegetation cover is removed and/or bare soil is exposed for at least the first five years after treatment to detect and treat any noxious weeds that may become established.

- Implement long-term monitoring of the burn to help us detect if shrub regeneration is not occurring as planned (and why) and to detect cheatgrass and other weeds at the early invasion stage. This may be as simple as some repeatable photo points and some canopy cover estimates or measurements, and include pre-burn data.

Wildlife

- Monitor proposed treatment areas that occur in the vegetation/elevation range preferred by nesting northern goshawks during sale layout, marking, and implementation for new nesting activity.
- Monitoring for Management Indicator Species (MIS) will continue in order to track changes in populations and habitat Forest-wide.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the need for the proposal, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

Original Proposed Action

A number of potential harvest units were dropped from the original proposed action to better address Forest Plan standards and guidelines for big game thermal cover, designated old growth, and to prevent any conflicts with known northern goshawk nests.

Uneven-aged Management

This alternative would only use selective harvesting or uneven-aged management to treat potential units within the area. Lodgepole and aspen typically regenerate new even-aged stands following a stand-replacing event such as a wildfire. Although uneven-aged management can be used to promote Engelmann spruce and subalpine fir, which typically grow in uneven-aged conditions, this treatment would create potentially unnatural conditions within the area's current even-aged stands of lodgepole and aspen. Uneven-aged management within the area's predominantly lodgepole pine stands would promote and speed up the invasion of other conifer species such as subalpine fir. Implementation of uneven-aged harvest prescriptions within mistletoed lodgepole stands would increase the spread of mistletoe from the overstory to younger lodgepole in the understory. Therefore, this treatment was dropped from consideration in lodgepole and aspen stands. The various shelterwood treatments proposed for mixed conifer and spruce-fir dominated stands under the proposal will maintain and create uneven age conditions in treated stands.

Prescribed Burning

Consideration was given to just using prescribed burning to broadcast burn forested and non-forested portions of the area—including areas identified for fuels treatment and/or timber harvest, to promote aspen and vegetation diversity. Though 2,604 acres of predominantly non-forested areas are proposed to be broadcast burned under all the action alternatives, in looking at the rest of the vicinity it was felt it was not feasible to burn the forested portions. For burning to be effective in promoting disturbance dependent species--such as aspen, it would need to be a crown or stand-replacing fire. This type of high intensity fire tends to create its own wind and to create spot fires sometimes miles from the main body of fire. The risk of adverse environmental effects and the risk of not being able to confine a prescribed fire to the treatment area make this alternative unfeasible. Though the use of fire(s) would be the best means to replicate natural disturbance and to encourage disturbance-dependent plant communities, potential detrimental effects to heritage resources, soils, water quality, stream channel stability, wildlife habitat, and area private land make this alternative unfeasible. As demonstrated by the 2002 Bear Mountain South Fire, it took the efforts of slurry bombers, helicopter water drops, bulldozers, hundreds of firefighters, and an expenditure of hundreds of thousands of dollars to bring this stand-replacing, crown fire under control.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 18. Treatments by Alternative

COMMERCIAL TREATMENT/ ACRES	Proposed Action	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Clearcut	234	0	234	0	0
Overstory Removal	35	0	35	0	0
Fire/Beetle Salvage	144	0	144	0	0
Sanitation/Salvage	613	0	613	426	0
Shelterwood – Preparatory Cut	866	0	866	268	0
Shelterwood – Seed Cut	155	0	155	0	0
Commercial Thinning	136	0	136	49	0
TOTAL ACRES	2,183	0	2,183	743	0
OTHER TREATMENT/ ACRES					
Broadcast Burn	2,604	0	2,604	2,604	2,604
Boundary Treatment	116	0	116	74	0
Precommercial Thinning	1,000	0	1,000	0	0

Table 19. Road Construction by Alternative

Roads	Proposed Action	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Specified Construction	0	0	0	0	0
Specified Reconstruction	6.2	0	6.2	2.0	0
Temporary Construction	2.9	0	2.9	0.9	0
Temporary Reconstruction	3.7	0	3.7	2.1	0
TOTAL MILES	12.8	0	12.8	5.0	0

Table 20. Road Decommissioning by Alternative

Roads	Proposed Action	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Miles of Road Proposed for Decommissioning	38.6	0	29.3	38.6	38.6

Table 21. Comparison of Alternatives

Purpose and Need	Proposed Action	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Vegetative Diversity	Designed to address, 234 acres of clearcut, 35 acres of overstory removal, 144 acres of fire salvage, along with the broadcast burn will promote conditions for new aspen regeneration. Sanitation/salvage treatment will maintain existing aspen.	With 0 acres of treatment, no action will allow decline in area aspen and vegetation diversity to continue.	Designed to address, 234 acres of clearcut, 35 acres of overstory removal, 144 acres of fire salvage, along with the broadcast burn will promote conditions for new aspen regeneration. Sanitation/salvage treatment will maintain existing aspen.	Broadcast burn will promote conditions for new aspen regeneration. Sanitation/salvage treatment will maintain existing aspen.	Broadcast burn will promote conditions for new aspen regeneration.
Natural Patch Size	Designed to address, all harvest treatments are directly adjacent to areas that have had past harvest. Includes all proposed road decommissioning.	With no harvest treatment or road decommissioning, no action will allow natural succession to continue.	All harvest treatments are directly adjacent to areas that have had past harvest. Includes 9.3 miles less road decommissioning.	66% less treatments than Proposed Action and Alt. 2. Includes all proposed road decommissioning.	0 acres of harvest treatment. Includes all proposed road decommissioning.
Forest Health & Resiliency	Designed to address, all proposed harvest treatments and precommercial thinning will improve forest health and resiliency.	With 0 acres of treatment, no action will allow area forest health and resiliency to continue to decline.	Designed to address, all proposed harvest treatments and precommercial thinning will improve forest health and resiliency.	With no precommercial thinning and 66% less harvest treatments than Proposed Action and Alt. 2, Alt. 3 will do less to address concern.	With 0 acres of treatment, Alt. 4 will allow area forest health and resiliency to continue to decline.
Providing a Flow of Timber	Designed to address, all proposed harvest treatments will produce commercial volume.	With 0 acres of harvest treatment, no action will produce no commercial volume.	Designed to address, all proposed harvest treatments will produce commercial volume.	With 66% less harvest treatments than Proposed Action and Alt. 2, Alt. 3 would produce the least amount of commercial volume.	With 0 acres of harvest treatment, Alt. 4 will produce no commercial volume.
Wildland Urban Interface	Designed to address, includes 116 acres of boundary treatment directly adjacent to private land with structures.	With 0 acres of boundary treatment, no action does not address concern.	Designed to address, includes 116 acres of boundary treatment directly adjacent to private land with structures.	Includes 74 acres of boundary treatment directly adjacent to private land with structures.	With 0 acres of boundary treatment, Alt. 4 does not address concern.
Watershed Restoration	Designed to address, includes all proposed Watershed Restoration projects. Includes all proposed road decommissioning.	With no Watershed Restoration projects, no action does not address concern.	Includes all proposed Watershed Restoration projects. Includes 9.3 miles less road decommissioning.	Designed to address, includes all proposed Watershed Restoration projects. Includes all proposed road decommissioning.	Designed to address, includes all proposed Watershed Restoration projects. Includes all proposed road decommissioning.

Significant Issue	Proposed Action	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Clearcutting	Includes 234 acres of clearcutting (11% of entire timber sale proposal).	Designed to address issue, includes no clearcutting.	Includes 234 acres of clearcutting (11% of entire timber sale proposal).	Designed to address issue, includes no clearcutting.	Designed to address issue, includes no clearcutting.
Cumulative Effects/ Habitat & Wildlife Diversity/ Fragmentation	Proposal found to be consistent with Forest Plan standards and guidelines for aquatic and terrestrial wildlife. Includes all proposed road decommissioning.	With no treatments and road decommissioning, no action will allow natural succession to continue.	Proposal found to be consistent with Forest Plan standards and guidelines for aquatic and terrestrial wildlife. Includes 9.3 miles less road decommissioning.	With 66% less harvest treatments than Proposed Action and Alt. 2, Alt. 3 is consistent with Forest Plan standards and guidelines for aquatic and terrestrial wildlife. Includes all proposed road decommissioning.	Except for the broadcast burn area Alt. 4 will allow natural succession to continue. Includes all proposed road decommissioning.
Forest Insects & Disease	Designed to address, all proposed harvest treatments and precommercial thinning will improve forest health and resiliency.	With 0 acres of treatment, no action will allow area forest health and resiliency to continue to decline.	Designed to address, all proposed harvest treatments and precommercial thinning will improve forest health and resiliency.	With no precommercial thinning and 66% less harvest treatments than Proposed Action and Alt. 2, Alt. 3 will do less to address concern.	With 0 acres of treatment, Alt. 4 will allow area forest health and resiliency to continue to decline.
Watershed Restoration	Designed to address, includes all proposed Watershed Restoration projects. Includes all proposed road decommissioning.	With no Watershed Restoration projects, no action will not address concern.	Designed to address, includes all proposed Watershed Restoration projects. Includes 9.3 miles less road decommissioning.	Designed to address, includes all proposed Watershed Restoration projects. Includes all proposed road decommissioning.	Designed to address, includes all proposed Watershed Restoration projects. Includes all proposed road decommissioning.

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This Chapter summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in the previous Table 21. The following Table 22 provides a tabular display of past harvest information since 1950 currently listed in the Forest RIS database for the Blackhall-McAnulty Analysis Area:

Table 22. Summary of Cumulative Effects in the Blackhall-McAnulty Analysis Area

ANALYSIS AREA	ACRES
Blackhall-McAnulty 6 th Level Watersheds	47,565
National Forest Land	45,315
State Land	619
Private Land	1,631
PAST HARVEST ACTIVITY SINCE 1950	ACRES
Clearcut/Overstory Removal	5,539
Partial Cutting Treatments	3,032
% of Forested & Suitable	25% / 39%
BLACKHALL-MCANULTY PROPOSED ACTION	ACRES
Clearcut/Overstory Removal	269
Partial Cutting Treatments	1,914
Hazardous Fuels Treatments	116
% of Forested & Suitable	7% / 10%
Prescribed Burning	2,604
PAST HARVEST ACTIVITY SINCE 1950 & BLACKHALL-MCANULTY PROPOSED ACTION	ACRES
Past Harvest	8,571
Blackhall-McAnulty Proposed Action	2,299
% of Forested & Suitable	31% / 49%
FORESEEABLE FUTURE PROJECTS	
Holroyd Timber Sale	*
Clearcut/Overstory Removal	114
Partial Cutting Treatments	200
Beaver Creek Timber Sale (In Colorado to the south)	**
Upper N. Platte Allotment Management Plan	***
Big Creek/Pearl Hazardous Fuels Analysis (In Colorado to the south)	****
Beetle Epidemic Salvage	*****
Aerial Cheatgrass Spraying EIS	*****
NFSR 498 Gravel Pit	*****

*Holroyd Timber Sale is currently being implemented. The effects of this proposal have been analyzed for cumulative effects under the Blackhall-McAnulty analysis.

**An Environmental Assessment for the Beaver Creek Timber Sale is scheduled for completion during the winter of 2004. The effects of this proposal have been analyzed for cumulative effects under the Blackhall-McAnulty analysis.

***An Environmental Assessment for the Upper North Platte Allotment Management Plan is scheduled for completion during the winter of 2004.

****Categorical Exclusion or an Environmental Assessment for Big Creek/Pearl Hazardous Fuels Analysis is scheduled for completion during the winter of 2004.

*****Though it is felt that the Proposed Action will be effective in salvaging and suppressing beetle in the proposed treatment units in these areas, beetle mortality salvage and/or suppression treatments within other portions of the analysis area would require additional environmental analysis, documentation, and public input.

*****The analysis of the cheatgrass problem for this and other proposals has prompted the Forest to initiate an EIS for aerial spraying of cheatgrass Forest-wide in the near future.

*****It is anticipated that in the near future a gravel pit will be developed off NFSR 498 east of Holroyd Park to provide road surface material for 498 and other roads in the area, which will require additional environmental analysis.

The information displayed in the remainder of this section includes pertinent unedited excerpts from various resource specialist reports that were completed for the Blackhall-McAnulty Analysis. Though it is more difficult for the reader to follow, it was felt that rewording specialist report language to make this section more readable might unintentionally change the author's message and intent. Copies of these reports are available for public review within the project file.

Air Quality

AFFECTED ENVIRONMENT

The affected environment in terms of air quality is not limited to the immediate proposed project area. A large area must be considered because air is a dynamic resource. Situated approximately 1/2 mile to the west, outside of the analysis area, the Encampment River Wilderness area is classified as a Class II Federal air shed. The State of Wyoming Department of Environmental Quality (DEQ) has classified the Encampment River Wilderness as a State Class I area for air quality and visibility. Situated approximately 5 miles to the east, outside of the analysis area, Platte River and Savage Run Wilderness areas have the same Federal and State air quality classifications. Along with the scattered private land in-holdings within the project area (Big Creek and Jerry Parks), communities in close proximity to the analysis area include Pearl and Cowdrey, Colorado, along with Riverside and Encampment, Wyoming.

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Under this alternative, no action would occur. With no proposed prescribed burning and/or pile burning, this alternative would have no effect to the existing air quality in the area.

Proposed Action

The Proposed Action would result in some temporary increases in airborne dust, and would result in exhaust emissions from heavy equipment. The Proposed Action includes prescribed burning and the burning of slash piles. This work would be done only on days when smoke dispersal meets Wyoming Department of Environmental Quality (DEQ) burning criteria. The short duration of this burning, and burning on days with good smoke dispersal will address DEQ concerns for smoke and visibility within nearby wilderness areas. It is anticipated that smoke from this proposal will have little or no effect to the vicinity's air quality.

Alternative 2

As with the Proposed Action, Alternative 2 would result in some temporary increases in airborne dust, and would result in exhaust emissions from heavy equipment. With the same amount of timber harvest and prescribed burning as what is included under the Proposed Action, the effects of this alternative to the area's air resource would be the same as described above for the Proposed Action.

Alternative 3

Containing 1,440 fewer acres of harvest treatments and 8.8 less miles of road construction and/or reconstruction than the Proposed Action, it is anticipated that smoke (from pile burning), dust, and/or emissions from this alternative would be less than that produced by the Proposed Action. Containing the same amount of prescribed burning as the Proposed Action, it would be anticipated that the effects of the burn on the air resource would be similar to what has been already described and would have little or no effect to the vicinity's air quality.

Alternative 4

Containing no harvest acres and road construction or reconstruction, it is anticipated that this alternative would have least amount of effect of the action alternatives to the area air resource. Containing the same amount of prescribed burning as the Proposed Action and other action alternatives, it would be anticipated that the effects of the burn on the air resource would be similar to what has been already described and would have little or no effect to the vicinity's air quality.

CUMULATIVE EFFECTS

Proposed Action

Road dust, vehicle emissions, and smoke from pile and prescribed burning produced by implementing the proposal would be temporary and would not cumulatively degrade air quality in the vicinity.

Alternative 2

With the same amount of timber harvest and prescribed burning as the Proposed Action, it would be anticipated that the effects would be the same as described for that alternative.

Alternative 3

Containing 1,440 fewer acres of harvest treatments and 8.8 less miles of road construction and/or reconstruction, but the same amount of prescribed burning as the Proposed Action, it would be anticipated that the cumulative effects of the timber harvest and burn would be less than what has been already described for the Proposed Action and Alternative 2 and would have little or no effect to the vicinity's air quality.

Alternative 4

Containing no harvest acres and road construction or reconstruction, it is anticipated that this alternative would have least amount of effect of the action alternatives to the area air resource. Containing the same amount of prescribed burning as the Proposed Action and other action alternatives, it is anticipated that smoke from prescribed burning would be temporary and would not degrade air quality in the vicinity.

Roadless Area

AFFECTED ENVIRONMENT

A small portion of the 7,429-acre East Fork Encampment River Inventoried Roadless Area (IRA) is located along the western boundary of the analysis area. The entire 9,426-acre Bear Mountain Inventory Roadless Area is located in the east central portion of the analysis area. Covering approximately 20% of the analysis area, this is the last remaining roadless area greater than 5,000 acres located east of Blackhall Mountain to the eastern Forest boundary. The IRAs were identified through the National Roadless Rule effort and under the current Medicine Bow National Forest Plan Revision. Access to the roadless area is generally easily obtained from several roads and trails leading into this part of the Forest.

There are currently no Forest Service designated motorized trails in either of the IRAs. The majority of the boundaries for all IRAs are on or near open motorized roads and trails. The Bear Mountain IRA does have illegal off road-motorized use. This use is predominantly from ATVs in the Henry Creek, Trent Creek, and Davis Creek areas. The District has closed several user-created ATV trails in the analysis area.

There are no developed recreation campgrounds or sites within the Bear Mountain Roadless Area. The southern portion of the Bear Mountain Roadless Area contains a segment of National Forest System Trail, locally known as the Big Creek Trail (NFST 471); this segment of the trail provides a foot/horse trail from Holroyd Park to Big Creek Park. The Big Creek Trail is a system trail and a historic trail created to access the original Forest Reserve by an early ranger.

Despite the illegal motorized use, much of the Bear Mountain Roadless Area offers a high quality Semi-Primitive Non-Motorized recreation experience. The area immediately southeast of Bear Mountain is approximately one mile from any open road or trail, possibly providing some recreation users a primitive recreation experience.

Under the present Forest Plan, the Bear Mountain Roadless Area has several visual quality objectives ranging from partial retention to maximum modification. The majority of the Bear Mountain Roadless Area scenery value is rated as very high. This same area has been inventoried with an existing condition for scenic integrity of very high because the landscape appearance and character has not been changed much by humans. Much of this roadless area has a landscape that is mainly free of influence from humans or their activity. This area would visually be changed by ecological change only.

The Encampment River Wilderness area is the nearest designated wilderness area and is located approximately ½ mile west of the analysis area. One piece of the Encampment River Wilderness addition almost borders the northwest boundary of the analysis area. The Huston Park Wilderness area is approximately 8 miles west of the analysis area. Savage Run Wilderness area is approximately 8 miles northeast of the analysis area. Platte River Wilderness area is approximately 5 miles due east of the analysis area.

Natural Integrity and Appearance

Natural integrity is the extent to which long-term ecological processes are intact and operating. Impacts to natural integrity are measured by the presence and magnitude of human-induced change to an area. Such impacts include physical developments (e.g., roads, fences, cabins), recreation developments, domestic livestock grazing, and mineral developments. Apparent naturalness (appearance) means that the environment looks natural to most people using the area. Even though some of the long-term ecological processes of an area may have been interrupted, the landscape of the area generally appears to be affected by the forces of nature. If the landscape has been modified by human activity, the evidence is not obvious to the casual observer, or it is disappearing due to natural processes.

The majority of the Bear Mountain Roadless Area has retained a high degree of natural integrity and apparent naturalness, with little evidence of human impacts. Some localized impacts are noticeable. These are mainly in the form of historic mining activities. Cabins; shaft houses, wagon trails, and prospecting pits are the most prominent disturbances found in portions of the Bear Mountain Roadless Area. Natural reclamation of the historic mining activity and associated wagon trail is occurring; however, continue to detract from the apparent naturalness.

Opportunities for Solitude and Remoteness

Solitude is a personal, subjective value defined as isolation from the sights, sound and presence of others, and human developments. Solitude can be impacted by numbers of people and parties encountered on a trail or in a camping area, human-generated noise, or improved access. Remoteness is a perceived condition of being secluded, inaccessible, and out-of-the-way. The physical factors that can create remote settings include topography, vegetative screening, changes in legal public access, and the distance from human impacts such as roads and timber harvest operations (sight and sound).

Opportunities for solitude and remoteness within the Bear Mountain Roadless Area is rated low, due to the short distance from the perimeter to the core of the area and illegal ATV incursions into the area. The core area acreage would be less than a square mile in the area. The steepness of the terrain and timber stands with open areas of rock and grass allow some solitude. Illegal ATV use and past mineral exploration activities have reduced the sense of solitude and remoteness across the roadless area and especially along the boundary.

Primitive Recreation Opportunities

A primitive recreation experience includes the opportunity to experience solitude, a sense of remoteness, closeness to nature, serenity, and spirit of adventure in an environment that offers a high degree of challenge and risk. Impacts related to primitive recreation experiences are usually expressed in changes to the physical setting, activities occurring in the area, and changes to the social experiences of others.

The Bear Mountain Roadless Area offers many challenges with moderate diversity of recreational experiences, and opportunities for primitive recreation (one of the predominant uses of the area) are rated as moderate. The combination of high mountain ridges and valley provide choice recreational settings for hunting, hiking, backpacking, and nature appreciation.

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Unroaded areas are valued for their very existence in an undeveloped state. This value is held by both users of the area, and intrinsically by those who place value on such undeveloped areas, simply knowing that they exist. Unroaded areas also provide security for wildlife and plant species, and opportunities for recreation in a non-motorized environment. When traveling in the Bear Mountain Roadless Area there is some sense of tranquility, isolation, and independence. Visitors can expect to see little sign of human impact or mechanization within the interior of the Bear Mountain Roadless Area, and the recreation experience is moderate to high. As there are no treatments under this alternative, there would be no effect to the existing condition of this resource.

Proposed Action

Under the Proposed Action, there are no harvest treatments and/or associated road construction proposed within an inventoried roadless area. Though this is the case, some of the harvest treatments included under the Proposed Action are directly adjacent to the Bear Mountain IRA. There are several cutting units just east of the East Fork Encampment River Inventoried Roadless Area, and there are several cutting units within the North Fork Big Creek drainage that are just west of the boundary of Bear Mountain Inventoried Roadless Area. A small portion of the prescribed burn area is within a non-forested portion of the IRA. Scheduled to be a spring burn with no control lines, it is anticipated that there will be no significant effects to this area from the burn. Cutting units and temporary roads that are situated near the edge of the roadless area could indirectly impact users along the edges of this IRA with greater noise, and could result in less solitude during implementation of this part of the proposal.

The selection of this alternative would have a minor indirect effect on inventoried roadless areas. The effect to roadless would be from the logging activity, mainly creating potential dust or noise next to the boundary of the roadless areas. Roadless recreation users at the edge of the roadless areas next to cutting units or on high spots within the roadless area may observe the timber harvest. This would be an immediate very short-term effect. An associated activity from the timber harvest would be slash disposal by broadcast burning. The effect from this would be in the form of smoke from the actual day of burning. The smoke may be observed in the roadless area to the east. It is doubtful that the burning would produce enough smoke to affect the down wind wilderness areas. Larger proposed burns in the Holroyd Park area are planned for spring when there should be little to no visitors to the two wilderness areas east of this area. Any burning would be an immediate, very short-term effect.

The selection of this alternative will make changes to the travel management in the analysis area. The majority of proposed changes would be south and southeast of the Bear Mountain Inventoried Roadless Area, though there are also some road closures identified throughout the analysis area. The projected road closures are mainly four wheel drive roads or maintenance level II roads. Many of these roads are very early wagon routes to access private land or historic mineral operations. Many were not even constructed; they were created by years of use from traveling across the route and have received little, if any, maintenance. The proposal is to close approximately 140 segments of roads, for approximately 38.6 miles of roads. Of these roads, the longest is 1.98 miles and the shortest is 0.02 miles, with an average segment length of 0.26 miles.

Closing these roads would not change the Recreation Opportunity Spectrum (ROS) in this area. The road closures located within the Bear Mountain Inventoried Roadless Area will enhance the roadless area. Closing of the roads would affect recreation users that annually use these roads. In most cases these road closures will restrict access into certain areas but will remove duplicate parallel roads that will directly improve hunting in the southeast portion of the analysis area. Road decommissioning proposed for areas adjacent to the IRA will result in fewer impacts such as noise to area use and more solitude following the closure of these roads.

Alternative 2

Under Alternative 2, there are no treatments and/or associated road construction proposed within an inventoried roadless area. Though this is the case, as with the Proposed Action, some of the harvest treatments are directly adjacent to the Bear Mountain IRA, and a small portion of the prescribed burn area is within a non-forested portion of the IRA. As with the Proposed Action, it is anticipated that there will be no significant effects to the IRA from the burn. Cutting units and temporary roads that are situated near the edge of the roadless area could indirectly impact users along the edges of this IRA with greater noise, and could result in less solitude during implementation of this part of the proposal. Road decommissioning proposed for areas adjacent to the IRA will result in fewer impacts such as noise to area use, and more solitude following the closure of these roads. With less road decommissioning than the Proposed Action, it would be anticipated that Alternative 2 would be less effective in reducing noise and increasing opportunities for solitude.

Alternative 3

As with Alternative 2, under Alternative 3 there is no proposed cutting or road building within any of the IRAs in the vicinity. Containing 1,440 fewer acres of harvest treatments and 8.8 less miles of road construction and/or reconstruction, but the same amount of prescribed burning and road decommissioning as the Proposed Action, it would be anticipated that the effects of the timber harvest and burn would be less than what has been already described for the Proposed Action and Alternative 2, and would be less likely to impact users of the Bear Mountain IRA than what was disclosed for the previous action alternatives.

Alternative 4

Containing no harvest acres and road construction or reconstruction, it is anticipated that this alternative would have least amount of effect of the action alternatives to the roadless areas. Containing the same amount of prescribed burning and road decommissioning as the Proposed Action, it is anticipated that would be less likely to impact users of the Bear Mountain IRA than what was disclosed for the previous action alternatives. Road decommissioning proposed for areas adjacent to the IRA will result in less impacts such as noise to area use, and more solitude following the closure of these roads than the existing condition to be maintained under Alternative 1 – No Action.

CUMULATIVE EFFECTS

The following Table 23 displays the effects of the Blackhall-McAnulty alternatives on the nine roadless characteristics from the Forest Service Roadless Area Conservation Final Environmental Impact Statement, Volume 1. See individual resource area discussions in this section (*Environmental Consequences*) for more specific explanations of the effects of treatments on Inventoried Roadless.

Table 23. Cumulative Effects of Alternatives on Roadless Area Characteristics

Roadless Area Characteristic	Proposed Action	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
High quality or undisturbed soil, water, and air.	Small portion of prescribed burn in roadless. Short-term effect to air quality due to proposed prescribed burning and slash pile burning.	Has no treatments in roadless, no effect.	Small portion of prescribed burn in roadless. Short-term effect to air quality due to proposed prescribed burning and slash pile burning.	Small portion of prescribed burn in roadless. Short-term effect to air quality due to proposed prescribed burning and slash pile burning.	Small portion of prescribed burn in roadless. Short-term effect to air quality due to proposed prescribed burning and slash pile burning.
Sources of public drinking water.	No municipal watersheds in area.	No municipal watersheds in area.	No municipal watersheds in area.	No municipal watersheds in area.	No municipal watersheds in area.
Diversity of plants and animal communities.	Small portion of prescribed burn in roadless. Area aspen in and outside of the IRA will be maintained and increased.	Has no treatments in roadless. Area aspen will continue to decline, decreasing area diversity.	Small portion of prescribed burn in roadless. Area aspen in and outside of the IRA will be maintained and increased.	Small portion of prescribed burn in roadless. Area aspen in and outside of the IRA will be maintained and increased.	Small portion of prescribed burn in roadless. Area aspen in and outside of the IRA will be maintained and increased.

Roadless Area Characteristic	Proposed Action	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Habitat for threatened, endangered, proposed candidate and sensitive species, and those species dependent on large relatively undisturbed areas of land.	Small portion of prescribed burn in roadless, no effect.	Has no treatments in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.
Primitive, semi-primitive, non-motorized classes of dispersed recreation.	Proposed Road decommissioning will improve to a lesser extent primitive and semi-primitive opportunities within and adjacent to the IRA.	Has no treatments in roadless, no effect.	Less road decommissioning will improve primitive and semi-primitive opportunities within and adjacent to the IRA.	Proposed Road decommissioning will improve primitive and semi-primitive opportunities within and adjacent to the IRA.	Proposed Road decommissioning will improve primitive and semi-primitive opportunities within and adjacent to the IRA.
Reference landscapes.	Small portion of prescribed burn in roadless, no effect.	Has no treatments in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.

Roadless Area Characteristic	Proposed Action	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Natural appearing landscapes with high scenic quality.	Small portion of prescribed burn in roadless, no effect.	Has no treatments in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.
Traditional cultural properties and sacred sites.	Small portion of prescribed burn in roadless, no effect.	Has no treatments in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.
Other locally identified unique characteristics.	Small portion of prescribed burn in roadless, no effect.	Has no treatments in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.	Small portion of prescribed burn in roadless, no effect.

Heritage Resources

AFFECTED ENVIRONMENT

The Blackhall-McAnulty Analysis combines three projects including: Blackhall Timber Sale, McAnulty Timber Sale and McAnulty II Prescribed Burn, that were previously identified and surveyed for heritage resources as separate proposals. State Historic Preservation Office (SHPO) and Forest cultural resource record searches were conducted. The searches were conducted for T.12N. and T.13N., R.81W., R.82W. and R.83W., 6th Principal Meridian, Carbon County, Wyoming. The searches revealed that a number of past cultural resource surveys had been conducted within the area. The file searches also revealed a number of previously recorded sites located within the area listed. GLO plats, Forest historic map files, historic cutover records and archival records were examined. A review of the National Register of Historic Places (NRHP) indicated that no listed sites are located within, adjacent, or near any proposed impact areas.

ENVIRONMENTAL CONSEQUENCES

In the case of the Blackhall, or northern portion of the proposal, a 100% intensive Class III field survey was completed for the proposed treatment areas during 1998. The survey and subsequent report determined that none of the cultural resources found during the survey were considered to be significant and all were recommended not eligible for the National Register of Historic Places. On 12/11/98 Wyoming SHPO concurred with this determination.

As for the remaining McAnulty and McAnulty II portion of the proposal, a 100% intensive Class III field survey was completed for the timber sale area, and a Class II sample survey was completed for the prescribed burn area. Survey was completed during portions of the 1999, 2000, and 2003 field seasons.

Approximately 7,495 acres were intensively surveyed, and 1,167 acres were sample surveyed, resulting in the location of 37 new cultural resource sites (14 historic and 23 prehistoric) and 54 isolated finds. 33 sites were determined to be ineligible to the National Register of Historic Places. The 4 eligible sites will be avoided during project activities. Approximately 15 previously recorded sites were monitored. A report documenting the findings of the survey has been submitted to the Wyoming State Historic Preservation Officer for review and consultation.

Alternative 1 – No Action

Under this alternative, no action would occur. This alternative would have no effect on significant cultural resources. No further field inventory would be required, and consultation with the State Historic Preservation Officer and Advisory Council on Historic Preservation would not be required.

Proposed Action

It is anticipated that the review of the survey and report will determine, since no significant cultural properties will be impacted by proposed project activities, that “no historic properties will be adversely affected.”

Alternative 2

Since this alternative has the same vegetation treatments, prescribed burning, and other watershed restoration projects as the Proposed Action, but less proposed road decommissioning, it is anticipated that the Wyoming SHPO review of the survey and report will determine, since no significant cultural properties will be impacted by Proposed Action project activities, “no historic properties will be adversely affected.”

Alternative 3

Since this alternative is the same as the Proposed Action, with the exception of no clearcutting, it is anticipated that the Wyoming SHPO review of the survey and report will determine, since no significant cultural properties will be impacted by Proposed Action project activities, “no historic properties will be adversely affected.”

Alternative 4

As previously disclosed, it is anticipated that the Wyoming SHPO review of the survey and report will determine, since no significant cultural properties will be impacted by Proposed Action project activities, “no historic properties will be adversely affected.”

CUMULATIVE EFFECTS

This project, in combination with other forest activities such as recreation and range activities, may have a cumulative effect on cultural resources in the form of increased soil erosion, increased visitor traffic and vandalism, and alteration of historic landscapes. Cumulative impacts of these types are difficult to quantify, but may be avoided or minimized through the implementation of appropriate site-specific treatments, when deemed necessary through consultation process with the State Historic Preservation Office and the Advisory Council on Historic Preservation.

Soils

AFFECTED ENVIRONMENT

The analysis area is predominantly metasedimentary and metavolcanic rocks (amphibolite, granite, felsic and hornblend gneiss with occasional pockets of granite). The northeast region has the Coalmont Formation, which consists of sandstone and claystone. The Browns Park Formation is in Jerry Park, and the North Park Formation is found in Holroyd Park. Both areas contain similar sedimentary and igneous rocks, formed during the Tertiary Period. The Browns Park Formation has tuffaceous sandstone and marl; the North Park Formation has tuffaceous sandstone, siltstone and claystone. The landform is moderately dissected, shallowly incised mountain slopes, with a rounded alpine area on Blackhall Mountain, a canyon around Beaver Creek, and valley landforms at Jerry and Holroyd Parks. Most of the soils in the project area have an erosion hazard that is slight or moderate. An area with very severe erosion hazard is limited in size (approx. 300 acres) and is found on steeper slopes to the east of Holroyd and Cunningham Parks. Some areas have inclusions of steeper slopes where special precautions will be needed.

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

This alternative would have the least impact on the soil resource. No further effects on the soil, beyond existing condition would occur. No further accelerated disturbance would occur, whether compaction, displacement, or erosion at whatever rate beyond existing condition, due to any timber harvest activities.

However, by not burning the area planned for the prescribed fire, there is a risk of additional fuel build-up and a severe wildfire could occur which would severely burn the soils. By not salvaging timber that is susceptible to a bark beetle attack, there is a risk to the timber adjacent to that area. If the adjacent timber is killed from the beetles, the additional build-up of dead fuel could increase the threat for a severe wildfire.

Proposed Action

Timber Harvest

Under this alternative, there will be harvest operations on approximately 2,039 acres. Direct effects would be potential soil erosion and displacement. The sheet and rill erosion hazard for the Blackhall and McAnulty harvest units is rated as moderate; however, within the harvest units there are inclusions of steep to very steep slopes (>45% slope). Heavy equipment should not be allowed on these steep slopes. Loss of soil productivity, due to compaction, from the temporary roads, skid trails, or site preparation would be another short-term effect. When the logging operation is over, the roads, main skid trails, and landings will be obliterated and seeded. When revegetation occurs, the soil productivity will eventually be restored to near pre-harvest levels.

Indirect impacts would be probable short-term decreases in soil productivity within the cutting units and in association with newly disturbed roads and skid trails. If Best Management Practices and the mitigations are followed, the impacts to the soil will be within the 15 percent Region 2 Standards and Guidelines. Maintaining a certain amount of coarse woody debris is important in maintaining long-term soil productivity. Since there will be no whole tree logging on the harvest units, the coarse woody debris will be left on site. After meeting requirements for regeneration and fuel levels, as much coarse woody debris should be left as possible. Units that had very little coarse woody debris on the ground will have more fine and moderately sized coarse woody debris on the ground after the site is harvested.

There will be about 13 miles of road construction under this alternative. Some of the roads will be temporary roads and some roads will be reconstructed. There will be about 7 miles of temporary road construction. These roads will impact the soil resource by temporarily taking land out of production. Many of the impacts will take place the first couple years after the disturbance. The roads that are planned either follow the contour or are on gentle terrain. There will be no known crossing of temporary roads over dry draws. There will be about 6 miles of road reconstruction. This will be a positive effect in terms of fixing existing drainage structures and reducing the amount of soil erosion occurring from these roads.

Fire Salvage

The effects on soils from the proposed fire salvage will be minimal because the area to be cut is small, not all the trees in the cutting unit will be harvested, and the burn severity of the soils was unburned, low, or moderate for most of the unit. The sheet and rill erosion hazard of the fire salvage unit is low to moderate. The compaction hazard is rated as moderate. Maintaining a certain amount of coarse woody debris is important in maintaining long-term soil productivity. Since the slash will be lopped and scattered after the harvest, this will add to the coarse woody debris. Dead trees left standing will eventually fall and add to the debris.

Fuel Treatment

The soil erosion hazard is slight to moderate. Although much of coarse woody debris will be removed, the litter layer and ground vegetation, such as grasses, will still be intact. This will greatly reduce any chance of soil erosion. The potential to compact the soil is rated as severe. Since equipment will be operated on dry or frozen ground, compaction will be kept below standards. Only 20 to 30% of the overstory will be removed, so this will limit the area that heavy equipment travels. There is one soil map unit in Jerry Park that is poorly drained. Use heavy equipment with caution in this area. Maintaining coarse woody debris is important for maintaining long-term productivity. However, in this case, keeping a small area relatively free of coarse woody debris is important to prevent the destruction of private property or to prevent a wildfire coming from private property onto Forest Service land. This zone free of coarse woody debris could prevent further soil damage if it stops a wildfire.

Prescribed Burn

Prescribed burns, and especially spring burns, do not typically consume vast areas of organic matter, the amount of exposed soil is limited, and if there is any soil movement it is only for a short distance (Baker 1990). But, this would depend on the timing and intensity of precipitation. No fireline construction will be needed for this project. The minimum effective ground cover recommended for the dominant soil type is 40 percent the first year and 60 percent for the second year. This is based on the Region 2 soil quality standard. Effective ground cover is defined as all living and dead herbaceous and woody material in contact with the ground, and all rocks greater than $\frac{3}{4}$ inch in diameter. Based on past prescribed spring burns on this Forest, exceeding the minimum effective groundcover has not been a problem.

Watershed Restoration

Herbicide application for cheatgrass: The soil types are not conducive to leaching and the areas of application are small and away from watercourses. As for the mine spoil removal, the equipment used for removal will stay on the existing system roads.

Based on field review and using soil and geologic maps, the effects of the proposed action on mass movement should be minimal. The location of the proposed units and road locations avoid areas of concern from a mass movement standpoint.

Alternative 2

The direct and indirect affects would be the same as the Proposed Action, except fewer roads would be decommissioned. According to the Sierra Madre Road Analysis, only one of the roads that would not be decommissioned was listed as a soil and water problem. Repairing the road would alleviate the problem.

Alternative 3

Since all the units that were proposed for clearcutting will be dropped, under this alternative there would be less soil impacts. However, if a wildfire did occur in these units with mature trees, soil erosion would occur. See the Proposed Action for the effects of fire salvage, fuel treatment, and thinning.

Alternative 4

Under this alternative, only projects associated with watershed restoration will be done. This would include removal of mine spoils from the stream course at Turnbull Gulch, herbicide treatment of non-native cheatgrass, prescribed burning, and travel management, such as road decommissioning and repair. The effects are addressed in the Proposed Action. Since no logging or fuel reduction would occur, this alternative would have less impact than the Proposed Action. However, should a stand-replacing wildfire occur on the proposed cutting units, the impact to the soil resource could be severe.

CUMULATIVE EFFECTS

Existing past and present disturbance activities within the watersheds include roads, timber harvest, grazing, fires, and recreation. Repeated harvest activity within the same site or cutting unit can lead to detrimental loss of topsoil, or excessive compaction and displacement. Medicine Bow-Routt National Forest standards and guidelines call for minimizing soil compaction by reducing vehicle passes, skidding on frozen or dry soil conditions. Soils are considered to have compaction if there is a 15 percent increase in bulk density. It is anticipated that the partial cut harvest stands included under the proposal would not be re-entered for 10 to 20 years; therefore, any cumulative compaction or displacement would be minimized.

New road construction, both temporary and permanent, can be considered cumulative in nature, especially if roads are not properly drained or are placed in unstable locations. If proper Best Management Practices (BMPs) are applied in any newly constructed roads, then cumulative impacts on soil productivity would be minimized. BMPs help to insure that erosion from cutting units or roads are not excessive.

Reducing the fuel load in the Jerry Park/Forest boundary fuel reduction and in the fire salvage area would reduce the risk of a wildfire in the area. A severe wildfire will have an impact on the soil resource. With a prescribed spring burn it is expected that the vegetation will come back relatively quickly and the amount of exposed soil will be temporary. There are no other prescribed burns planned in the watershed during the short time the soil will be exposed. If a water repellent layer does form, the duration of the effects are short lived, especially in low to moderate severity burns. Since there have been no wildfires in the area in the recent past and because it is impossible to predict if one would occur in the near future, there are no cumulative effects in relation to soil heating. The effects of nutrients in the soil after a fire are complex and not entirely understood, but there may be a short-term decrease in certain nutrients, depending on the timing and intensity of precipitation and the intensity of the fire. Since cattle will not be grazing in the area for two seasons after the burn, nutrient cycling will be altered temporarily.

Forest Plan Consistency

The Proposed Action and Alternatives 1 through 4 will meet the 1985 Medicine Bow National Forest Plan Standards and Guidelines for the soil resource, with given mitigation measures. For each alternative there will be no known irreversible or irretrievable commitment of resources.

Fisheries, Aquatics, and Watershed

AFFECTED ENVIRONMENT

The Blackhall-McAnulty Analysis Area is situated on the east slope of the Sierra Madre Range within two 5th level watersheds (7 partial or complete 6th level watersheds) on the Brush Creek/Hayden Ranger District. The proposed project occurs in the Beaver Creek and Big Creek watersheds, which both flow into the North Platte River above the Encampment River. The major perennial streams in the Beaver Creek watershed are Beaver, Etna, Camp, and Little Beaver Creeks. Minor drainages include Flohr, Collins and Turnbull Creeks, and a couple of unnamed tributaries to Beaver Creek.

Past activities can increase sediment delivery to stream channels in a variety of ways, however roads have been estimated to produce 85 to 90% of the sediment reaching streams in a forested watershed (Burroughs 1990). Approximately 75 miles of roads (37% of roads in the area) were field surveyed in the project area during the summer of 2002, primarily in the Big Creek watershed (Purchase 2002a). Erosion and/or sediment delivery to streams was observed during surveys of 51 miles of road, or over two-thirds of the roads surveyed. Roads located near streams were more likely to contribute sediment to streams; however roads in the uplands, which cross stream channels, were also observed to be contributing sediment. Surveyed roads in the eastern portion of the analysis area (NFSR 418.1C, 3C and 5C) all were observed to be routing sediment to streams in the Henry Creek and Lower Big Creek drainages.

Road densities vary across the analysis area. Some of the smaller watersheds, such as Holroyd Park, North Bear Creek, and Henry Creek, show high road impacts, as they have roads running parallel to the main stream, roads crossing many tributary streams, and some road sections located quite close to the main stream channel. These roads are located on highly erodible soils that tend to rut easily and transport sand size sediment downslope into streams. It is likely that these streams have higher sediment loads from road related sediment, which is confirmed by road surveys in the Henry Creek watershed. Little Beaver Creek also has relatively high road impacts on similar erodible soils. Although roads in this watershed are not located as close to the stream channel as others, there are still many road crossings on tributary streams that road surveys indicate are delivering sediment to stream channels.

The North and Middle Forks of Big Creek have high road related impacts. Road densities, stream crossings, and roads near streams tend to be high for most of the smaller watersheds. Field road surveys indicate that many of the roads in these watersheds do transport sediment into streams. The high sediment loads observed during stream surveys of the North and Middle Forks are most likely due to road related sediment from closed and abandoned roads, which need additional waterbars and erosion control work to reduce sedimentation.

The perennial streams in this area are designated Class 2AB - Fisheries and Drinking Waters. Class 2AB waters are those surface waters known to support or have the potential to support populations of game fish and/or drinking water supplies. They are considered to be high quality waters, which support the beneficial uses of aquatic life, fisheries, drinking water, recreation, wildlife, agriculture, and scenic value (WYDEQ 2001). Intermittent streams in this area are classified by the State of Wyoming as Class 3B if no fisheries are thought to be present. These waters support beneficial uses of aquatic life other than fish, recreation, wildlife, agriculture, and scenic value (WYDEQ 2001). None of the streams within the analysis area have been listed as impaired on the current WYDEQ 303d list (WYDEQ 2002).

Other factors affecting stream channels are cattle grazing, irrigation diversions, and the Bear Mountain South Fire (2002), which was in the headwaters of the North Fork of Big Creek.

ENVIRONMENTAL CONSEQUENCES

Biological accounts and determinations for this project are based on the best available information on population status, habitat quality, and quantity. Species assessments in this analysis were prepared from existing Forest Plan data, Inland West Watershed Initiative (IWWI 1996-1999), Wyoming Natural Diversity Database (WNDD 2002) records, and recent project area field surveys (2002). Because species cannot exist without their supporting habitats, direct, indirect, and cumulative impacts to both species and their habitats have been evaluated. Effects on management indicator species (MIS) are disclosed as part of the NEPA disclosure, and brook and brown trout are selected for project monitoring. MIS (“common trout”) monitoring is also planned and scheduled at the Forest watershed level.

Alternative 1 – No Action

Current management plans would continue to guide management of the project area. Treatments or actions to salvage burned timber, promote wood fiber production/utilization, set back seral configurations, pursue secondary aspen enhancement, reduce tree density, and treat dwarf mistletoe or mountain pine beetle infestations would not occur. Road conditions would remain essentially the same; annual road maintenance along open roads would keep the roads in essentially the same condition as currently. Scheduled watershed improvement on closed and obliterated roads includes adding waterbars and other actions to reduce erosion on these roads. This activity will reduce sediment delivery from closed roads and is being done as a part of routine road maintenance. Irrigation ditch maintenance will continue to occur, which will help to reduce erosion from the ditches in the analysis area. Past timber harvest in the area would gradually recover as trees mature.

Sediment

The No Action alternative would have no direct or indirect effects on sediment, as there would be no ground-disturbing activities associated with this alternative.

Flow Regime

With this alternative, no vegetation would be removed, so there would be no direct or indirect effects on streamflow.

Riparian Areas and Wetlands

Under this alternative, there would be no direct or indirect effects on riparian areas or wetlands. Overall, riparian ecosystems would improve in localized areas due to the watershed improvement. This would slightly increase the amount of functioning riparian and wetland ecosystems in the area.

Fish Habitat and Populations

The No Action alternative would have no direct or indirect effects detrimental to fish populations since there would be no vegetative management activities.

Aquatic Ecosystems

The No Action alternative would have no direct or indirect effects detrimental to aquatic ecosystems or habitats, since there would be no vegetative management activities.

Proposed Action

Sediment:

Effects of Timber Harvest

The proposed timber harvest would not increase sediment delivery to streams, as all stream channels, riparian areas, and wetlands will be buffered by a minimum 100-foot buffer from proposed harvest areas. These buffers have been shown to be effective in filtering sediment (Welsch 1991).

Effects of Road Reconstruction and Temporary Road Construction

Road reconstruction and short temporary road construction would occur in the headwaters of Beaver Creek, North Fork, and Middle Fork Big Creeks. A few small stream crossings of small, intermittent headwater tributaries would be required to access the harvest units. No road reconstruction or temporary road construction is required in the McAnulty Creek watershed, except for a small amount of road reconstruction in the lower watershed area southeast of Jerry Park. Most of these roads would be decommissioned at the end of this project.

The lower watershed areas of both the Middle Fork and North Fork Big Creek have road reconstruction and temporary road construction. These roads will entail a few intermittent stream crossings for both road reconstruction and temporary road construction. These roads are located in lower slope positions and have a greater potential of increasing fine sediments in nearby stream channels.

Road 407.1A would be reconstructed to access unit 73. This road is located very close to a tributary of the North Fork of Big Creek, and the road was observed to be contributing sediment in its existing condition. Reconstruction would likely reduce long-term sediment production, although fine sediments would increase in this tributary during reconstruction activities.

Effects of Road Decommissioning

Road decommissioning includes installing adequate drainage such as water bars and removing culverts at stream crossings to restore the natural channel. Fine sediments would be increased during the decommissioning at stream crossings and for several years afterward as the stream crossing area revegetates.

Beaver Creek Watershed: Only a few miles of road decommissioning are proposed in this watershed, mostly in Little Beaver Creek. Several roads near stream channels in Little Beaver Creek are proposed for closure, and would likely reduce sediment in this creek over the long term, although short-term increases in fine sediment are likely as a result of restoring stream crossings.

North and Middle Fork Big Creek Watershed: Roads are proposed for decommissioning southeast of Jerry Park and in the lower portion of the Middle Fork and North Fork. This decommissioning will reduce fine sediments over the long term in the small stream channels closest to these roads.

South Fork Big Creek: A few small road segments are proposed for decommissioning in this watershed. The two-track road close to the creek, in Holroyd Park south of the 498 bridge, will reduce effects on the riparian area and sediment in the South Fork above NFSR 498.

Bear Creek: The proposed road decommissioning would reduce road density and roads near stream channels in this watershed. Fine sediments in the tributaries of Bear Creek would decrease over the long term as these roads revegetate.

Lower Big Creek: Proposed road decommissioning in the SW portion of lower Big Creek would reduce fine sediments in Henry Creek and other tributaries of Lower Big Creek.

Little Beaver Creek: Heavy ATV resource damage right up the bottom of the drainage through the whole riparian area. Necessary to close roads 415.1H (4488) and 415.2L to allow riparian area to heal.

Effects of Prescribed Fire

The prescribed broadcast burns would primarily burn non-forested vegetation, such as sagebrush. Fire would be contained using snow, or by existing breaks, such as existing two-track roads. The resulting low intensity burn would be a mosaic, and would have minimal effects on soil erosion. It is unlikely that the prescribed burn would increase erosion or contribute sediment to stream channels.

Effects of Mine Spoil Removal

This project will remove mine spoils from the stream channel of Turnbull Gulch. This will prevent additional spoils from entering the stream channel and reduce the sediment load in this small intermittent creek below the mine.

Closing designated roads specified in the Sierra Madre Travel Management roads analysis, and performing the repairs and maintenance should have *beneficial* direct, indirect, and cumulative effects on the streams, riparian/wetland areas, and the watersheds as a whole in which they presently occur. Roads decommissioned, utilizing culvert removal, water bars, and revegetation, are less susceptible to unrecognized erosion and sedimentation problems. Road closures and decommissioning included as part of this project, along with removing mine spoils in the Turnbull Gulch stream channel and floodplain, should be cumulatively beneficial to affected watersheds in the long term.

Flow Regimes

Equivalent Clearcut Acre percentage increase was estimated for all watersheds from the proposed timber harvest and commercial thinning activities. The potential water yield increase resulting from prescribed fire in sagebrush and grass vegetation types is considered to be negligible and so is not included in these calculations. This alternative would increase water yield from less than 0.1% to 3.7% for the watersheds in this area. These flow increases are too small to be measured and would not cause additional stream channel erosion or instability for the streams in the analysis area.

Riparian Areas and Wetlands

With the 100-foot buffer, riparian areas and wetlands would not be directly affected by the proposed timber harvest except at temporary road stream crossings. The project would require several temporary road crossings of intermittent drainages. At these crossings, disturbance of riparian vegetation and soils would be minimized, and the disturbed area rehabilitated at the end of the project.

The proposed road decommissioning would restore riparian and wetland areas at existing road stream crossings. This would incrementally increase the amount and connectedness of riparian areas in the project area. Riparian areas currently affected by sediment contributed from proposed decommissioned roads would be improved as waterbars and other drainage structures are added to stabilize these roads.

Fish Habitat and Populations

The use of Best Management Practices (BMPs) for forestry related to water quality, Watershed Conservation Practices Handbook (WCPs), and the Forest Plan Standards and Guidelines should greatly limit detrimental changes to fish habitat and populations. Consequently, no direct effects are anticipated for fish habitats or populations from the Proposed Action. Indirect effects may occur as a result of eroded material from temporary road construction or decommissioning being transported to perennial streams, affecting spawning gravels, egg, and larvae survival. Long-term effects are estimated to be negligible due to the location of proposed activities away from perennial water sources, and the use of BMPs for any work being done in or around dry intermittent or ephemeral drainages.

Aquatic Ecosystems

The Proposed Action alternative would have no direct effects on aquatic ecosystems or habitats, since there would be no vegetative management activities within riparian or wetland communities through the use of BMPs and watershed conservation practices. Indirect effects from sediment deposition are possible during temporary road reconstruction and during road decommissioning, but are limited in scope and time, so are expected to be minor.

Alternative 2

This alternative would have effects similar to the Proposed Action; however, there would be less road decommissioning in the Henry Creek and Lower Big Creek watersheds. Fine sediment levels would remain approximately the same as they are currently in Lower Big Creek, but would decrease in the other watersheds with road decommissioning as described under the Proposed Action effects. This alternative would have the same effects on flow regime as the Proposed Action. Effects of this alternative would be similar to the Proposed Action, except that less riparian area would be improved in the Henry Creek and Lower Big Creek watersheds due to the lesser amount of road decommissioning. As for fish habitat and populations, along with the aquatic ecosystems, effects for this alternative would remain unchanged from those in the Proposed Action. The approximately 10-miles of road closures left open in this alternative are in the far eastern portion of the project area. The roads are seasonally closed by snow during the winter and spring months, and used mainly during the big game hunting season. This alternative would have no increase in ECA for the Beaver Creek watershed, as no timber harvest would occur in this watershed. For the Big Creek watershed, ECA increases are slightly less than for the Proposed Action. The estimated increases are less than 1.5% for all watersheds and would be too small to be measured or to result in decreased stream channel stability. Effects on wetlands and riparian areas would be similar to the Proposed Action, as the primary effects on these resources are from the road decommissioning projects. Direct and indirect effects to fish habitat and aquatic ecosystem would remain the same as in the Proposed Action through the use of BMPs, Watershed Conservation Practices, and specified mitigation for the project.

Alternative 3

This alternative would have effects similar to the Proposed Action, as the primary effects on sediment are from the roads decommissioning activities, which are the same under this alternative as for the Proposed Action. This alternative includes the same road reconstruction and would likely cause short-term increases in fine sediment. It also includes the same roads southeast of Jerry Park, and would have the same effects as the Proposed Action in that area.

Alternative 4

This alternative would have effects similar to the Proposed Action, since the primary effects on sediment are the road decommissioning activities, which are the same under this alternative as the Proposed Action. While the road reconstruction near Jerry Park would not occur, the same small tributary streams that would be affected by road reconstruction would be decommissioned, resulting in a similar effect of short-term fine sediment increases from the ground disturbance associated from installing waterbars and removing culverts. Long-term sediment reduction would be similar to the Proposed Action as the decommissioned roads stabilize and revegetate. This alternative would not affect flow regimes, as no timber harvest or other removal of forest vegetation would occur. Effects on wetlands and riparian areas would be very similar to the Proposed Action, as the primary effects on these resources would occur as a result of the road decommissioning projects. However, there would be fewer effects on several small tributary streams, which would have been affected by temporary road construction under the Proposed Action. Direct and indirect effects of Alternative 4 are essentially equivalent to the No Action alternative with respect to timber harvest activities for fish habitats/populations and aquatic ecosystem.

CUMULATIVE EFFECTS

Alternative 1 – No Action

Cumulative effects include the proposed timber harvest in Colorado and effects of the Holroyd Timber Sale and Prescribed Burning Project.

Sediment

Fine sediment levels would decrease over time, primarily in the North and Middle Forks of Big Creek, as the planned watershed improvement activities reduce sediment from closed and abandoned roads. Sediment levels in Quimby Creek would continue to decrease as the Bear Mountain South Fire area revegetates and the soils stabilize. Much of the sediment from the fire would be stored in the beaver dams along Quimby Creek and lower down on Big Creek.

Flow Regime

Streamflows would slowly decrease in Beaver Creek and the northern portion of Big Creek as vegetation recovers in past timber harvest units and wildfire areas. Water yield increase from Holroyd would add 106 ECA to Big Creek, or less than 0.1%. The Routt NF is planning the Beaver Creek Timber Sale in the Colorado Portion of Big Creek. This timber sale is expected to harvest 307 acres, adding approximately 184 ECA to the North and Middle Forks of Big Creek, or 0.5% ECA increase in this watershed. The slight increase in ECA from both of these projects is not measurable and would have no effects on streamflow regime or stream channel processes.

Riparian Areas and Wetlands

With the use of BMPs, neither the Holroyd nor Beaver Creek projects would have any significant effects on riparian areas or wetlands. The planned watershed improvements on obliterated and decommissioned roads would include removing road stream crossings. At these stream crossings, the stream channel and floodplain would be restored, which would allow the riparian and associated wetland areas to recover.

Fish Habitat and Populations

The No Action alternative would not contribute to the cumulative effects incurred from past harvests, habitat degradation, or road construction. Current fish populations appear to be strong throughout the watersheds, and no major changes are expected either in population numbers or distribution. Over time and with revegetation, the watershed projects would stabilize the drainages in which they occur, protecting fish habitat and populations and increasing overall watershed health.

Aquatic Ecosystems

The No Action alternative would not contribute to the cumulative effects incurred from past harvests, habitat degradation, or road construction. Over time and with revegetation, the watershed projects would stabilize the drainages in which they occur, protecting amphibian and other aquatic biota habitat and populations and increasing overall watershed health.

Proposed Action

Sediment

The cumulative effect would be an overall reduction of fine sediments in the long term due to the scheduled watershed improvement on existing closed, decommissioned, and abandoned roads, in addition to the proposed road decommissioning. For some streams, there would be an immediate reduction in sediment when roads that are currently adding significant amounts of sediment to streams are decommissioned. For other streams, there would be short-term increases in fine sediments from removal of stream crossings over the next 2 to 3 years, but the risk of stream crossing failure and overall fine sediment levels would decrease over the longer term, from two to five years after project implementation.

Flow Regimes

The cumulative water yield increase is low for most watersheds. North Fork and Middle Fork Big Creek have the highest ECA increases, 16.6% and 20.2% respectively. Flow increases are not considered to be significant until approximately 25% of the forested basal area on the watershed has been removed (FSH 2509.25.11.1). Both of these streams have stable stream channels, but have excessive fine sediment loads, which appear to be contributed to by abandoned roads in these watersheds rather than stream channel erosion. As mentioned under cumulative effects for sediment above, sediment from these abandoned roads will be reduced over the next several years from scheduled watershed improvement activities in the area.

Riparian Areas and Wetlands

The scheduled watershed improvement activities on currently closed and decommissioned roads would add to the amount of improved riparian areas by restoring road stream crossings and reducing sediment contributed from these older roads. Cumulatively, the project area would have increased riparian and wetland conditions, as well as a small increase in riparian and wetland acreage.

Fish Habitat and Populations

Effects on fish populations and habitats are expected to be minor for the project, due to limited temporary road construction, road removal post harvest, and improvement from approximately 38 miles of road decommissioning. Cumulative effects for sedimentation affecting streams long term within the project area should be reduced substantially by the implementation of road closures and repairs proposed.

Aquatic Ecosystems

As specified above, through harvesting protocols the cumulative effects incurred should be minor in effect and duration from timber harvest, temporary road construction, and road decommissioning. Habitat fragmentation should be minimal for amphibians, as harvesting activities should be well out of the normal habitat for these species. A greater benefit could be expected long term from proposed watershed restoration and road decommissioning portions of the project.

Alternative 2

Cumulative effects would be similar to the Proposed Action, with the exception of the tributaries of Lower Big Creek, which would have fine sediment levels similar to the existing condition. Overall, riparian areas and wetlands would improve in the project area in most watersheds similar to the Proposed Action, except for the Lower Big Creek and Henry Creek watershed.

Alternative 3

Cumulative effects of fine sediment would be similar to the Proposed Action. There would be short-term increases from road decommissioning and scheduled watershed improvement, with long-term reduction in sediment levels. This alternative would have the same effects on flow regime as the Proposed Action for the Big Creek watershed, and similar to the No Action alternative for the Beaver Creek watershed. As with the Proposed Action, the project area would have overall increase in both quality and areal extent of functioning riparian areas, once the road decommissioning and watershed improvement projects have been implemented and the disturbed areas have revegetated. Cumulative effects for fish habitat and the aquatic ecosystem for this alternative should be reduced from those in the Proposed Action, due to the lesser amount of disturbed acres from timber harvest and road construction. However, the road decommissioning portion of the project should have a beneficial effect cumulatively on the affected watersheds' overall health.

Alternative 4

Cumulative effects of fine sediment would be similar to the Proposed Action—short-term increases from road decommissioning and scheduled watershed improvement, with long-term reduction in sediment levels as these areas revegetate. This alternative would have the same effects on flow regimes as the No Action alternative. As with the Proposed Action, the project area would have overall increase in both quality and areal extent of functioning riparian areas, once the road decommissioning and watershed improvement projects have been implemented and the disturbed areas revegetated. Cumulative effects of Alternative 4 are essentially equivalent to the No Action alternative with respect to timber harvest activities for aquatic and riparian dependent species. It has the potential for the greatest amount of watershed improvements and increased watershed health with the minimum amount of disturbance.

Federally Listed Species

Table 24 represents federally listed aquatic or riparian dependent T&E species identified by the U.S. Fish and Wildlife Service (USFWS) (May 2003) that may occur or be affected by activities on the Medicine Bow NF. Candidate and Proposed species are included with the Sensitive species in the Biological Evaluation (BE) portion of the document. Not all listed species necessarily occur near, or are adversely affected by the proposed management activities within the project area. General descriptions of physical environmental consequences for proposed activities are described in the Environmental Effects portion of this document for each of the alternatives. These effects are then applied to habitats and populations of affected threatened or endangered species listed on the following table.

Table 24. Threatened or Endangered Aquatic or Riparian-Dependent Species That May Occur in the Project Area or be Impacted by the Blackhall-McAnulty Timber Sale Project

Species	Status	Suitable Habitat In Project Area	Species Known or Suspected to Occur	Determination of Effects
Whooping crane (<i>Grus americana</i>)	E	NO, downstream in Platte River mainstem ecosystem.	NO, but flows could affect habitat downstream.	No Effect Project will not affect stream flow in suitable habitat.
Least tern (<i>Sterna antillarum</i>)	E	NO, downstream in Platte River mainstem ecosystem.	NO, but flows could affect habitat downstream.	No Effect Project will not affect stream flow in suitable habitat.
Pallid sturgeon (<i>Scaphirhynchus albus</i>)	E	NO, downstream in Platte River mainstem ecosystem.	NO, but flows could affect habitat downstream.	No Effect Project will not affect stream flow in suitable habitat.
Eskimo curlew (<i>Numenius borealis</i>)	E	NO, downstream in Platte River mainstem ecosystem.	NO, but flows could affect habitat downstream.	No Effect Project will not affect stream flow in suitable habitat.
Bald eagle (<i>Haliaeetus leucocephalus</i>)	T ***	NO, downstream in Platte River mainstem ecosystem. Local population evaluated In Wildlife Section	NO, but flows could affect habitat downstream.	No Effect Project will not affect stream flow in suitable habitat.
Piping plover (<i>Charadrius melodus</i>)	T	NO, downstream in Platte River mainstem ecosystem.	NO, but flows could affect habitat downstream.	No Effect Project will not affect stream flow in suitable habitat.
Western prairie fringed orchid (<i>Platanthera praeclara</i>)	T	NO, downstream in Platte River mainstem ecosystem.	NO, but flows could affect habitat downstream.	No Effect Project will not affect stream flow in suitable habitat.

E = endangered species; T = threatened species; habitat is present within or adjacent to the proposed project area but not within any proposed treatment areas.

ENVIRONMENTAL CONSEQUENCES

General changes in condition that would be expected as a result of the proposed actions are: Direct effects would be mortality from the inadvertent taking of listed, threatened, or endangered individuals, or crucial habitat modification or destruction by personnel and equipment working in habitat areas. Indirect effects would be the loss of shading, ground vegetation, and cover in habitat areas, as well as increased precipitation run-off and sediment load to lotic and lentic aquatic systems from management in areas immediately within, adjacent, or upstream of habitat areas. Cumulative effects would be spatial or temporal treatments that overlap compounding impacts, especially those that contribute to habitat loss, stream sediment loading, or changes in water yield.

Federally Listed Species with Habitat Within the Blackhall-McAnulty Timber Sale Project Area

There are no federally listed aquatic species within the project area, so there would be no effect associated with the Blackhall-McAnulty Timber Sale project for federally listed aquatic species or their habitats either directly, indirectly, or cumulatively. The Wildlife section will address local populations of bald eagles, and this report will address only downstream species and their habitats. None of the other listed aquatic species have habitat present within or adjacent to the proposed project area.

Listed T and E species or their habitats are not known or suspected to occur in the project area.

Candidate western boreal toad and the petitioned Colorado River cutthroat trout is included in the Biological Evaluation (BE) and evaluated as a Forest Service sensitive (S) species.

Species with Off-Site Habitat that May be Affected by Activities within the Blackhall-McAnulty Timber Sale Project Area

Platte River Mainstem Ecosystem Species: The T&E species listed in Table 24 are native to the Platte River mainstem ecosystem. Their life cycles depend on natural flow regimes that include flood flows and usual sediment transport. Their biology is fully described by the USFWS (1999). These species are included in this BA even though they occur far outside the project area, because projects that result in changes in timing or amounts of flow have been found to adversely affect habitat and populations of species in the Platte River mainstem ecosystem.

Direct Effects: The Proposed Action would have *no effect* on downstream listed species or their habitats, because all above-listed species (except bald eagles) are not known or suspected to occur in the Blackhall-McAnulty Timber Sale analysis area. Therefore, no inadvertent taking of listed species by direct mortality, critical habitat modification or destruction is possible. Results of the Proposed Action activities would be the same as the No Action alternative. All other alternatives would have a similar effect for listed species.

CUMULATIVE EFFECTS

The Proposed Action would have *no effect* on listed species or their habitats. All the above downstream-listed species except bald eagles are not known or suspected to occur in the Blackhall-McAnulty Timber Sale analysis area, and any effects would not be translated downstream to potential habitat. Suitable habitat is located over 100 miles downstream from the project area. Temporary local water quality changes (e.g., sediment) would not translate to downstream habitat. It has been suggested that increased water yield from vegetation treatment may be beneficial to Platte River mainstem ecosystem species, because vegetation treatment projects (timber harvest or burning of green trees) of sufficient size can lead to increases in water yield, due to a reduction in transpiration and reductions in snow interception losses by vegetation. The potential water yield increases from the proposed project are small, because of the distribution of timber treatments across five watersheds. While water yield increases as a result of vegetative management are real and have been documented in watersheds less than a few square miles in size, research has not been able to detect changes in water yield on larger basins. Additionally, there are a variety of water users between the project area and suitable downstream habitats, which could nullify any increases in water before it reached downstream habitats. Therefore, this project is not expected to change streamflows where suitable habitat for these endangered species exists.

Summary of Findings and Consultation Requirements for T&E Species

Completion of this biological assessment has not identified nor requires mitigation measures or recommendations for listed T&E species. There are not likely to be direct, indirect, or cumulative effects on downstream aquatic habitats or listed species in the Platte River mainstem river ecosystem. Consultation with the USDI Fish and Wildlife Service (FWS) is required for the EIS with any alternative selected for this project, and would be accomplished following preferred alternative selection. However, it is expected the FWS would likely concur with a finding of *no effect* from this project on potential, critical, or suitable habitats downstream for any federally listed, threatened, or endangered species covered by this biological assessment (50 CFR 402.10) unless the project changes, or new information indicates different effects might be anticipated.

Forest Service Sensitive Species

The U.S. Forest Service (FS) is required to provide habitats that are necessary to support viable populations of sensitive (S) species and other wildlife (National Forest Management Act, 36 CFR 219.19). The Rocky Mountain Regional Endangered, Threatened, and Sensitive Species Lists (USDAFS 94) were used to determine those species that may occur on the Medicine Bow National Forest. Table 25 provides the list of sensitive (S) aquatic species for the Blackhall-McAnulty Timber Sale project analysis area.

Table 25. FS Listed Sensitive Aquatic Species that May Occur in the Project Area or be Impacted by the Blackhall-McAnulty Timber Sale Project

Species	Status	Sensitive Species Carried Forward
Wood frog (<i>Rana sylvatica</i>)	S	NO. Species occurs in riparian areas, streams, wetlands, and ponds, but not documented in Sierra Madre.
Tiger salamander (<i>Ambystoma tigrinum</i>)	S	YES. **Species known or have potential to occur in riparian areas, streams, wetlands, and ponds.
Western boreal toad (<i>Bufo boreas boreas</i>)	C, S	YES. **Species known or have potential to occur in riparian areas, streams, wetlands, and ponds.
Northern leopard frog (<i>Rana pipens</i>)	S	YES. **Species known or have potential to occur in riparian areas, streams, wetlands, and ponds.
Colorado River cutthroat trout (<i>Oncorhynchus clarki plueriticus</i>)	S	NO. Species native to and distributed on west side of Continental Divide in perennial streams.
Yellowstone cutthroat trout (<i>Oncorhynchus clarki bouvieri</i>)	S	NO. Species native to and distributed in the Columbia and Snake River basins; not in Sierra Madre.

C = candidate species; S = sensitive species; ** = habitat is present within or adjacent to the proposed project area, but not within any proposed treatment area.

Species with Habitat within the Blackhall-McAnulty Timber Sale Project Area

Western boreal toad (*Bufo boreas boreas*), tiger salamander (*Ambystoma tigrinum*), and leopard frog (*Rana pipens*) have not been documented to inhabit, but do have suitable habitat within or adjacent to the Blackhall-McAnulty Timber Sale proposed project area.

ENVIRONMENTAL CONSEQUENCES

Direct Impacts: There is quality amphibian habitat present within the analysis area, but past and present surveys (WNDD 2002 and August 2002) for sensitive amphibians have not documented their existence in the project area. More common chorus frogs were the only amphibians documented to exist within the analysis area, and their occurrence was extremely small (Eaglin 2001). However, amphibians sometimes disperse relatively great distances from aquatic systems, therefore there is the remote possibility that equipment or personnel activity in treatment areas could pose a risk to individual amphibians.

There are many perennial streams within and around the proposed harvest treatment units. There are no naturally occurring Forest Service listed sensitive fish species within the analysis area. It is unlikely that there would be any direct impacts to amphibians, fish, or their habitats, provided best management practices (BMPs) for timber harvesting, specified mitigation, and watershed conservation practices (WCPs) are utilized to protect water quality and associated riparian/wetland habitats.

Indirect Impacts: Loss of shading, ground vegetation, cover, and stream channel damage should not occur from personnel and equipment harvesting in the treatment units, provided there is compliance with BMPs, WCPs, and specified mitigation. There is the possibility of precipitation or snow melt run-off causing sediment loading or chemical spill transport to lotic and lentic aquatic systems within the project area. Weekly monitoring following precipitation events should preclude this from happening, and if it should occur would be identified and corrected before there was damage to habitats or species.

CUMULATIVE EFFECTS

National Forest System lands represent a very large portion of the potential for good fish and amphibian populations in the Rocky Mountain West. Well-established populations of non-native trout occupy the stream habitat at most elevations within the project area, and there are no naturally occurring Forest Service listed sensitive fish species within the project area of the Medicine Bow NF. However, amphibians do not exhibit the same good population presence as “common trout” within the project area, even with the amount of suitable habitat present. Sediment deposition is expected to be the greatest cumulative impact for fish and amphibians affecting spawning gravels, dissolved oxygen concentrations, and water quality. The implementation of BMPs, mitigation and monitoring, along with the proposed road closures and repairs, should greatly reduce the cumulative impacts from erosion and sediment deposition.

None of the impacts associated with the Blackhall-McAnulty Timber Sale project for either the proposed or alternative activities would have adverse effects for Forest Service designated aquatic or riparian-dependent sensitive (S) species or their habitats. The activities included in the Proposed Action and Alternatives 2 and 3 may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability Forest wide for “common trout species,” boreal toad, northern leopard frog and the tiger salamander. The proposed timber sale should not directly, indirectly, or cumulatively impact listed sensitive (S) individuals or their habitats, because there are no designated sensitive (S) fish species in the analysis area, and sensitive (S) amphibian species have not been found within or closer than 8 km (5 miles) to the proposed timber sale activity. Specified mitigation and monitoring measures should protect potential habitat for all aquatic and/or riparian species.

Management Indicator Species

AFFECTED ENVIRONMENT

The Medicine Bow National Forest Land Management Plan (1985) lists species considered as Management Indicator Species (MIS) when present on National Forest System lands. The Rocky Mountain Regional Office developed Project Guidance for Management Indicator Species (2/2001). Project-level NEPA analysis must identify and document the effects on MIS.

The Medicine Bow National Forest LMP lists several potential aquatic MIS: western boreal toad, wood frog, and beaver are considered ecological indicators; and Colorado River cutthroat trout, rainbow trout and brook trout (“common trout species”) are management indicators for fish (Table 26). There are no aquatic MIS listed for either recovery species or featured species.

Table 26. Aquatic and Riparian-Dependent Management Indicator Species (MIS) Known or with Potential to Occur in the Blackhall-McAnulty Timber Sale Project Area

Species	Status	MIS Species Carried Forward for Analysis
Common trout: Brook trout (<i>Salvelinus fontinalis</i>)	MIS	YES. **Species known or have potential to occur in analysis area perennial streams, and sufficient data and populations exist where they occur to monitor and evaluate.
Brown trout (<i>Salmo trutta</i>)	MIS	YES. **Species known or have potential to occur in analysis area perennial streams, and sufficient data and populations exist where they occur to monitor and evaluate.
Common trout: Rainbow trout (<i>Oncorhynchus mykiss</i>)	MIS	NO. **Species known or have potential to occur in analysis area perennial streams, but sufficient populations or data <u>do not</u> exist to monitor and evaluate.
Wood frog (<i>Rana sylvatica</i>)	MIS	NO. **Habitat in riparian areas, streams, wetlands, and ponds, but sufficient population <u>not</u> available for monitoring and evaluation.
Western boreal toad (<i>Bufo boreas boreas</i>)	MIS	NO. **Habitat in riparian areas, streams, wetlands, and ponds, but sufficient population <u>not</u> available for monitoring and evaluation.

Species	Status	MIS Species Carried Forward for Analysis
Colorado River cutthroat trout (<i>Oncorhynchus clarki plueriticus</i>)	MIS	NO. Species native to and distributed on west side of Continental Divide, and are not known or have potential to occur in analysis area perennial streams. Experimental population in the tributary to Beaver Creek to small too evaluate and monitor.
Beaver (<i>Castor canadensis</i>)	MIS	NO. **Species known or have potential to occur in beaver ponds and along streams with <u>accessible</u> riparian vegetation, but sufficient population is not available for monitoring and evaluation. Species can be better utilized as a keystone species.

MIS = management indicator species: ** = habitat and/or populations present within or adjacent to the proposed project area.

Species Selection for Management Indicators within the Project Analysis Area

Common trout (brook and brown trout) are known to inhabit the perennial streams within the Blackhall-McAnulty project analysis area. Brook and brown trout were selected for analysis as an MIS, because they are relatively abundant and widely distributed within aquatic ecosystems that are most likely to be affected by the Blackhall-McAnulty timber sale activities (see Table 4 of the specialist report for population statistics). All stream drainages within the analysis area to be monitored are perennial. Ephemeral drainages are only seasonally connected to mainstem drainages during spring rain and snow-melt conditions; however, at certain times of the year some intermittent streams may be accessed by fish and used as rearing habitat.

Common Trout (Brook Trout):

Brook trout are ubiquitous in most of the Medicine Bow-Routt National Forest, where they occur in 162 of the 196 sixth-level watersheds on the Forest (Medicine Bow side). Of these, 145 watersheds are classified as having strong brook trout populations (USFS 2001b).

Common Trout (Brown Trout)

Brown trout have relatively strong populations across the Medicine Bow-Routt National Forest. They occur in 100 of the 196 sixth-level watersheds on the Forest (Medicine Bow side), and out of these, 54 watersheds are classified to have strong brown trout populations (USFS 2001b).

Overall aquatic habitat conditions in the drainages scheduled or proposed for timber harvest do not appear to have been adversely modified or affected by past timber harvests, and the streams in the analysis area support strong populations, where they exist, of brook and brown trout.

ENVIRONMENTAL CONSEQUENCES

Pre-project monitoring indicated robust brook and brown trout populations where they exist within the analysis area. Because the buffer distance between proposed activities and brook/brown trout habitat meet Forest Plan direction for riparian area protection, we do not expect to see effects of timber harvest activities translated to stream reaches occupied by common trout species. These buffer distances (BMPs) are sufficient to protect stream shading that without could affect water temperature and trophic status of the stream. The vegetative buffer should also prevent displaced fine sediment from road construction or decommissioning, or harvest units reaching the stream at significant levels.

Past and proposed timber harvests are the most likely source for adverse cumulative impacts to aquatic systems and populations in the project area. Heavy precipitation events following the proposed prescribed burn and on the 2002 Bear Mountain South wildfire area could promote increases in stream sediment deposition. This could effectively reduce habitat quantity and quality with respect to potential spawning areas, and egg or larvae survival. Weekly monitoring recommended during project implementation should catch sediment mobilization and deposition before it can affect aquatic systems within the project area.

The Bear Mountain fire did envelop some riparian areas, so some site specific observation monitoring will need to be done.

Under controlled burn management, the risk of significant adverse effects would be low, and these impacts should not translate into direct or indirect impacts to fish habitat or populations on site. Timber harvest and the prescribed burns would have ***no significant effect on habitats or populations*** of brook or brown trout within the analysis area perennial streams.

The proposed vegetative management activities associated with any alternative for the Blackhall-McAnulty Timber Sale project are not expected to cause significant or measurable changes in the habitat quantity or quality, or to affect the status for known common trout (brook/brown trout) populations. There would be ***no detrimental direct, indirect, or cumulative effects on management indicator species or their habitats***, because **of the use of BMPs, watershed conservation practices, Forest Standards and Guidelines. Recommended mitigation measures for species and habitats should be implemented as described for areas where proposed activities and habitats coincide.**

Forest Plan Consistency

The Blackhall-McAnulty Timber Sale project is consistent with the pertinent Forest Plan goals, guidelines and standards, because silvicultural activities have been specifically designed to stay out of riparian and wetland zones. The use of existing roads and the immediate closure of any temporary roads following the project will limit stream network expansion within the analysis area. This should reduce the amount of available road surface capable of contributing sediment to the streams, as increased sediment deposits and siltation can drastically affect the survivability of fish or amphibian eggs or their hatched offspring.

The Blackhall-McAnulty Timber Sale project is consistent with 9A Management Area direction, because riparian areas in the Blackhall-McAnulty project areas are adequately buffered and are not subject to silvicultural management. Additionally, road closures and repairs specified as part of the travel management portion of the project should reduce the amount of stream network expansion and connectivity capable of delivering sediment to streams.

Consistency With Other Laws and Regulations

Wetlands/Floodplains Executive Orders: This project is consistent with these executive orders for the following two reasons: The project will improve wetland and floodplain function through reducing road related impacts on roads targeted for decommissioning. Secondly, the project will use the best available BMPs to reduce effects of road reconstruction and temporary road construction across stream channels.

Clean Water Act: This project would comply with the Clean Water Act and State of Wyoming State Water Quality Standards through the use of BMPs and associated monitoring. Overall, the project should decrease fine sediment levels in streams and improve water quality within the project area. There are no streams designated as impaired by the State of Wyoming, which would be affected by this project (WYDEQ 2002). This project would not increase risk of impairment.

State of Wyoming Turbidity Waiver: Stream crossing removal projects during road decommissioning may require a short-term exemption from turbidity standards. These projects would be evaluated and a waiver secured, if needed, prior to implementation.

Stormwater Discharge Permit: The road decommissioning and mine spoils removal projects may require a Stormwater Discharge Permit. These projects will be evaluated to determine the need for this permit, and a permit would be secured prior to project implementation.

Rare and Sensitive Plants

AFFECTED ENVIRONMENT

The Cheyenne office of the U.S. Fish and Wildlife Service (USFWS) provided the Medicine Bow National Forest (February 24, 2003) with a list of proposed, endangered, threatened, and candidate plant species that are known or are likely to occur on the Wyoming portion of the forest. The Wyoming Natural Diversity Database (WYNDD 2002) websites and geographic information systems were consulted for the most up-to-date information regarding the occurrence of proposed, endangered, threatened, and sensitive (PETS) plant species within or near the project area. Information on occurrence and distribution of plants and plant habitat on the Medicine Bow-Routt National Forests (MBRNF) was derived from Burke (2000), Hartman and Nelson (2002), Chumley et al. (1998), Kastning (1990), Mills and Neighbors (1995) and Packer (1999).

The Blackhall-McAnulty Analysis Area has no known occurrences or potential habitat for plant species formally listed or officially proposed as threatened or endangered under the Federal Endangered Species Act (CNHP 2002, WYNDD 2002). There are 81 plant species on the 1994 R2 Sensitive species list, of which twelve are known to occur or are likely to occur on the Medicine Bow-Routt National Forests (Fertig et al. 1994, Spackman et al. 1997). Of these twelve species, five are not likely to occur within or near the project area and have been dropped from further consideration.

Survey Intensity

The field reconnaissance specific to the Blackhall portion of the analysis area was conducted in the field season of 2002. The McAnulty portion was surveyed during the 2003 field season. With the exception of the slender moonwort, the surveys occurred during the times of year and at an intensity that would have allowed us to locate populations of all the plant species listed on Table 27, had they been present in the project area (Proctor 2003). Slender moonwort is a very small ephemeral species that may not appear above the ground every year. It is possible that populations of slender moonwort populations could go un-detected in survey efforts.

Survey Results

Of the eight plant species thought to have potential habitat in the analysis area, six were not found as a result of the PETS plant species field survey. Of those six plant species that were not found, five have been dropped from further consideration, including: *Carex livida*, *Drosera rotundifolia*, *Festuca hallii*, *Ipomopsis aggregata ssp. weberi*, and *Penstemon harringtonii*.

Table 27. Candidate Threatened and R2 Sensitive Plant Species Suspected to Occur in the Analysis Area

Species	Vegetation Type and Habitat Requirements	Soil Type Required	Habitat Present in the Analysis Area	Species Potential to Occur in Analysis Area	Survey Method Utilized in the Analysis Area	Species Present/Found in the Analysis Area
<i>Botrychium lineare</i> (slender moonwort) Candidate Threatened	Grassy slopes, among medium-height grasses, along edges of streamside forests.	Soil type can vary	YES	Low potential	2002 Intensive 2003 Intensive	No No
<i>Carex livida</i> (livid sedge) R2 Sensitive	Float mats, bogs, fens, peatlands marls wetsedge hummocks.	Histisols	YES	Moderate potential	2002 Intensive 2003 Intensive	No No
<i>Cypripedium fasciculatum</i> (Clustered lady's slipper) R2 Sensitive	Open lodgepole pine/spruce fir.	Soil type can vary	YES	High potential	2002 Intensive 2003 Intensive	Yes Yes
<i>Drosera rotundifolia</i> (round leaf sundew) R2 Sensitive	Acid fens, floating mats, bogs & peatlands.	Histisols	YES	Moderate potential	2002 Intensive 2003 Intensive	No No
<i>Festuca hallii</i> (Hall fescue) R2 Sensitive	Montane meadows, conifer forest edge & openings.	Mostly Calcareous & Volcanic	YES	Low potential	2002 Intensive 2003 Intensive	No No
<i>Ipomopsis aggregata</i> ssp. <i>Weberi</i> (Rabbit ears gilia) R2 Sensitive	Openings conifer forest slopes/ridges dominated sagebrush, rabbit brush, Prunus, Purshia.	Gravelly clay-loam soils derived igneous/volcanic parent	YES	Low potential	2002 Intensive 2003 Intensive	No No

Species	Vegetation Type and Habitat Requirements	Soil Type Required	Habitat Present in the Analysis Area	Species Potential to Occur in Analysis Area	Survey Method Utilized in the Analysis Area	Species Present/Found in the Analysis Area
<i>Machaeranthera coloradensis</i> (Colorado tansy aster) R2 Sensitive	Gravelly, open sagebrush in mountain parks. Dry tundra.	Calcareous-Sandstone/limestone outcrops	YES	Moderate potential	2002 Intensive 2003 Intensive	Yes Yes
<i>Penstemon harringtonii</i> (Harrington's beard tongue) R2 Sensitive	Open big sagebrush or pinyon-juniper forest.	Loams/clay, loams of calcareous limey shales, limestones	YES	Low potential	2002 Intensive 2003 Intensive	No No

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Under this alternative, no action would occur. Therefore under Alternative 1, natural environmental processes may impact individuals but are not likely to cause a trend to federal listing or loss of viability.

All Action Alternatives

Platanthera praeclara, Western prairie fringed orchid (**Endangered**) and *Spiranthes diluvialis*, Ute ladies' tresses orchid (**Endangered**): Increases in water yield are real, but are almost impossible to measure beyond the project area, because they are masked by natural variation in flows at the watershed scale. There could be immeasurable, potentially beneficial effects to downstream species if this water reached habitat for listed species in the Platte River mainstem in Nebraska. However, because the Platte River Basin is significantly over-appropriated for water rights and any new water is likely to be used by water rights holders, any increases in water yield are not expected to reach Nebraska. Furthermore, there is no legal mechanism to protect the water yield increases and deliver them to the central Platte critical habitat.

Flows from Colorado into Nebraska are not likely to change. Therefore, the project would not have any net effect on habitats in the mainstem Platte River. Thus, the project is determined to have **no effect** on Ute ladies' tresses orchid, or Western prairie fringe orchid populations or habitat. No consultation with the Fish and Wildlife Service is required for these species.

Botrychium lineare, slender moonwort (Candidate Threatened): Our best survey efforts were put forth to detect slender moonwort had it been present in the analysis area. No populations were found as a result of that field reconnaissance. If this species were found within the analysis area, we expect they would occur in areas protected through project design and by riparian standards and guides and best management practices. Because the presence of this plant cannot always be detected, we have determined that the proposed action **may adversely affect individuals but is not likely to result in a loss of viability on the Planning Area, nor cause a trend towards federal listing or a loss of species viability for slender moonwort**. The Forest Service maintains discretion to modify projects or contracts if the slender moonwort is determined to occur within a project or contract area.

Cypripedium fasciculatum, clustered lady's slipper orchid (R2 Sensitive): Because clustered lady's slipper orchids have been documented in so many locations on the Medicine Bow-Routt National Forests and elsewhere in Region 2, viability concerns for this species have decreased. Through project design, small populations (20-49 stems/acre) of clustered lady's slipper orchid could be lost as a result of the proposed action. However, core populations (>50 stems/acre) and other important occupied sites would be protected from the proposed action. Therefore the proposed action **may adversely affect individuals but is not likely to result in a loss of viability on the Planning Area, nor cause a trend towards federal listing or a loss of species viability for clustered lady's slipper orchid**.

Machaeranthera coloradensis, Colorado tansy aster (R2 Sensitive): Assuming project design under all action alternatives, no individuals or whole populations of *Machaeranthera coloradensis* populations would be lost as a result of management activity. **Therefore, under all action alternatives, there would be no adverse impacts to *Machaeranthera coloradensis*.**

A few high quality fens were found in and adjacent to proposed harvest units within the Blackhall-McAnulty Analysis Area. No PETS plants were detected in the fens found associated with the Blackhall-McAnulty Analysis Area (Proctor 2003). However, fens are one of the rarest wetland types found at temperate latitudes and they are considered potential habitat for over 1/3 of the rare plants found on the Medicine Bow-Routt National Forests (Cowardian et al. 1979). Assuming project design under all action alternatives, no fens would be lost as a result of management activity. **Therefore, under all action alternatives, there would be no adverse impacts to fens.**

CUMULATIVE EFFECTS

Some of the potential habitat for these species occurs on private and state lands. There are no predicted effects from management actions. Since there is very little known about interactions among disjunct populations, it is difficult to predict how effects to a single population might influence the status of other populations.

Vegetation

AFFECTED ENVIRONMENT

Ranging in elevation from 8,000' to 10,979', the Blackhall-McAnulty Analysis Area is predominantly forested, with parks or meadows of various sizes scattered across the landscape. General vegetation zones present in the analysis area include lodgepole pine forests, Engelmann spruce-subalpine fir forests, alpine tundra, sagebrush-steppe, aspen, and riparian areas (seeps, fens, and carrs). These plant communities are segregated along gradients of elevation and topography, which directly affect important plant growth determinants such as temperature, effective precipitation, and hydrologic regime.

Based on RIS database information for the Blackhall-McAnulty area, much of what is forested is dominated by stands of lodgepole pine pole timber and saw timber (63%). Engelmann spruce and subalpine fir dominate the higher elevations around 10,979' Blackhall Mountain along the northwestern boundary of the area, along with many north facing slopes and riparian areas (5%). The very top of Blackhall Mountain is a mix of rock and alpine tundra (1%). Descending in elevation to the east, the lodgepole pine becomes more mixed with aspen (8%). These lower elevation stands are interspersed with a number of sizeable parks, including: Big Creek, Jerry, Quimby, and Holroyd Parks, small meadows, sparsely forested, windswept ridges, and non-forested southerly facing slopes (21%). Many of the streams at the lower elevations of the area are bordered by riparian areas dominated by willows (1%<). At the lower treeline at about 8,200 feet and on southerly aspects the lodgepole pine and aspen become mixed with scattered limber pine (1%<), and unique, relic stands of Douglas-fir (1%<), along with ponderosa pine (1%<).

In examining the fire history or stand origin data for the area, it appears that the vast majority of existing stands at the lower and middle elevations resulted from fires that burned the area shortly after Euro-American settlement of the vicinity. Of the 30,800 forested acres that have had timber inventory conducted within them, approximately 60% regenerated from fires that burned the area during this early settlement period between 1860 and 1909. As with elsewhere in the American West, public concern for the unchecked wildfires that burned the area during this period were one of the main reasons it later became National Forest. Located predominantly at the higher elevations, this same data estimates that approximately 13% of the inventoried forest resulted from fires prior to 1860 and settlement. Reflective of the earlier fires, creation of the National Forest in 1902, and early efforts by Forest Service to control wildfires, the database estimates that only 8% of the area was affected by wildfires between 1910 to 1949. More reflective of clearcutting and timber harvest rather than fire, the database estimates that the remaining 19% of the stands that have been inventoried have regenerated between 1950 and the present.

The greatest effect fire suppression has had in the area has been the noticeable conversion of many aspen stands to subalpine fir, lodgepole pine, and in some cases Douglas-fir. Most of the aspen stands in the vicinity are considered overmature, with the vast majority being well over 100 years old. Ponderosa pine, which is currently relegated to southerly aspects at the lower elevations in the eastern portion of the area, appears to have been more prevalent at one time. As with aspen, it appears the lack of fire has led to a decrease in this fire-dependent tree species.

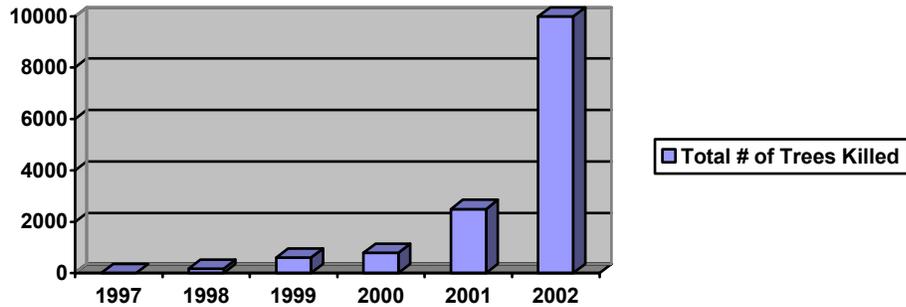
During the summer of 2002 a lightning-caused fire burned approximately 500 acres in the northeastern portion of the analysis area. Named the Bear Mountain South Fire, this intense crown fire burned through an area that was predominantly lodgepole pine. Considered a major project fire, it took the efforts of slurry bombers, helicopter water drops, bulldozers, hundreds of firefighters, and the expenditure of hundreds of thousands of dollars to bring this fire under control.

Forest Insects and Disease

Bark Beetles

Since 1997, aerial surveys of the area conducted by the Forest Service have detected a marked increase in mountain pine beetle activity and subsequent mortality within stands dominated by lodgepole pine. The 2002 aerial survey of the area again verified much of the current beetle activity and spread is within forested areas that have been classified as being unsuitable for timber production, along the southern end of Bear Mountain Inventoried Roadless Area. The Holroyd Timber Sale (currently being implemented) is designed to help reduce beetle spread and mortality along the NFSR 498 corridor, further south of the roadless area. Graph 1 displays the estimated tree mortality that has occurred in the area since 1997.

Graph 1 – Blackhall-McAnulty Mountain Pine Beetle Activity 1997-2002



It should be noted that there is typically a one-year time lag between beetle infestation and tree death. The dead trees that were visible and counted through the aerial survey in 2002 were actually trees that were attacked and killed by beetles the previous summer of 2001. The total tree mortality in the area is in reality much higher than what is displayed, due to the thousands of additional trees that were infested by beetles during the summer of 2002. Walk-thru surveys done in the fall of 2001 and during the 2002 field season confirmed high infestation areas from the aerial survey.

Another bark beetle that has caused a noticeable increase in tree mortality within subalpine fir stands across the analysis area is western balsam bark beetle. Closely related to the mountain pine beetle, the balsam bark beetle, along with a root disease (armillaria), have caused scattered fir mortality from the lower forested elevations up to the highest elevation on Blackhall and Bear Mountains. There is evidence that scattered pockets of dead subalpine fir helped fuel the Bear Mountain South Fire during its crown fire run.

Another potentially damaging insect that may pose a threat to the Engelmann spruce within the analysis area in upcoming years is spruce beetle. Spruce beetle is similar to the pine beetle in that it is cyclic, and when conditions are favorable the beetle's populations can increase to epidemic levels. Once an epidemic occurs, all spruce 5" in diameter and greater are susceptible to attack. There are indications that spruce blow-down that has occurred in recent years within watersheds to the west of the analysis area may provide a medium and/or epicenter for the start of a spruce beetle epidemic that could spread into the spruce dominated forests at the higher elevations of Blackhall Mountain.

Dwarf Mistletoe

Dwarf mistletoe is present in lodgepole pine in stands throughout the analysis area. Mistletoe is a parasitic plant that deforms trees, causes rot, and weakens a tree so that it is more susceptible to insects and disease. The RIS database estimates that 61% of the lodgepole stands within the Blackhall-McAnulty Analysis Area have low to high levels of mistletoe infestation. Associated with this, there are a number of forested stands where yearly tree mortality exceeds yearly tree growth. The presence of mature and overmature lodgepole pine with low to high levels of dwarf mistletoe provides a ready source of vulnerable trees for a growing mountain pine beetle epidemic to spread into.

Table 28. Existing Dwarf Mistletoe Rating

Average Dwarf Mistletoe Stand Rating*	Acres
No infection	11,289
Low – moderate	12,112
High	5,375

(Source: Forest RIS Database)

*Average stand rating based on the Hawksworth 6-class dwarf mistletoe rating system.

Hazard Classifications

Stand hazard rating is a measure of the degree of damage that can be expected in a stand if a beetle outbreak occurs. Stand hazard is influenced by site characteristics as well as stand characteristics. Stand hazard rating identifies stands where mortality can be expected if a bark beetle outbreak occurs. It is an important planning tool because it can identify stands that are most vulnerable to attack and most likely to sustain heavy mortality if attacked. This assessment is based on stand level information, but was mapped at a large scale to provide an overall picture of the situation. Stand hazard rating for lodgepole pine cover types incorporates information on elevation, latitude, age, and average diameter.

Much of the current beetle activity displayed on the previous Graph 1 and broken down in Table 28 is in the lower elevations along the eastern Forest boundary within large stands of lodgepole pine, along with scattered ponderosa and limber pine. Based on tree inventory data for the area, most of these stands are in the moderate to high risk category for mountain pine beetle. Lodgepole pine stands that have a moderate to high risk are typically greater than 90 years old, contain trees with diameters that average 6" or greater, and are located below 9,800' in elevation.

The situation now in the assessment area is such that conditions are right for mountain pine beetle to attack and kill standing pines. The dramatic increase in mountain pine beetle populations and subsequent tree mortality, along with the current weather conditions and abundant lodgepole pine food source, indicate that epidemic levels will continue to spread in the Blackhall-McAnulty area.

Wildland-Urban Interface

The 2002 Bear Mountain South Fire alerted many landowners within and adjacent to the analysis area to the dangers wildfires present to private land and structures. Much of the 1,631 acres of private within the analysis area is undeveloped. One exception to this is the private inholding in the vicinity of Jerry Park in which a number of rustic cabins have been built over the years. Another area of concern that is directly adjacent to the analysis area that has a high number of structures on private land is the Skyline Ridge area. Both of these pieces of private could be described as communities at risk. More specifically, a community at risk is defined as a wildland-urban interface community in the vicinity of Federal lands that are at high risk from wildfire in which there are on-going and/or plans for projects to conduct fuels treatments.

As part of the planning requirements under this effort, Federal agencies have been directed to assess the level of wildfire risk, and the types and extent of treatments required to mitigate the risk. Because of this risk, these two areas provide an opportunity to apply the goals and objectives of the National Fire Plan.

Past Timber Harvest

Many of the forested stands within the analysis area show evidence of tie hack and pre-1950 selective logging. Evidence of this late 19th and early 20th century logging, in the form of stumps and old overgrown logging roads, can be found throughout the area. The greatest effect this early day logging had on the project area was probably not the cutting, but the wildfires that these early day loggers may have caused. It is evident that the fires that burned much of the area between 1860 and 1909 were probably human-caused and fueled by slash from this early day logging. There was virtually no regulation of logging in the vicinity until after the Forest was created in 1905. Another major effect of this early logging and subsequent cutting up until around 1950 was to create forest conditions that promoted the spread of dwarf mistletoe within area lodgepole pine stands. Many of the openings created by this era's selective cutting regenerated to lodgepole pine, changing what were single-storied stands to the current multistoried stands. Dwarf mistletoe in the lodgepole overstory that was not cut has spread into much of the lodgepole regeneration within these stands.

Large-scale timber harvesting in the form of clearcutting began in the area in the mid to late 1950's. It was also during this time that much of the area's existing Forest roads were constructed or reconstructed to provide access for the timber sales. As with other parts of the Medicine Bow-Routt National Forests, early clearcut harvesting of a number of stands in the area was done with alternate strips. Since that time clearcut harvesting has been done with small, irregular shaped units. The District resource information system (RIS) database lists an estimated 8,571 acres of harvest treatments, or 24% of what is forested, have occurred in the analysis area since 1950. Of this amount, approximately 4,646 acres were clearcut. Today these clearcuts have regenerated to young lodgepole pine and aspen stands. Pre-commercial thinning, release and weed, and mistletoe control cutting has also occurred on some of the past treated acres. Since 1950 a number of lodgepole pine pole timber stands along NFSR 498 in the Holroyd Park area have been commercially thinned for post and poles. The Jerry Park #2 Timber Sale (1994) was the most recent timber sale in the area. Located northwest of Big Creek Park, this sale harvested a number of primarily clearcut units in and around the Jerry Park vicinity. Situated along the NFSR 498 corridor in the extreme southeastern portion of the area, the Holroyd T.S. is currently being implemented. This 1.1 MMBF sale is designed to promote area ponderosa pine and aspen, along with reducing the spread of mountain pine beetle and associated tree mortality in this portion of the area.

Within the analysis area, approximately 22,162 acres are classified as suitable and 23,153 acres are classified as non-suitable. Suitable is defined as areas where the land has been deemed capable and suitable for timber management and production. It is also within these suitable lands that timber harvest is scheduled and counts towards the Medicine Bow National Forest's allowable sale quantity (ASQ). Approximately 39% of what is suitable has had some sort of harvest since 1950.

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Under the No Action alternative there would be no treatment to the vegetation in the area. In proposing no action, Alternative 1 would do the most in addressing concerns for maintaining the area in its present state--allowing natural succession to continue to occur. In most environmental analyses the No Action alternative represents a static, relatively unchanging baseline of the analysis area's existing condition that can be used to compare the potential effects of the action alternatives. In the case of the Blackhall-McAnulty Analysis, the No Action alternative could have major implications to the timber resource in the area. Alternative 1 would do the least during this entry in moving the vicinity's forests towards the desired future condition for the area. By dropping all proposed timber harvest and prescribed burning, this alternative would allow to continue the conversion of low and middle elevation areas that were once dominated by aspen, and in some case ponderosa pine, to subalpine fir and lodgepole pine stands, reducing the biodiversity of these areas. Non-forested areas would continue to convert to heavy shrub communities, reducing forage opportunities for livestock and area wildlife.

By not moving forward with the proposed timber harvest, boundary treatment, and precommercial thinning, the parasitic plant dwarf mistletoe would continue to spread unchecked through the area's predominantly lodgepole pine stands and into adjacent regenerated clearcuts, infecting the existing sapling and poletimber size lodgepole, weakening trees, and making them more susceptible to future disease and/or insect attack—such as mountain pine beetle. Mountain pine beetle would continue to spread unchecked through the area, causing mortality within the vicinity's lodgepole, ponderosa, and limber pine stands. As with pine beetle, western balsam bark beetle would be allowed to spread unchecked through the area, causing additional mortality to area subalpine fir. Tree mortality due to these bark beetles will increase wildfire potential in the area. As shown by the 2002 Bear Mountain South Fire, under the right conditions and with an ignition source, a sizeable fire can occur in the area. If another wildfire were to occur, the presence of existing lodgepole pine and subalpine fir dead and dying trees would allow the fire to easily transition in to a crown fire or stand-replacing fire. In most cases fir exist as “ladder” fuels that would allow a potential wildfire to burn up into the crowns of the predominantly lodgepole pine stands. A future crown fir could be very detrimental to the few remaining ponderosa pine in the area, possibly killing them.

Although annual road and periodic ditch maintenance would still occur under this alternative under normal program of work, the other watershed restoration projects identified for the area such as the removal of mine spoils and cheatgrass treatments would not occur. Other identified projects such as the Big Creek Trail improvements and Travel Management road decommissioning would also not be implemented.

Proposed Action

Commercial Timber Sale(s)

Because it contains the most acreage of proposed treatments, the Proposed Action is the most aggressive action alternative in moving the Blackhall-McAnulty vicinity's vegetation towards the desired future condition for the area. Designed to directly address the purpose and need for the proposal, under the Proposed Action a combination of harvesting, prescribed burning, and associated projects would be used to increase vegetation diversity, promote and maintain the characteristic landscape and stand patch size, to improve forest health and resiliency, and to salvage dead and reforest the area burned by the 2002 Bear Mountain South Fire.

An analysis of the area has found that most of the acreage proposed for treatments would result in treating commercial-size trees (lodgepole greater than 5 inches in diameter). Past experience and research has shown that in such situations a multiproduct timber sale or a combination of commercial sales is the most efficient method to salvage dead trees, reduce the spread of mountain pine beetle, along with implementing treatments to reduce the future susceptibility of area stands to beetles (Amman, et al.1977). Harvest units would be situated predominantly within areas that have had past timber sale entries. Potential commercial silvicultural treatments include: clearcutting, overstory removal, fire/beetle salvage, sanitation/salvage, shelterwood, and commercial thinning. Commercial volume from suitable timber lands will count towards the Medicine Bow National Forest's allowable sale quantity (ASQ).

Vegetation Diversity

It would be anticipated that the estimated 234 acres of clearcut, 35 acres of overstory removal, and 144 acres of fire/beetle salvage would all be beneficial in promoting and increasing the existing amount of aspen that currently exists on these 413 acres (approx. 1% of area). Though only 30 acres of this amount is within stands currently classified as being aspen (4D), past timber sales in the area have demonstrated that clearcutting and overstory removal treatments are very beneficial in promoting aspen. Stands that were treated with these prescriptions from since the 1960's have regenerated to mixed stands of aspen and lodgepole pine. Consideration will be given to possibly using broadcast burning within the clearcut units to both reduce logging slash and promote new aspen regeneration. Similar treatments in clearcut units in the Headquarters Timber Sale in the late 1990's were a resounding success in reducing slash and promoting a flush of new aspen regeneration. The fire salvage would be beneficial in promoting aspen by removing dead or beetle-infested spruce, lodgepole, and fir that is currently impeding new aspen regeneration. Though not directly designed to promote aspen, the 1,479 acres of sanitation/salvage and shelterwood prep treatments proposed will be beneficial in maintaining small groups of aspen within these stands by removing competing conifers.

Natural Patch Size

Along with increasing diversity, the Proposed Action is also designed to treat intervening and/or stands adjacent to past harvest areas from timber sales in the 1960's, 1970's, and 1980's. By doing so, this alternative does the most to address the need to maintain and restore the characteristic landscape mosaic of large patches of vegetation of similar age and size. Timber harvest since the 1970's has created a pattern of older forest perforated by clearcut openings that average 10 to 15 acres in size, negatively affecting the areas aesthetics and decreasing the value of these stands to dependent wildlife species. Similar to the harvesting that was completed under a number of sales across the Forest in the 1990's, treating intervening stands will help consolidate these treatment areas into larger, more homogenous, like-aged stands of vegetation that are better able to mature into and/or function as beneficial habitat for dependent wildlife. The end result of treating these adjacent stands will be the consolidation and/or creation of sizeable blocks of vegetation, with trees ranging in age from between 1 to 30 years old. Over time as these stands mature, the younger trees will eventually catch up in size and height of the trees thirty to forty years older, creating an indiscernible, larger block of mature forest.

Forest Health and Resiliency/Mountain Pine Beetle

Along with addressing the need for maintaining the characteristic landscape, treatments of these intervening and/or adjacent stands have been designed to help in improving area stand health/resiliency. Treatment of these stands will not only reduce the spread of mistletoe from older infested lodgepole to adjacent healthy lodgepole regeneration, but will also reduce the spread of mountain pine beetle within lodgepole pine, and the spread of western balsam bark beetles within subalpine fir in the area. Since 1997, aerial surveys of the area conducted by the Forest Service have detected a marked increase in mountain pine beetle activity and subsequent mortality within stands dominated by lodgepole pine. The 2002 aerial survey of the area again verified much of the current beetle activity and spread is within forested areas that have been classified as being unsuitable for timber production, along the southern end of Bear Mountain Inventoried Roadless Area.

The tactics in our "toolbox" for mitigating beetle impacts can be categorized as follows: suppression, protection, and prevention. *Suppression* is direct action against beetle populations, killing or removing them. Effectiveness depends on the timely application of suppression actions, involving as much of the local beetle population as possible. The smaller a growing population is, the more easily and successfully it can be abated by suppression actions. In addition to early detection and control over the entire infested area, suppression is most successful if treatment is thorough, if control work is continued as long as necessary, and if follow-up surveillance is performed.

Protection of trees in an area involves the use of chemicals and/or insecticides that attract or repel beetles. This form of treatment is typically used to protect individual trees in a developed campground or around a structure. There is a high level of concern about the effects on the environment from the use of insecticides when spraying individual trees, especially on non-target organisms such as natural enemies, and about public safety.

Prevention involves modifying the habitat so that it is no longer susceptible to or favored by these tree-killing bark beetles. Prevention is the only tool that addresses the cause of the problem, which is a susceptible forest condition, rather than assailing the symptom of the problem, which is too many beetles in one place at one time. In some cases, prevention involves a regeneration harvest of susceptible stands. This is particularly effective and appropriate against mountain pine beetle in even-aged lodgepole pine stands. In other cases, thinning or partial cutting can be done that will moderate or eliminate bark beetle activity until conditions revert to those prior to the action. In lodgepole pine with beetles, we have considerable experience and knowledge showing the efficacy of thinning or partial cutting at reducing or eliminating mountain pine beetle-caused mortality (Amman et al. 1977).

The Holroyd Timber Sale (currently being implemented) is designed to help reduce beetle spread in mortality along the NFSR 498 corridor, further south of the Bear Mountain Inventoried Roadless Area. The Proposed Action proposes to conduct both suppressive and preventative treatments in lodgepole pine stands that have a moderate to high risk to beetle attack in the project area. Under this proposal, harvest treatments (clearcut, overstory removal, and sanitation/salvage) would be designed to salvage dead and infested trees, to suppress and reduce the spread of mountain pine beetle from currently infested lodgepole into adjacent un-infested lodgepole pine (Amman et al. 1977). Area lodgepole stands that are currently uninfested, that are moderately to highly susceptible to beetle spread, would be treated with preventive thins (shelterwood and commercial thinning) to reduce their future susceptibility to beetles (Amman 1988).

The 2,183 acres of proposed harvest treatments—excluding some of the area identified for fire salvage, are situated within stands that both have lodgepole pine with low to high infestations of mistletoe, and as shown by the 1997-2002 aerial surveys--an alarming increase in bark beetle activity. By removing lodgepole pine that has both dwarf mistletoe, and in a number of cases--pine beetles, the treatments will reduce both the potential spread of mistletoe and beetles into the remaining lodgepole pine. Similarly, by removing larger subalpine fir that has beetles and/or is highly susceptible to attack will also reduce beetle spread and mortality of remaining fir. The additional growing space and less competition for sunlight, nutrients, and water provided to the remaining lodgepole pine and fir through the removal of diseased and overtopped lodgepole and fir would over time allow the retained trees to become healthier or more resilient, which results in trees that are more likely to be resistant to future insect and disease attacks.

The direct effect of this alternative on these stands is that both beetle populations and the hazard risk will be reduced in the short term. Suppression treatment will reduce beetle spread and restrict beetle populations to localized areas. The suppression treatments would have a positive effect to near- or long-term objectives in these areas. Stands treated with the clearcut and overstory removal prescription will be effectively “beetle proofed” in both the short and near term. The subsequent lodgepole regeneration in these stands will have a low susceptibility to beetle for the next 60 to 80 years. The clearcut and overstory removal treatments will promote aspen regeneration in stands that currently have an aspen component. The maintenance and promotion of non-pine and/or non-host tree species such as aspen under these and the other treatments under the proposal will provide more future options to area management in the event of another beetle outbreak (Amman *et. al.* 1977). The Project Silviculturist has found clearcut and overstory removal prescriptions to meet the requirements of NFMA (36 CFR Part 219.27).

Stands treated with partial harvest suppression treatments such as overstory removal/seed cut and sanitation/salvage will continue to be dominated by mature forest cover of live lodgepole pine, with stocking reduced by about one-third. Indirect effects include the potential for windfall following the thinning. These areas are not particularly hazardous for windfall, but a small amount of blow-down should be expected. Since these stands are relatively even-aged and trees are closely spaced, the thinning in these stands, even with careful logging, will result in some damage to some retained trees. Dwarf mistletoe is generally light in these stands (some individual, older stands have moderate to high levels of mistletoe). The thinning will have the indirect effect of producing conditions that are ideal for the spread of mistletoe through remaining timber, if it is present in appreciable amounts. Mistletoe affects stands very slowly, and given that the thinning is meant only to preserve stands for future treatments, it is unlikely that severe mistletoe infections will have the time necessary to cause serious growth losses. This would allow the stands to be held in a healthy condition and with more management options, until well after the beetle epidemics subsided.

Preventive actions in the form of shelterwood and commercial thinning on an estimated 1,157 acres are proposed in areas currently uninfested with beetles. A number of studies conducted on National Forests across the Rocky Mountain West have found that thinning lodgepole pine can greatly minimize mountain pine beetle mortality (Amman 1988). In the short term, thinning, such as the proposed shelterwood preparatory cut, will change the treated stands’ micro site conditions, increasing sunlight intensity, wind movement, and air temperature. This subtle change in the micro site conditions by opening the stand up appears to be disruptive to beetle spread and infestation. In the long term, reduced tree competition and increased tree vigor from the preventive thin allows the retained trees to produce more sap or resin, thus they are better able to ward off future beetle attacks.

As with some of the suppression treatments, the preventive thinning subjects the treated stands to a certain amount of risk for wind-throw. These areas are not particularly high hazard areas (Alexander 1986) for wind-throw, but it should be recognized that there is potential for further stand damage, or even loss, should high winds hit these stands in the first few years. The thinning will also have the indirect effect of producing conditions that are ideal for the spread of mistletoe through remaining timber, if it is present in appreciable amounts. Mistletoe affects stands very slowly, and given that the thinning is meant only to preserve stands for future treatments, it is unlikely that severe mistletoe infections will have the time necessary to cause serious growth losses. This would allow the stands to be held in a healthy condition and with more management options, until well after the beetle epidemics subsided. The end result of the proposed treatments would be the reduction of lodgepole pine with dwarf mistletoe within approximately 6% of the forested acreage, or 7% of the stands currently dominated by lodgepole in the analysis area. Furthermore, the treatments would also effectively reduce the potential spread of pine bark beetles into and from within approximately 6% of the forested acreage, or 7% of moderate and high hazard lodgepole pine stands in the Blackhall-McAnulty area.

Prescribed Fire

Under this proposal, predominantly non-forested areas dominated by sagebrush and bitterbrush in the vicinity of Cunningham and Holroyd Parks would be broadcast burned during the spring to create a mosaic of shrub, forbs, and grass age classes, to improve forage for big game and livestock, and to encourage new aspen and ponderosa pine regeneration in areas where present. It is anticipated that only a minimal amount of fire line would be required, using area two-track roads and forested areas, with snow serving as the primary firebreaks for the burn. A small portion of this proposal falls within the Bear Mountain Inventoried Roadless Area. The objective of the spring burn is to create (maximum) 50% mix mosaic between unburned and burned areas. Areas with cheatgrass and/or areas that were already burned in the recent past within the identified burn polygons will be reconned, mapped, and incorporated into the final burn proposal.

This proposal would do the most in addressing the purpose and need of maintaining and improving vegetative diversity in the analysis area, by creating a variety of shrub age classes for dependent wildlife. Depending on snow and moisture conditions when the burn is implemented during the spring, portions of the burn will under burn existing aspen and relic ponderosa, potentially creating conditions for new aspen and ponderosa regeneration.

Reduce Hazardous Fuels Adjacent to Private Land

Under this proposal, forested areas on the National Forest directly adjacent to private land and structures in the vicinity of Jerry Park and along the Forest boundary in the Skyline Ridge area would be treated through a combination of commercial and service contracts to reduce hazardous fuels. The proposed boundary treatment is designed to specifically address the project's purpose and need--including reducing the risk of catastrophic fire affecting the wildland-urban interface area surrounding the private land. Best described as a boundary treatment, under this treatment, diseased, dead standing (20-30% of overstory), down dead trees, ladder fuels, and slash within 100 to 200' of the National Forest boundary with private land where there are existing structures would be cleared to create a fuelbreak that would increase the controllability of a potential wildfire burning from Forest onto private land and/or from private land onto the Forest. The end result of this treatment will be an area forested with scattered live trees with little or no slash or dead trees present. Plans are to require whole tree skidding in all proposed fuels treatment units. Cut trees in these boundary areas will be yarded to landings where the unmerchantable slash will be piled. Piles generated by whole tree skidding and/or unit piling would subsequently be burned during fall and winter months after there is adequate snowfall. Some selected piles will be left unburned to provide for possible small mammal and/or amphibian habitat. In the case of the Skyline Ridge proposal, due to the current access, all or most access for treatments on the National Forest would require the adjacent private landowners permission and the granting of temporary access to the Forest Service and/or contractors across the private land to areas identified for treatment. Without this permission and access, it is doubtful this portion of the project would ever take place.

Precommercial Thinning

There are many second-growth stands of predominantly lodgepole pine and aspen (seedling/sapling in size) within regenerated clearcuts that are experiencing a slowing of growth due to overcrowding. If left unaltered, this overstocked condition would result in stands with reduced vigor, increased mortality, and greater susceptibility to insects. The stands would be hand-thinned with chainsaws to promote a healthier, faster growing, beetle and disease-resistant future stand. All proposed thinning units are outside of areas mapped as Lynx Analysis Unit (LAU). It is anticipated that this thinning project would be accomplished through a series of service contracts.

Under this proposal, stands that currently average between 1,000 to 2,000 trees per acre will be thinned down to stands ranging from 400 to 600 trees per acre. As with the timber sale treatments, the additional growing space and less competition for sunlight, nutrients, and water provided through the thinning to the remaining lodgepole pine, fir, spruce, and aspen--through the removal of diseased and overtopped lodgepole and fir, would over time effectively allow the retained trees to become healthier or more resilient, which results in trees that are more likely to be resistant to future insect and disease attacks.

Travel Management

Another project considered under this analysis is the implementation of Phase 2 of the *Forest-Wide Travel Management Environmental Assessment* (October 16, 2000) within the project area. Phase 2 analysis includes determinations on whether or not unplanned and unmanaged user-created roads and trails will be added to the Forest Transportation System, whether or not additional motorized opportunities should be developed, or if existing Forest Transportation System routes should be opened or closed. A preliminary roads analysis of the area has found that there are a number of roads within the project area that have been identified as requiring maintenance or closure, to reduce soil erosion and sediment entering area creeks. High open road densities in the eastern portion of the area could potentially be degrading wildlife security areas and habitat effectiveness in big game winter range areas.

A review of the roads identified for decommissioning found that this proposal will have little effect to the current access for vegetation management in the vicinity. The majority of the road segments identified for closure are within inventoried roadless, management areas in which timber management is not an emphasis (i.e., big game winter range), and/or provide duplicate road access. Lower overall road densities from the proposed road decommissioning will lessen the current cumulative effects to wildlife, soil, and water resource areas, possibly making future timber sale and vegetation management proposals in the area more feasible and less constrained.

Big Creek Trail

The current western terminus of this non-motorized trail would be moved to a better location, where a trailhead with adequate vehicle parking and signing would be established. The project will consider placement of additional signing along the trail, and the possibility of establishing another trailhead at the eastern terminus of the trail. Situated primarily in Inventoried Roadless and/or areas currently inaccessible to vegetation management, this proposal will have no effect to the vegetation and timber resource.

Watershed Restoration

A number of watershed restoration projects have been identified for possible implementation within the analysis area to address soil, water, native flora, and fauna concerns. These proposals will have no effect to the timber resource. The implementation of the watershed restoration proposal will lessen the current cumulative effects to wildlife, soil, and water resource areas, possibly making future timber sale and vegetation management proposals in the area more feasible and less constrained.

Alternative 2

This alternative differs from the Proposed Action, in that it reduces the amount of road proposed to be decommissioned by an estimated 9.3 miles in the eastern part of the area. As discussed under the Proposed Action, this proposal will have little effect to the current access for vegetation management in the vicinity. The majority of the road segments identified for closure are within Inventoried Roadless, management areas in which timber management is not an emphasis (i.e., big game winter range), and/or provide duplicate road access. Lower overall road densities from the proposed road decommissioning will lessen the current cumulative effects to wildlife, soil, and water resource areas, possibly making future timber sale and vegetation management proposals in the area more feasible and less constrained.

Containing all the remaining treatments and project proposals as the Proposed Action, it is anticipated this alternative would have the same effects as disclosed under the Proposed Action. See the Proposed Action for a discussion of the effects of the proposal on the vegetation and timber resource in the area.

Alternative 3

In addressing the significant issues of clearcutting and cumulative impacts of past management, this alternative differs from the Proposed Action and Alternative 2, in that it drops all proposed clearcutting, fire salvage, pre-commercial thinning, and further reduces the amount of timber harvest and road construction proposed for the northern portion of area. Dropping treatments within the northern portion of the area will lessen the likelihood of reducing mistletoe and beetle spread and associated mortality in the Beaver Creek and Camp Creek watersheds. Beetles in the area have the potential to spread into lodgepole stands on the north end of the analysis area that are on National Forest, BLM, and private lands.

Alternative 4

Designed to address the significant issues of cumulative effects and watershed restoration, Alternative 4 only includes the entire prescribed burning proposal, travel management - road decommissioning, and watershed restoration proposals included under the Proposed Action. A description of the implications of implementing these projects can be found under the Proposed Action. In addressing the significant issues, this alternative differs from the Proposed Action, Alternative 2, and Alternative 3, in that it drops all proposed timber harvest, fire salvage, precommercial thinning, and road construction and reconstruction proposed for the Blackhall-McAnulty area. See Alternative 1 – No Action for a description of the implications of not implementing these projects.

CUMULATIVE EFFECTS

Alternative 1 – No Action

There is no threat of ecological collapse or loss of ecological function from dwarf mistletoe, beetle outbreaks, and/or subsequent wildfires. Beetle populations naturally experience boom and bust cycles, and forests have proven resilient, if not dependent on these cycles (Alexander 1981). Disturbances become problematic when they threaten the uses we manage the forests for. Assessing and deciding between options where there is disagreement about the values at risk is a challenge. Some disturbances cannot be controlled, others can be "managed," while still others can be manipulated very successfully to achieve objectives. Where we can influence or control expected disturbances, and where we choose to do so for specific reasons, in most situations, is heavily dependent on what past management actions have occurred before the disturbance event occurs. These epidemics will continue, to a degree that will be determined, in part, by future silvicultural and fire management practices (Schmid and Mata 1996).

Past timber management practices that have occurred on adjacent ownerships and on the Forest predominantly within the 7E timber emphasis Management Area have had a positive influence on the current situation. Areas that have been regenerated (clearcut, overstory removal, etc.) or that have received partial harvest treatments (thinning, sanitation/salvage, etc.) are less susceptible to bark beetle attack and aggregation. These past silvicultural treatments reduced the stand age, basal area, trees per acre, and arrangement of host trees, all of which reduce the attractiveness to beetles. Although many of the past treatments were not specifically designed to reduce bark beetle habitat, they accomplished that effect to some degree. Past timber management since 1950 in the form of clearcutting or overstory removal has effectively reduced stand beetle susceptibility on National Forest lands in the Blackhall-McAnulty area by roughly 5,539 acres. An additional 3,032 acres that have received past partial harvest also have a reduced risk to beetle spread and mortality.

Healthy stands provide several management options into the future, but dead stands offer fewer options. Virtually all of the suitable timber sites in 7E Management Areas are important for their near or long-term contribution to the goals for production of commercially valuable wood products. Susceptible stands are, almost by definition, the more productive, higher value, and higher volume stands. If all moderate and high hazard lodgepole pine stands in the Blackhall-McAnulty Analysis Area are attacked as assumed, then about approximately 20,000 acres will no longer meet quality and quantity objectives set out in the Forest Plan in the near term. Furthermore, under a worst-case scenario, the epidemic has the potential to cause widespread mortality across an estimated 200,000 acres of contiguous pine forest on federal, state, and private land in the Sierra Madre Range and Park Range further to the south.

Forest Plan Consistency

Alternative 1 is not consistent with standards and guidelines for the timber resource under the Medicine Bow Forest Plan (1985). The No Action alternative may result in deviation from these important guidelines from the Forest Plan 7E and other management areas:

- The Medicine Bow Forest Plan (III-4) states as a goal: Provide for timber harvest to support local dependent industries and management of the many Forest resources in a manner that meets silvicultural needs of timber species, places timber stands under management, minimizes timber management costs, and supplies wood products to meet National needs.
- Also stated as goal within this section (Medicine Bow III-4): Treat vegetation to provide a Forest environment for the uses compatible with the Management Area Objectives.
- Forest Plan general direction (p. III-34 #1): Use both commercial and non-commercial silvicultural practices to accomplish wildlife habitat objectives.
- Medicine Bow Forest Plan direction (p. III-84): Protect life, property, and resource values from wildfire.
- Medicine Bow Forest Plan direction (p. III-84): Prevent or suppress epidemic insect and disease populations that threaten forested tree stands with an integrated pest management approach consistent with resource management objectives.
- Management Emphasis is on wood fiber production and utilization for Management Area 7E, Medicine Bow Forest Plan (p. III-189).

Suppression treatments aimed at meeting this objective are not accomplished, thereby increasing the opportunity for beetle populations to increase. The production of sawtimber is not emphasized in this alternative. Dead stands do not accumulate additional volume or value over time. Dead stands are less valuable than live stands. The forest in these areas is not managed to produce sawtimber in an economically efficient manner. Forest management post-epidemic will probably concentrate on restoration activities such as salvage and reforestation, rather than on the production of “regular program” timber sales. The forest is not managed using treatments that maintain acceptable growth rates, nor do they favor commercially valuable tree species. Area lodgepole pine stands will show a rapid deceleration in the rate of volume accumulation post-epidemic. Dead lodgepole pine is less valuable than green timber. The merchantable sized live trees in the affected stands and in the assessment area will be subalpine fir and aspen. These two species are the least valuable of commercial species in the area.

Proposed Action

Past timber management practices that have occurred on adjacent ownerships and on the Forest have had a positive influence on the current situation. Areas that have been regenerated (clearcut, overstory removal, etc.) or that have received partial harvest treatments (thinning, sanitation/salvage, etc.) are less susceptible to bark beetle attack and aggregation. Those practices reduce the presence of dwarf mistletoe, stand age, basal area, trees per acre, and arrangement of host trees, all of which reduce the attractiveness to beetles. Although many of the past treatments were not specifically designed to reduce bark beetle habitat, they accomplished that effect to some degree. Past timber management since 1950 in the form of clearcutting or overstory removal has effectively reduced stand beetle susceptibility on National Forest lands in the Blackhall-McAnulty area by roughly 5,539 acres. An additional 3,032 acres that have received past partial harvest also have a reduced risk to beetle spread and mortality. Without this past treatment, it is doubtful whether the Proposed Action could ever approach being effective in reducing beetle spread and associated mortality.

The relative high amount of past silvicultural treatments that have occurred in the Blackhall-McAnulty area provide a ready foundation for the 2,299 acres of suppression and preventative treatments included under the Proposed Action. Of this amount, an estimated 1,026 acres of moderate and high hazard lodgepole stands would receive suppression treatments, or about 3% of what is forested, while an additional 1,273 acres of preventative treatments would occur in the area, or about 4% of what is forested within the area.

Healthy stands provide several management options into the future, but dead stands offer fewer options. Virtually all of the suitable timber sites in the 7E Management Area are important for their near or long-term contribution to the goals for production of commercially valuable wood products and timber sustainability. Susceptible stands are, almost by definition, the more productive, higher value, and higher volume stands. Approximately 10% of what is classified as suitable for timber production in the area would be treated under the proposal. The 1,000 acres of precommercial thinning will further reduce the future beetle risk of regenerated clearcut and overstory removal stands treated since 1950. Past timber harvest since 1950, in combination with the Proposed Action treatments, would cumulatively reduce mistletoe and beetle spread, along with the beetle hazard risk, on an estimated 49% of the total suitable timber base in the analysis area.

The combination of treatments under the Proposed Action, along with past harvest, would reduce beetle spread and mortality across an estimated 22,000 acres of lodgepole pine within the analysis area that currently rate as having a moderate to high risk to beetle attack. The cumulative effect of past and proposed harvest treatments in the Blackhall-McAnulty area will greatly lessen the possibility of the current mountain pine beetle epidemic spreading and/or coalescing with other epicenters beyond the analysis area boundary. The largest action alternative, the Proposed Action would do the most to reduce the possibility of widespread mortality across an estimated 200,000 acres of contiguous lodgepole pine forest on federal, state, and private land in the Sierra Madre Range and Park Range in Colorado to the south.

Lower overall road densities from the proposed road decommissioning and the proposed watershed restoration projects will lessen the current cumulative effects to wildlife, soil, and water resource areas, possibly making future timber sale and vegetation management proposals in the area more feasible and less constrained.

Forest Plan Consistency

The Proposed Action is consistent with standards and guidelines for vegetation and the timber resource under the Medicine Bow Forest Plan (1985).

Alternative 2

See the Proposed Action for a discussion of the cumulative effects of Alternative 2 on the vegetation and timber resource in the area.

Forest Plan Consistency

Alternative 2 is consistent with standards and guidelines for the timber resource under the Medicine Bow Forest Plan (1985).

Alternative 3

Healthy stands provide several management options into the future, but dead stands offer fewer options. Virtually all of the suitable timber sites in the 7E timber Management Areas are important for their near or long-term contribution to the goals for production of commercially valuable wood products and timber sustainability. Susceptible stands are, almost by definition, the more productive, higher value, and higher volume stands. Approximately 3% of what is classified as suitable for timber production in the area would be treated under the proposal. Past timber harvest since 1950, in combination with the Proposed Action treatments, would cumulatively reduce beetle spread and hazard risk on an estimated 42% of the total suitable timber base in the analysis area.

With approximately 66% less treatment acres than the Proposed Action, it would be anticipated that this alternative would be less effective in reducing beetle spread and mortality across an estimated 22,000 acres of lodgepole pine within the analysis area that currently rates as having a moderate to high risk to beetle attack. Similar to the Proposed Action, treatments under Alternative 3, in combination with past harvest treatments across the Blackhall-McAnulty area, will lessen the possibility of the current mountain pine beetle epidemic spreading and/or coalescing with other epicenters beyond the analysis area boundary. The third largest action alternative, Alternative 3 would be less effective than the Proposed Action and Alternative 2 in reducing the possibility of widespread mortality across an estimated 200,000 acres of contiguous lodgepole pine forest on federal, state, and private land in the Sierra Madre Range and Park Range to the south in Colorado.

Forest Plan Consistency

Alternative 3 is consistent with standards and guidelines for the timber resource under the Medicine Bow Forest Plan (1997) in the southern portion of the area where treatments are proposed. Alternative 3 is not consistent with standards and guidelines for the timber resource under the Medicine Bow Forest Plan (1985) in the northern part, where all treatments have been dropped. Alternative 3 may result in deviation from these important guidelines from the Forest Plan 7E and other management areas in this specific area including:

- The Medicine Bow Forest Plan (III-4) states as a goal: Provide for timber harvest to support local dependent industries and management of the many Forest resources in a manner that meets silvicultural needs of timber species, places timber stands under management, minimizes timber management costs, and supplies wood products to meet National needs.
- Also stated as goal within this section (Medicine Bow III-4): Treat vegetation to provide a Forest environment for the uses compatible with the Management Area Objectives.
- Management Emphasis is on wood fiber production and utilization for Management Area 7E, Medicine Bow Forest Plan (p. III-189).
- Medicine Bow Forest Plan direction (p. III-84) is to prevent or suppress epidemic insect and disease populations that threaten forested tree stands with an integrated pest management approach consistent with resource management objective.

Alternative 4

A description of the implications of implementing the projects under this alternative can be found under the Proposed Action. See Alternative 1 – No Action for a description of the implications of not implementing these projects.

Fuels

AFFECTED ENVIRONMENT

Fire Regimes

Studies conducted in the southern portion of the Sierra Madre by the University of Wyoming found a fire interval of less than 200 to 400 years. In other words, on average, it would take approximately 200 to 400 years for a series of stand-replacing fires to burn this portion of the area. Data collected during the studies would tend to indicate that large stand-replacing fires (1,000+ acres) burned portions of the range every 100 years or so. Lower elevations that tend to be drier tend to have shorter fire interval, while wetter higher elevations have a longer interval. The current direction from the Medicine Bow National Forest Land Management Plan and the Forest Fire Management Plan requires that all wildfires within the analysis area (AA) be suppressed.

Historic fire regimes within the AA vary, depending upon the vegetation type. A fire regime is a generalized description of the role fire plays in an ecosystem. Systems for describing fire regimes may be based on the characteristics of the disturbance, the dominant or potential vegetation of the ecosystem in which ecological effects are being summarized, or fire severity, based on the effects of the fire on dominant vegetation (Agee 1993).

In its simplest form, a fire regime can be described by frequency, and intensity or severity. Fire frequency is determined by ignition sources and burning conditions (primarily fuel moisture and wind). Although related, intensity is more an indicator of resistance to control, and severity is a measure of ecological impact (i.e., to organisms, tree mortality, etc.). However, the term “intensity” is commonly used synonymously with severity in describing a fire regime. For example, a ponderosa pine stand which “historically” may have burned at relatively frequent intervals (i.e., less than 35 years) with relatively low surface fire intensity would be characterized as having a high frequency – low severity fire regime.

Many methods are available for quantifying and describing fire regimes. The method used here is the same as used in the National Fire Plan (USFS 2000). Five combinations of fire frequency, expressed as fire return interval and fire severity, are defined in the table below. Groups I and II include fire return intervals in the 0-35 year range. Group I would include (on the Medicine Bow NF) ponderosa pine and dry-site Douglas-fir. Group II includes the dryer grassland types and shrubland communities. Groups III and IV include fire return intervals in the 35-100 plus year range. Specifically, within the AA, fire regime group III would include species such as aspen, limber pine, and younger and more open-grown stands of lodgepole pine. Fire regime group IV would include older dense stands of lodgepole pine. Group V is the long-interval (infrequent), stand replacement fire regime which is composed of Engelmann spruce and subalpine fir.

Table 29. Fire Regime Groups, Frequencies and Severity

Fire Regime Group	Frequency (Fire Return Interval)	Severity
I	0-35 years	Low severity
II	0-35 years	Stand replacement severity
III	35-100+ years	Mixed severity
IV	35-100+ years	Stand replacement severity
V	>200 years	Stand replacement severity

Fuel Models within the Analysis Area

The criteria for choosing a fuel model includes the fact that the fire will burn in the fuel stratum best conditioned to support the fire. This means situations may occur where one fuel model represents rate of spread most accurately, and another may best depict fire intensity. The appropriate selection of a fuel model from the 13 available can be considered something of an “art,” where integration of knowledge, experience, and an understanding of the underlying building blocks (i.e., Rothermel’s fire spread equation) of the model(s) is necessary. As actual projects are proposed within the AA, the fuel model assigned by the AML (Arc Macro Language) in GIS may be modified or changed, if it is felt another model would better reflect actual fire behavior.

Table 30 summarizes the acres in the AA associated with each of the fuel models.

Table 30. Acres in AA by Fuel Model

Fuel Model	Typical Fuel Complex	Acres
1	Short grass	3,079
2	Timber (understory/sagebrush)	8,493
5	Brush (shrub/willow/sedge)	1,390
8	Closed timber litter	29,939
10	Timber (litter and understory)	1,838
11	Light logging slash	502
(wet meadow, rock, water, no data)		2,509

Fire Weather

The collection and processing of weather data is critical for the purpose of describing potential fire behavior in the AA. Historical weather data was collected from the Sawmill Park (482105) Remote Automated Weather Station (RAWS), which contained records from 1988 through 2001 (13 years). This station is located 55 air miles east of the AA. The Sawmill Park RAWS is the closest one to the AA and should give an adequate representation of the historic weather conditions in the AA, as it is located at a similar elevation and in a similar vegetation type.

Fire Behavior

Surface fire behavior was modeled in the AA using Behave Plus Fire Modeling System, Release 1.0.0. A modeling run was completed using the weather attributes for each fuel model within the AA.

Table 31 summarizes the fire behavior output from Behave (see Appendix of Fuels Specialist Report for Behave output).

Table 31. Fire Behavior in Drought Conditions

FBPS Model	1	2	5	8	10	11
NFDRS Model	L	C	F	H	G	K
Rate of Spread (ch/h)	156	85	41	3	10	10
Heat per Unit Area (Btu/ft ²)	96	523	715	209	1383	805
Fireline Intensity (Btu/ft/s)	274	811	537	9	247	149
Flame Length (ft)	5.9	10	8	1	6	5.4

It is important to note that the Behave fire behavior program only models surface fire behavior and does not include surface to crown fire initiation, nor does it predict or model active, passive, or independent crown fire. This is not a noticeable problem in the grass, shrub, or slash fuel models (assuming no timber component); however, it does pose a problem when describing potential fire behavior in the timbered stands.

Flame length is a reasonable measure of the fire's intensity and subsequent resistance to control. Various flame lengths and their Hazard Rating are quantified in Table 32, below:

Table 32. Flame Length Hazard Rating

Hazard Rating	Flame Length (feet)	Fire Suppression Interpretation
Low	Less than 4	Fires can generally be attacked at the head or flanks by persons using hand tools. Handline should hold the fire.
Moderate	5 to 8	Fires are too intense for direct attack on the head by hand crews. Handline cannot be relied on to hold fire. Equipment such as dozers, engines, and aircraft retardant can be effective. Fires are potentially dangerous to personnel and equipment.
High	9 to 10	Fires may present serious control problems, i.e., torching, crowning, and spotting. Control efforts at the head will probably be ineffective.
Extreme	Greater than 11	Crowning, spotting, and major fire runs are probable. Control efforts at the head of the fire are ineffective.

Whether a fire has the ability to transition into the canopy of a timbered stand is critical in assessing the effectiveness of suppression efforts. For example, if fire spread is limited to the surface with flame lengths less than four feet, suppression efforts by hand crews are usually effective. If flame lengths are less than eight feet, suppression efforts are possible using mechanical equipment such as dozers or engines. However, once flame lengths exceed eight feet, as is the case in some shrublands or when crowning occurs, suppression efforts are limited to the flanks of the fire, as crews, mechanical equipment, and aerial retardant is not effective at the head of the fire. This latter fire behavior becomes even more erratic as one considers the increase in spotting, which is especially noticeable as the conifer overstory becomes involved.

The transition of surface fire into the crown/canopy can be characterized as passive, active, or independent crown fire. The fire may transition rapidly from passive to active to independent, or may remain in the passive or active stages without ever reaching the independent stage. Once a surface fire transitions into the crown or canopy, flame lengths are in excess of eight feet. The different stages of crown fire are described below:

- Passive – characterized by single or group tree “torching.” This stage of a crown fire is small in scale (involving one or several trees) and can reinforce or accelerate surface spread, but the main fire spread is dependent upon the surface spread rate.

- Active – characterized by a “pulsing” fire that advances as a wall of flame extending from the surface fuels to well above the involved crown fuel layer. Fire carries in the crown and spread rate is greater than spread rate on the ground. However, these “runs” are relatively short-lived and are dependent upon surface fire to support fire in the crown. When the surface fire catches up to where the pulse weakened, the process reinitiates.
- Independent – characterized by fire “running” through the crown without the support of surface fire intensities. These runs can greatly influence fire spread over short periods of time, but are often short-lived.

Fire Occurrence and Risk in the AA

Fire risk is the simple measure of fire starts on a per 1,000 acre basis over a ten year period (per decade). The fire risk value corresponds to a likelihood of fire starts per 1,000 acres per decade. The following are risk ratings and range of values used to categorize risk.

Low Risk: 0 to 0.49 – projects a fire every 20 or more years per thousand acres.

Moderate Risk: 0.5 to 0.99 – projects one fire every 11 to 20 years per thousand acres.

High Risk: ≥ 1.0 – projects at least one fire every 0 to 10 years per thousand acres.

An analysis of fire records was completed for the entire Sierra Madre Range. Wildland fire ignitions were homogeneous throughout the entire range. Since fire risk (i.e., the number of wildland fire ignitions) is usually expressed as the number of ignitions per 10,000 acres per decade, that analysis will give a good indication of fire occurrence in and adjacent to the AA.

The database used for the analysis includes only fires that had an Individual Fire Report (FS-5100-29) completed and submitted, and includes the years from 1970 to 1999. A total of 92 fires occurred in the Sierra Madre Range during this time period, 50 percent were human-caused. Analysis shows that the number of starts per 10,000 acres per decade is approximately 0.1 (low), where one would expect, at most, a fire every 20 or more years per thousand acres. As an additional note: During the summer of 2002 a lightning-caused fire (Bear Mountain South) burned approximately 500 acres in the northeastern portion of the area.

Local Fire Responsibilities and Response Times

Initial attack (IA) response to wildfire starts (ignitions) within the analysis area (AA) is handled through an interagency dispatch center located in Rawlins, Wyoming. The center is run jointly by the Bureau of Land Management and the Forest Service, and it serves a variety of agencies, including the Brush Creek/Hayden and Laramie Districts of the Medicine Bow–Routt National Forest.

There is currently an eight-hour Initial Attack reciprocal agreement in place between Carbon County (local cooperators) and the Forest Service. Under typical circumstances (i.e., all stations are manned and no severity resources are on stand-by), the closest Forest Service ground resources to respond to a wildfire start in the AA would be from the Brush Creek/Hayden Ranger District in Encampment, WY, and include one Type-6 engine. Response times from Encampment are approximately one hour. Other Forest Service resources available include Type-6 engines from Laramie, WY, or Walden, CO. Local county cooperators are also available for IA response to the AA.

During a normal fire season, air-attack resources in the form of aerial retardant aircraft or smoke jumpers are not pre-positioned in the vicinity of the AA and are usually only requested for IA on fires with large fire potential growth, where improvements may be threatened, or in areas of difficult access. The closest air bases that could supply an aircraft for retardant application would be from either Grand Junction, CO, Lakewood, CO (Jeffco), and during high severity, from Greybull, WY. The closest smoke jumper base is in Grand Junction, CO. A helicopter module is available for IA in the area. It is BLM-operated and is stationed in Rawlins, WY.

ENVIRONMENTAL CONSEQUENCES

Given the large acreage of the proposed treatment units and their proximity to private ownerships, the analysis pertaining to surface to crown transition and canopy fire behavior was limited to site-specific modeling in the area targeted for treatment where benefits of fuels reduction was the primary objective (i.e., the fuelbreak adjacent to private lands).

Fire behavior was modeled under a no-action and action alternatives, and for the boundary treatment and shrubland burning. The results of the Forest Vegetation Simulator-Fire Fuels Extension (2002) (FVS-FFE) modeling are listed in Table 33 and the results of the Behave Plus modeling for the shrublands are listed in Table 34.

Table 33. Boundary Treatment (Fuelbreak) Fire Behavior and Fuel Load

Year	No Action			Timber Harvest/Thinning/Whole Tree Skid		
	Flame Length	Fire Type	Surface Fuel Load	Flame Length	Fire Type	Surface Fuel Load
2003	2.8	Surface	40.8	2.8	Surface	40.8
2004	4.0	Surface	42.2	4.0	Surface	42.2
2005	4.2	Surface	43.0	4.2	Surface	42.4
2006	4.3	Surface	43.6	4.2	Surface	43.3
2007	4.3	Surface	44.0	4.2	Surface	26.6
2008	4.3	Surface	44.3	1.3	Surface	26.8
2009	4.4	Surface	44.5	1.3	Surface	27.1
2010	4.4	Surface	44.7	1.4	Surface	27.4
2011	4.4	Surface	45.0	1.5	Surface	27.7
2012	4.4	Surface	45.0	2.1	Surface	29.9

Table 34. Broadcast Burning (Shrublands)

No Action		Broadcast Burning	
Flame Length (feet)	Fireline Intensity (Btu/ft/s)	Flame Length (feet)	Rate of Spread (Btu/ft/s)
9.8	811	5.9	594

Alternative 1 – No Action

Under this alternative, there would be no treatment to the vegetation in the area. The conditions related to fuels would not be treated and the potential fire behavior would be what was modeled under the no-action alternative. The FVS-FFE modeling indicated that without treatment, flame lengths would become in excess of four feet in the areas identified for boundary treatment. The shrublands would also not be broadcast burned. The Behave Plus model indicated flame lengths in excess of 8 feet (9.8’) in the shrublands for the no-treatment alternative. Any effects from smoke resulting from the burning of piles would not occur. Refer to the fire behavior discussion under the Proposed Action and Table 33 and, where treatments are compared to the No Action alternative.

Proposed Action

The following information on effects is for all action alternatives and will be compared to the No Action alternative. Specific effects analysis for fire and fuels will be limited to the areas where: (1) the objective is to treat fuels (i.e., the fuelbreak adjacent to private lands), (2) where broadcast burning is planned for treating shrublands, and (3) to changes in the transportation system.

Direct Effects

Boundary Treatment: The 2002 Bear Mountain South fire alerted many landowners within and adjacent to the analysis area to the dangers wildfires present to private land and structures. Under this proposal, forested areas on the National Forest directly adjacent to private land and structures in the vicinity of Jerry Park and along the Forest boundary in the Skyline Ridge area would be treated through a combination of commercial and service contracts to reduce hazardous fuels. The treatment area is 116 acres in size. Best described as a boundary treatment, under this treatment, diseased, dead standing (20-30% of overstory), down dead trees, ladder fuels, and slash within 100 to 200’ of the National Forest boundary with private land where there are existing structures would be cleared to create a fuelbreak that would increase the controllability of a potential wildfire burning from Forest onto private land and/or from private land onto the Forest. The end result of this treatment will be an area forested with scattered live trees with little or no slash or dead trees present. Plans are to require whole tree skidding in all proposed fuels treatment units. Cut trees in these boundary areas will be yarded to landings where the unmerchantable slash will be piled. Piles generated by whole tree skidding and/or unit piling would subsequently be burned during fall and winter months after there is adequate snowfall.

Broadcast Burning: Under this proposal, predominantly non-forested areas dominated by sagebrush and bitterbrush in the vicinity of Cunningham and Holroyd Parks would be broadcast burned during the spring to create a mosaic of shrub, forbs, and grass age classes, to improve forage for big game and livestock, and to encourage new aspen and ponderosa pine regeneration in areas where present. The proposed burn units total 2,604 acres. It is anticipated that only a minimal amount of fire line would be required using area two-track roads and forested areas, with snow serving as the primary firebreaks for the burn. A small portion of this proposal falls within the Bear Mountain Inventoried Roadless Area.

<p>Boundary Treatment (fuelbreak)</p>	<p>By removing dead, damaged, disease-infected and insect-infested trees, and thinning the stand, treatments can have positive effects on the fuel profile. How slash is treated plays a major role in post-treatment fire behavior. The Proposed Action includes whole-tree skidding in the boundary treatment areas, where slash would be piled at landings and later burned.</p> <p>Table 33 displays the results of modeling the stand targeted for boundary treatment under a no-action and action alternative. Referring to the table, the treatments are planned for 2005 and their subsequent effect is displayed in the years 2006 and later. Under the No Action alternative, flame lengths are in excess of four feet. Under the action alternative, flame lengths are less than two feet following treatment, allowing for direct attack by hand crews.</p>
<p>Broadcast Burning (shrublands)</p>	<p>Although the primary objective of the broadcast burning is rangeland improvement, there will also be benefits to the fuels profile and subsequent fire behavior.</p> <p>Table 34 displays the results of modeling shrublands under both the action and no-action alternatives.</p> <p>Under the no-action alternative, flame lengths are in excess of eight feet (9.7'), which limits suppression operations at the head to aerial attack. Under the action alternative, flame lengths are under eight feet (5.9), allowing direct attack by mechanical equipment.</p>
<p>Road Construction</p>	<p>Under the Proposed Action, 5.7 miles of existing roads would be reconstructed, 2.9 miles of temporary road would be constructed, and 3.7 miles of temporary road would be reconstructed.</p> <p>The number of accessible roads is a “double-edged sword” in terms of travel management and fire suppression. While roaded access to an area increases the risk of human-caused ignition, the same roads provide access to fire fighting personnel and equipment, aiding in shorter response times and providing access during extended attack.</p>

	<p>Given the relatively low fire risk in the area (see fire risk analysis section) and the fact that no new permanent roads are being constructed, the additional short-term temporary road access would not contribute to a significant amount of additional ignitions. From 1970 to 1999 there were only 92 ignitions in the entire Sierra Madre Range, and only ½ of those were human-caused. Given this low fire risk, any increase in roads would be offset by improved motorized access to the area by fire fighting personnel.</p>
<p>Road Decommissioning</p>	<p>A preliminary roads analysis of the area has found that there are a number of roads within the project area that have been identified as requiring maintenance or closure to reduce soil erosion and sediment entering area creeks. High open road densities in the eastern portion of the area could potentially be degrading wildlife security areas and habitat effectiveness in big game winter range areas. Miles of roads proposed for decommissioning under the Proposed Action is 38.6.</p> <p>Of the roads proposed for decommissioning, six roads or segments are the primary access routes into remote areas. These roads are NFSR 418.3c, NFSR 498.1d, NFSR 4501, NFSR 4502, NFSR 498.1a and NFSR 4504. Decommissioning these roads would increase response times by ground-based firefighting resources, for both initial and extended attack. It is estimated that the closure of the roads, given a worst-case scenario, could increase response times by approximately one hour.</p>

Indirect Effects

<p>Burning</p>	<p>Proposed slash treatments for the boundary treatment include whole-tree, and piling and burning. The proposal also includes broadcast burning in shrublands. The smoke generated by pile burning is considered an indirect effect. The smoke emissions can be mitigated. Burning (as required by Forest Service policy) will only be completed on good to excellent smoke dispersal days and after a smoke permit is received from the Wyoming DEQ (Division of Environmental Quality).</p>
<p>Road Construction & Road Decommissioning</p>	<p>The existence of roads can have an effect on wildfire size and shape. The existence of a road has little effect at the head of a fire burning under extreme conditions or in the canopy of a conifer stand. However, the existence of roads can have an effect on the spread of fires where the primary carrier is shrubs or grass and where the fire remains primarily on the surface.</p>

Alternative 2

Direct effects will be similar to those described under the Proposed Action, with the exception that fewer roads would be decommissioned. Fire behavior would be the same as that discussed under the Proposed Action for the boundary treatment and broadcast burning. The effects due to road construction would also be the same as discussed under the Proposed Action. In reference to the reduced number of roads identified for decommissioning, fire response times in the AA would stay the same in areas accessed by NFSR 418.3c, NFSR 498.1d, NFSR 4501, NFSR 4502, and NFSR 498.1a, as these roads would not be closed/decommissioned. Response times by ground-based resources would increase in areas accessed by NFSR 4504 in the southeastern portion of the AA.

Alternative 3

Direct effects will be similar to those described under the Proposed Action, with the exception that no boundary treatments in the Skyline Ranch area would be completed. Benefits to the fuels profile and subsequent decreased fire behavior associated with the boundary treatments would not be recognized in the Skyline Ranch area, as discussed under the Proposed Action section. The effects from road construction and decommissioning would also be the same as discussed under the Proposed Action.

Alternative 4

Direct effects will be similar to those described under the Proposed Action, with the exception that no boundary treatments would be completed. Benefits to the fuels profile and subsequent decreased fire behavior associated with the boundary treatments would not be recognized, as discussed under the Proposed Action section. Direct effects related to the shrubland burning would be similar to those discussed under the Proposed Action. The effects from road construction and decommissioning would also be the same as discussed under the Proposed Action.

CUMULATIVE EFFECTS

Proposed Action

No other fuels treatments are planned for, or have recently taken place on Federal lands in the AA. Some limited broadcast burning has taken place in the shrublands. Additional burning is planned in shrublands (300 acres) and ponderosa pine understory (100 acres), which was identified during the Holroyd Timber Sale analysis. None of these previous or proposed treatments have a significant effect on fire behavior or fuel loading in the AA.

Alternative 2 and Alternative 3

The cumulative effects would be the same as those discussed under the Proposed Action.

Alternative 4

The cumulative effects for shrubland burning would be the same as those discussed under the Proposed Action.

Forest Plan Compliance

The actions proposed are consistent with Forest-wide standards and guidelines for fire and fuels as referenced in the Land and Resource Management Plan (LRMP).

Recreation

AFFECTED ENVIRONMENT

The analysis area has no developed picnic or campground recreation facilities within its perimeter. The area has one National Forest System Trail--Trail 471, locally known as the Big Creek Trail, has portions that are very historic to the Forest Service. This trail follows the main drainage of the analysis area. The lower end of the trail starts where the Big Creek Guard Station stood and serviced the early Blackhall Lookout and the upper Encampment River and Mount Zirkel Range area.

The analysis area does not have any designated Wyoming State Snowmobile Trails within the area. The campgrounds in the vicinity of the analysis area are Six Mile Gap Campground, approximately 6 air miles east, Lakeview Campground at Hog Park Reservoir, approximately 8 air miles to the west, and Big Creek Lake Campground in Colorado, approximately 5 air miles to the south.

There are no designated National Wilderness System lands within the immediate vicinity of the project area. The analysis area is east of the Encampment River Wilderness Area and west of the Platte River Wilderness Area. One piece of the Encampment River Wilderness addition almost borders the analysis area northwest boundary in Section 9, T.13N., R.83W., 6th P.M., Carbon County Wyoming. In this portion of the Forest there are not many roadless areas over 5,000 acres. A small portion of the 7,429-acre East Fork Encampment River Inventoried Roadless Area (R20613) is located along the central western boundary of the analysis area. The entire 9,426-acre Bear Mountain Inventory Roadless Area (R20614) is located in the east-central portion of the analysis area.

Recreation Opportunity Spectrum

Recreation Opportunity Spectrum (ROS) provides a framework for stratifying and defining classes of outdoor recreation environments, settings, setting consistencies, activities, and experience opportunities. The settings, activities, and opportunities for obtaining experiences have been arranged into six classes along a continuum or spectrum. The classes are as follows: Primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, Roaded Modified, Rural, and Urban. For example, people visiting the Primitive and Semi-Primitive Non-Motorized areas would expect to have a recreation experience in which they would not encounter or expect to encounter many people or any motorized vehicles. For a person visiting a Primitive and Semi-Primitive Non-Motorized area to encounter motorized equipment would detract from their recreation experience. In the last five areas: Semi-Primitive Motorized, Roaded Natural, Roaded Modified, Rural, and Urban, forest visitors would have a recreational experience where they would expect to see motorized travel and vehicles.

The ROS designations within the Blackhall-McAnulty Analysis Area are as follows: **Roaded Natural** (9%), **Roaded Modified** (39%), **Semi-Primitive Motorized** (33%), **Semi-Primitive Non-Motorized** (15%) and Other (4%, this is composed of State and Private land). **Roaded Modified**, **Roaded Natural**, and **Semi-Primitive Motorized** all allow vehicular/motorized travel. These motorized ROS designations make up 81% of the analysis area, allowing a high availability for motorized travel on open designated routes.

The Blackhall-McAnulty Analysis Area has a mix of ROS designations, allowing for a range of recreation opportunity. The RM and RN designated areas allow recreation opportunities that allow access for sedans, trailers, RVs, and motor homes in mainly the western and southern portion of the analysis area. The SPM designated areas allow recreation opportunities for ATV, ORV, four-wheel-drive, and high clearance vehicles in the north and eastern portion of the analysis area. The SPNM designated area allows for non-motorized recreation opportunities in the vicinity of Bear Mountain, located in the central portion of the analysis area.

Recreation Uses

The primary summer and fall recreation use in this area is dispersed recreation which includes but is not limited to the following activities: driving for pleasure along the existing open roads, especially during the fall color season, hunting, fishing, four-wheel-drive use, hiking, backpacking, picnicking, mountain biking, camping, personal use firewood cutting, and riding horses. Deer and elk antler hunting is an activity that is becoming more popular every year, especially in the Holroyd and Big Creek Parks, and along the edge of the Forest. Hunting is the most popular activity, mainly in the form of big game hunting for deer and elk, but also includes grouse and bear hunting. Local Carbon County hunters predominantly use this area for day hunting. There are dispersed summer and hunting camps throughout the analysis area; many of the dispersed hunting camps are along the main roads, such as NFSR 409, 404, 415, 407 and 498. The Holroyd Park area is a very popular summer destination for dispersed camping. The area receives fairly low traffic, has several nice dispersed spots, and is relatively close to several mountain streams.

In spite of the change in Travel Management on the Medicine Bow-Routt National Forest, barring travel off designated routes, the Forest Service and the public have noted and recorded illegal off-road use in the analysis area, especially in the Bear Mountain Roadless Area. This illegal use can often create soil erosion issues, vegetation damage, and wildlife security impacts. It also potentially impacts the recreation experience of other Forest visitors.

Trail 471 (the Big Creek Trial) travels from Big Creek Park over the ridge into Holroyd Park and follows Big Creek to the Forest boundary. This is a very low standard trail that has fords instead of trail bridges to cross Middle Fork Big Creek and South Fork Big Creek. All open roads in the analysis area are enrolled in the Wyoming State Trails ORV Sticker program, which makes them available for use by ATVs.

The winter use in the analysis area is very low. The remoteness of the area makes it out of reach for cross-country skiing, backcountry skiing, and snowshoeing. There are no designated groomed or un-groomed snowmobile trails in the immediate vicinity of the analysis area. There is some minor snowmobile use into the analysis area from private cabins outside the Forest along the Skyline Road, from the Pearl, Colorado area, and from the Blackhall Road. Though there are main roads throughout the analysis area that could be used for winter trails, some of the roads receive enough wind and drifted snow that they are only travelable by very skilled riders.

Recreation Experience

The Blackhall-McAnulty Analysis Area provides a variety of recreation experiences. Recreation experience in this area can range from a motorized travel experience to a semi-primitive backcountry experience. The recreation experience can be affected by evidence of past human activity. Visitors will find areas of past timber harvest and road construction, and areas that have none. They will also encounter evidence of historic mining and homesteading. To some people, these human-created features represent an environment that has been altered by man, but to others it provides the visitor with a sense of history and independence.

When traveling in the Bear Mountain Roadless Area there is some sense of tranquility, isolation, and independence. Visitors can expect to encounter little evidence of human modernization and mechanization within the interior of the area, and the recreation experience is moderate to high.

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Recreation activities and use would continue in the area regardless of the selected alternative. Based on nationwide trends, recreation use in the area would increase over time. The No Action alternative would result in no direct or indirect effects on recreation. The No Action alternative would result in no cumulative effects on recreation.

Proposed Action

Timber harvest operations occurring during the summer and fall would have a short-term direct effect on recreation in the near vicinity of the harvesting. Dispersed recreation within the vicinity of logging operations will be temporarily affected. These activities will be displaced to other locations where logging is not occurring. There would also be a direct effect on users of dispersed campsites in the immediate vicinity of the logging, as several of the forested dispersed campsites are located in the sanitation/salvage units. The disruption would be in a relatively small area, with many other opportunities available for campers and hunters to move to other locations.

Timber harvest operations and log hauling create potential hazards to area users, and some may find the sight, noise, and dust created by these operations offensive. Timber harvest operations during the winter months have the potential to disrupt snowmobile use. This disruption would be from a very small user group, as there are no designated snowmobile trails in the area.

The selection of this alternative will make changes to the travel management in the analysis area. The majority of proposed changes would be south and southeast of the Bear Mountain Inventoried Roadless Area, though there are road closures identified throughout the analysis area. The projected road closures are mainly on four-wheel-drive roads or maintenance level II roads. Many of these roads are very early wagon routes to access private land or historic mineral operations. Many were not even constructed--they were created by years of use from traveling across the route, and have received little if any maintenance. The proposal is to close approximately 140 segments of roads, a total of approximately 38.6 miles of roads. Of these roads, the longest is 1.98 miles, and the shortest is 0.02 miles, with an average segment length of 0.26 miles. Closing these roads would not change the Recreation Opportunity Spectrum (ROS) in this area. The road closure of routes located within the Bear Mountain Inventoried Roadless Area will enhance the roadless area. Closing the roads would affect recreation users that annually use these roads. In most cases, although these road closures will restrict access into certain areas, removal of duplicate parallel roads will directly improve hunting in the southeast portion of the analysis area. Though the closures will not change the ROS, it should improve the dispersed recreation activities and solitude in the area.

The selection of this alternative would provide for improved trailheads for National Forest System Trail 471. The west trailhead, including bulletin board and parking, would be located just east of NFSR 407 on 407.1B. This alternative would also locate new bulletin boards at the east end of NFST 471 and near the confluence of Big Creek, Middle Fork, and South Fork Big Creek. Further needed development on this trail would be to install a bridge on Middle Fork and South Fork Big Creeks in Holroyd Park to improve hiker safety during spring flows. This would provide for a better recreation opportunity for hikers, horseback riders, and fishermen.

Alternative 2

Under Alternative 2, the direct, indirect, and cumulative effects would be the same as the Proposed Action, except for the travel management portion. Alternative 2 selects fewer segments of roads, thus closing fewer miles of roads. This alternative also leaves open several loop roads south and east of the Bear Mountain Inventoried Roadless Area. The projected road closures are mainly on four-wheel-drive roads or maintenance level II roads. Many of these roads are very early wagon routes to access private land or historic mineral operations. Many were not even constructed--they were created by years of use from traveling across the route and have received little if any maintenance. Closing these roads would not change the ROS in this area. The road closure of routes located within the Bear Mountain Inventoried Roadless Area will enhance the roadless area. Closing the roads would affect recreation users that annually use these roads. In most cases, although these road closures will restrict access into certain areas, removal of duplicate parallel roads will directly improve hunting in the southeast portion of the analysis area. Alternative 2 will allow for more motorized access in the analysis area than the Proposed Action.

Alternative 3

Alternative 3 is composed of the same projects as the Proposed Action, except that all units proposed for clearcutting would be dropped. The effects from the remaining projects would be the same as described in the Proposed Action. The effects of the timber harvest that were discussed under the Proposed Action would be greatly diminished. The selection of this alternative would require much less time for timber harvest. With less timber harvest there would be far less interaction between recreation visitors and the following harvest associated items; log trucks, noise and dust from harvest activity, harvest workers camps.

Timber harvest operations would occur during the summer and fall, and would have a very short-term direct effect on recreation in the near vicinity of the harvesting. Recreation users would be by displaced during logging operations. Users of dispersed campsites in the immediate vicinity of the logging would be displaced, with several of the campsites being located in the sanitation/salvage units. The disruption would be in a relatively small area, with many other opportunities available for campers and hunters to move to other locations.

Dispersed recreation within the vicinity of logging operations will be temporarily affected. These activities will be displaced to other locations where logging is not occurring. Timber harvest operations and log hauling create potential hazards to area users, and some may find the sight, noise, and dust created by these operations offensive.

Alternative 4

Alternative 4 is composed only of the watershed restoration projects and the travel management road closures identified under the Proposed Action. These two categories of projects would have the same the direct, indirect, and cumulative effects discussed under the Proposed Action.

CUMULATIVE EFFECTS

Proposed Action and Other Action Alternatives

The proposed harvest activity is a very small part of the much larger analysis area. Logging has occurred in the past within the vicinity of proposed harvest units; the impacts will be short term and will replicate similar treatments in the past. The timber harvest activities and associated activities would not significantly affect recreation use or opportunities. Forest Plan desired conditions for recreation would be maintained. The implementation of these alternatives would result in no cumulative effects on recreation.

Lands, Minerals, & Special Uses

AFFECTED ENVIRONMENT

Although the analysis area contains signs of historic mineral exploration and mining, currently there are no active mining claims located within the analysis area. There may be some recreational rock hounding or gold panning occurring in the area during the summer and fall seasons. The proposed alternatives would have little impact, if any, on these activities. There is a parcel of private land, Jerry Park, located wholly in the analysis area in parts of Sections 4 and 33, T.12N., R.82W. Other private land is located in the Big Creek Park area and along the north and eastern side of the analysis area, which is the Forest boundary. There are a variety of permitted special uses in this area. They include big game and fishing outfitted guiding, summer horse packing trips, some one-day recreation events, ditch, and reservoir easements.

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Mineral activities and special use permitted activities would continue in the area regardless of the selected alternative. Based on nationwide trends, the use by outfitter guides in the area may increase over time. The No Action alternative would result in no direct or indirect effects on lands, minerals, or special use permittees. The No Action alternative would result in no cumulative effects on lands, minerals, or special use permittees.

Proposed Action and Other Action Alternatives

Timber harvest operations occurring during the summer and fall may have a short-term direct effect on recreational mineral discovery activities in the near vicinity of the harvesting. This would be by displacing these users during logging operations. There would also be a direct effect on the outfitter guides who use this area in the immediate vicinity of the logging. The disruption would be in a relatively small area. There are opportunities available for outfitter guides to move to other locations. There are proposed units slated for a variety of treatments located next to private lands in the area. There would be effects to residents of these parcels from noise and increased traffic during harvesting activities. The route of haul from the boundary treatment area in Section 9, T.13N., R.82W. would need the acquisition of temporary easements from the private landowners for use of the Skyline Road if timber is hauled north. If the timber is removed using National Forest System roads to the south, there may be limitations on the size of trucks used.

CUMULATIVE EFFECTS

Proposed Action and Other Action Alternatives

The proposed harvest activity is a very small part of the much larger analysis area. Logging has occurred in the past within the vicinity of proposed harvest units; the impacts will be short term and will replicate similar treatments in the past. The timber harvest activities and associated activities would not significantly affect lands, minerals, or special uses activities. Forest Plan desired conditions would be maintained. The implementation of and of these alternatives would result in no cumulative effects on lands, minerals, or special uses.

Range

AFFECTED ENVIRONMENT

The project area encompasses Big Creek and Beaver Creek cattle allotments, and also includes a small portion of Wood Mountain Cattle Allotment. Big Creek Allotment is grazed by yearling cattle under a three pasture deferred rotation system from June 16 through September 15. Beaver Creek Allotment is grazed by cow/calf pairs under a deferred system, whereby cattle do not enter the allotment until August 1 or later. The OFF date for Beaver Creek Allotment is October 10. At the last analyses stocking was found to be within the estimated capacity of the primary range for both allotments. Both allotments are scheduled for management plan revision in 2004, and some changes in grazing systems may be made at that time.

The grazing permittees rely on a combination of fence and natural barriers to keep cattle on their allotments and within pastures. On Big Creek Allotment the pasture boundaries are partially fenced, with the unfenced portions employing steep slopes and/or timber stands with few openings and little forage in the understory to block livestock travel. Even though Beaver Creek Allotment is considered to be all one pasture, the permittees make use of natural barriers and drift fences between usable portions of the allotment to implement an informal rotation of use. Riparian area management is the biggest challenge to the permittees, as livestock tend to spend much of their time in these productive sites if not actively herded to upland areas or attracted there with salt or other supplements. Both allotments are rugged and contain a lot of forested areas, making precise livestock management difficult. Cattle are often hard to locate and move from place to place.

Road systems allow permittees to access the allotments quicker and easier for activities such as moving or checking livestock, placing salt, and maintaining improvements. Some roads are used for trailing cattle from place to place within the allotments. Roads can also create livestock management difficulties where they breach natural barriers between pastures or allotments, or where there are gates that may be left open by road users.

Wood Mountain Allotment is a cattle allotment managed under a season-long system. The permitted grazing season is July 15 to September 30. The northern third of the allotment, a portion of which falls within the analysis area, is normally not used by livestock until late August or early September. This allotment will not be discussed further in this report because such a small portion is included in the analysis area and no treatments are proposed for that area.

Like most of the grazing allotments on the Medicine Bow-Routt National Forests, Big Creek, Beaver Creek, and Wood Mountain allotments were grazed heavily by livestock from the early 1900’s to the 1950’s or 1960’s. This led to poor condition rangelands, particularly in riparian areas, and on flat or gently sloping meadows and shrubland sites. Improved management and reduced stocking levels since that time have allowed most rangeland sites to improve in condition, but some may take much longer to reach good to excellent ecological condition.

A variety of treatments, including approximately 376 acres of prescribed burn, 2,550 acres of spraying, and approximately 5 acres of brush hog, have been applied to shrublands within the project area in the past to increase forage for livestock or big game species and to create a variety of age classes of big sagebrush and other shrubs. There have also been a few wildfires, burning approximately 281 acres of shrubland and 41 acres of aspen.

Many of the shrublands that were sprayed with 2,4-D in the mid 1960’s have probably returned to pre-spray canopy cover levels, though transect data show that some have not. Areas burned, sprayed, and brush-hogged from 1980 to the present are mostly still characterized by a more open shrub canopy and support higher grass production than nearby untreated areas. The known treatment and wildfire dates give us the following estimated age class distribution for sagebrush and sagebrush/bitterbrush shrublands within the analysis area.

Table 35. Age Class Distribution for Shrublands

Age of Upland Shrublands in Years	Acres Within Analysis Area	% of Analysis Area	Acres in 5A	5A
1	10	<1	0	0
11	10	<1	10	<1
13	30	<1	30	1
15	96	1	96	2
16	250	3	250	6
22	36	<1	36	1
23	214	2	0	0
37-39	2,042	22	1,148	27
40+	6,512	71	2,730	63
TOTAL	9,200	100	4,300	100

This age class distribution reveals that Non-forested Big Game Winter Range (5A) within this analysis area does not meet Forest Plan standards and guidelines for age class distribution. The desired condition (Forest Plan) is to have 10% in a young age class and 30% in a mature age class. The Forest Plan does not give guidance as to what ages ranges are normally considered to fall within the young, mature, and old age classes for shrublands.

Past vegetation treatments and wildfires are not the only mechanism that create variations in shrubland canopy cover. Variations in soils and moisture caused by slope and aspect also create variety in shrub canopy cover within the analysis area. Canopy cover measurements made during summer 2002 in the shrubland communities on the southwest-facing slopes above Holroyd Park ranged from 6% shrub canopy cover on windswept ridgetop sites to 59% on the lee side of a north-south trending ridgetop (snowdrift area). Fringed sagebrush is not counted in shrub canopy measurements since it has a growth form more like a forb. These transects were all located on slopes that are considered secondary range for livestock (cattle only use them after they have grazed down more favored areas such as riparian areas and adjacent uplands), but they are considered winter range and/or parturition areas for deer and elk.

The data from the permanent transects, along with other observations made within the project area over the last few years, show a variety of trends regarding changes in canopy cover of shrubs:

- On some sites sagebrush canopy can decrease spontaneously as a result of natural shrub mortality factors and/or changes in intensity and/or timing of livestock use and/or wildlife use. Leaving some sagebrush stands untreated with fire or chemicals does not necessarily mean shrub canopy cover will continue to increase to the exclusion of other desirable plant species or to a level that is undesirable for wildlife habitat values.
- The rate at which big sagebrush canopy cover returns to pre-treatment levels is highly variable. Likely such factors as site conditions (soil type and moisture regime), sagebrush subspecies (Wyoming big sagebrush versus mountain big sagebrush), competing plant species, livestock grazing levels, and climatic cycles influence how quickly shrubs regenerate on a site.
- Bitterbrush responds favorably after herbicide and prescribed burning treatments, but the rate of increase in canopy cover is variable among sites.
- The southwestern facing slopes of the Big Creek drainage, including McAnulty Creek, South Fork Big Creek, and Holroyd Creek, appear to be receiving excessive impacts from big game in the winter season. On the lower slopes where snow melts on sunny winter days, the bitterbrush and other browse appears to be severely hedged (Big Creek Watershed Assessment Report 2002).
- Shrub regeneration after prescribed burning has been prevented or slowed considerably in areas of heavy localized use by wildlife (elk and deer) and/or livestock. There are some areas within the 1980 and 1987 prescribed burns within Big Creek Allotment where this appears to be happening. The presence of abundant deer and elk sign (droppings and shed antlers) and some cattle sign would appear to indicate that these areas are grazed and/or browsed heavily most years. The soils and moisture levels on these sites may also contribute to the observed lack of shrub component 23 and 16 years after the burn treatments. A complete inspection of all the prescribed burn sites has not been made, so it is difficult to say how many acres within them have had shrub regeneration delayed or prevented by heavy use. The known areas to date total approximately 5-10 acres.

- The invasion of cheatgrass (*Bromus tectorum*) on some burned sites (both wildfire and prescribed burns) has retarded shrub and herbaceous plant regeneration and/or crowded out native species that successfully survived the fires. There are approximately 44 known acres of cheatgrass within the project area. A complete inventory has not been done. One infestation of about 1 acre occurs along a road shoulder in the Little Beaver area, where both prescribed burning in 1992 and road maintenance activity have disturbed the native plant community and spread the cheatgrass. The majority of cheatgrass acres falls within the Big Creek Allotment and are within big game winter range. At least 27 acres are within the Big Creek wildfire area. Cheatgrass was present within lower Big Creek Canyon near the Forest boundary prior to the 1987 wildfire. The fire greatly increased its abundance and appears to have stimulated its spread. The remaining known acres are with units that were prescribed burned in spring 1987 or 1988 on the southwest-facing slopes above Cunningham Park. It does not appear that cheatgrass was initially present in these units when the burns were implemented, but today it dominates portions of at least 6 of the burn units (approximately 16 acres). Some of these prescribed burn units were fertilized the following year, a treatment that can greatly boost cheatgrass success, but which does not do much for native cool season grasses. It is likely that livestock and wildlife transported seed from the Big Creek wildfire area to the prescribed burn units, as the two sites are only 1½ miles apart.
- The recent severe drought and below-normal snowpack experienced over the last three years may be damaging bitterbrush plants within the project area. Decadent bitterbrush plants that only show signs of light or no browsing have been observed. Leaf volume of these plants is very low, and most is down inside the canopy where it would have been protected from drying sun and wind, or where it may have been protected from winter frost damage by the branches above.

ENVIRONMENTAL CONSEQUENCES

Of the various activities and vegetation treatments included in the Proposed Action, the broadcast burning and cheatgrass control have the greatest effect upon rangeland health. They are therefore discussed in more detail in this report than are the other components of the project.

Alternative 1 – No Action

Under this alternative only routine road maintenance and repair and ditch repair work would occur. Both permittees would still have to adapt their livestock management to account for effects of other planned timber harvest and prescribed burn projects within their allotments, but the cumulative effects would not be as great. Age class diversity of aspen and shrub/grass plant communities within the project area would continue to decrease unless wildfires were to occur. In the absence of natural fires, older aspen stands will gradually convert to conifer stands through natural succession and will no longer provide much forage for cattle. There will be few young aspen stands to replace them. Similar changes would occur on some sagebrush and mountain shrub sites in the absence of natural fires. On some sites old shrub stands will become dense with little herbaceous understory, and the shrubs will eventually become decadent, providing less food for browsers. These changes in aspen and shrub/grass communities would eventually reduce the amount of forage available for cattle, deer, and elk; but the process is very slow and gradual and would not be expected to affect wildlife populations or livestock capacity until many years in the future.

Eventually, wildfires are likely to occur in dense, decadent shrub stands and/or mature or over-mature conifer stands to restore some age class diversity in plant communities. When wildfires occur within grazing allotments, the burned areas must be rested from livestock use until revegetation occurs. Since wildfires may be very large, or may burn with an intensity that sterilizes the topsoil, revegetation could take much longer than would be needed to revegetate a prescribed burn conducted during cool spring conditions.

Not all shrubland sites will necessarily develop into dense decadent stands in the absence of fire. On some sagebrush sites, other natural mortality factors such as insects and disease cause patchy die-off of shrubs. Young shrubs eventually recolonize these open areas with the result that the plant community perpetuates itself over the long term, as do other types of climax plant communities. On some shallow, rocky sites shrubs are short in stature and widely spaced, and probably never relied much on fire for regeneration or naturally had a very long fire return interval. These types of sites will not change much from the present condition under this alternative.

If cheatgrass control is not carried out, implications for wildlife species that utilize the shrublands could be serious over the long term. Cheatgrass dominance of a site eventually leads to loss of the shrub component through a combination of frequent wildfires and inability of sagebrush seedlings to become established. Other native plant species are also often crowded out and the site often becomes a cheatgrass monoculture. Conversion of shrublands to annual grasslands can have a serious negative impact on a variety of wildlife species, and especially affects those dependent upon sagebrush for food and/or shelter.

Proposed Action

The following tables describe direct and indirect effects of the Proposed Action on rangeland resources and livestock management.

Table 36. Effects of Broadcast Burning of Shrublands

Direct Effects	Indirect Effects
<p>There will be a temporary increase in herbaceous forage production in most burned areas within one or two years of the treatment due to reduction or elimination of sagebrush and temporary reduction of canopy cover of bitterbrush, serviceberry, rabbitbrush, and snowberry. Response of native herbaceous plants will depend on:</p> <ul style="list-style-type: none"> ▪ Local intensity of the burn (hot spots where the fire burns more intensely due to heavy fuels versus lightly burned sites) – some native perennial grasses and forbs may be killed in hot spots. ▪ Post-burn precipitation patterns and amounts. ▪ Pre-burn plant species composition and vigor. If there is a lot of bitterbrush, rabbitbrush, serviceberry, and/or snowberry in the shrub stand, these will resprout after the fire and will shorten the period of herbaceous species dominance. If herbaceous species are sparse before the treatment, it will take longer for production to increase significantly after the burn. ▪ Pre-burn presence or subsequent arrival of invasive non-native plant species. <p>There will also likely be an increase in forage palatability and nutrient value of forage in the burned areas in spring and summer for the first few years after the treatment. This is from the fertilizing effect of ash and decaying sagebrush roots.</p>	<p>There may be a small, temporary reduction of livestock grazing levels in some riparian areas and adjacent uplands, as cattle are attracted to the more palatable and accessible feed in the burns. The flush of herbaceous growth in prescribed burns would likely benefit herbivorous wildlife species more than cattle. This is because it is customary to rest burned areas from livestock use for one or two growing seasons immediately following the treatment. This means much of the enhanced palatability of the burn areas will have faded by the time livestock have access to the forage.</p> <p>The increased palatability and nutrient content of post-fire plants decline in fall as grasses and forbs cure out and deciduous shrubs drop their leaves. For this reason, wintering wildlife will not benefit much in terms of nutritional content of forage. Available protein will likely be somewhat lower for wintering wildlife on the burned areas until sagebrush reestablishes itself, since winter herbaceous plants and bitterbrush (which usually sprouts well after fire) are lower in protein than sagebrush.</p>

Direct Effects	Indirect Effects
<p>Burns expose bare mineral soil and free up nutrients for plant growth. This can provide an ideal seedbed for invasive plants, including noxious weeds and cheatgrass.</p>	<p>New noxious weed infestations may become established in burned areas and/or existing infestations may increase in size. New infestations could include new sites for noxious weeds already in the project area or establishment of new species. Past prescribe burned areas in the project area have been invaded by cheatgrass and musk thistle.</p>
<p>Prescribed burning in the sagebrush/grass and mixed mountain shrub plant communities will set them back to an early successional stage, providing more young stands than currently exist. Creation of young shrub stands is desirable since about 93% of the shrublands within the analysis area are 37 years old or older. The Forest Plan calls for maintaining at least 10% of shrublands in a young age class.</p>	<p>A greater variety of age classes of sagebrush provides more diverse habitat structure for wildlife. Creation of young stands ensures that some sagebrush stands will be reaching maturity as older ones become decadent, maintaining healthy sagebrush stands over time.</p> <p>Establishment of young stands of sagebrush could be delayed or eliminated on sites where big game and/or livestock use is frequently excessive or where invasive weeds outcompete the native plant species. Instances of both situations have been observed within the analysis area on past prescribed burn sites, and elk populations are higher now than they were when those sites were burned.</p> <p>Shrubs such as bitterbrush, snowberry, rabbitbrush, and serviceberry normally sprout vigorously after a cool fire and will thus regenerate more quickly than big sagebrush. This will shift shrubland composition to dominance by these species for varying periods of time, depending on the site characteristics. Bitterbrush and serviceberry are generally more palatable to wintering deer and elk than big sagebrush, but they often have lower protein content than big sagebrush.</p>

Direct Effects	Indirect Effects
<p>The permittee on Big Creek Allotment would likely not be able to use the pastures where burning is planned for one or two growing seasons after the burn (to allow for optimum vegetation recovery).</p>	<p>The permittee will have to find alternate pasture for most of the livestock permitted on the Big Creek Allotment for three years. Also, the Big Creek permittee may have to invest more time in monitoring and managing the burns, once cattle are allowed back on them, in order to insure that palatable shrubs are not heavily browsed.</p>

Table 37. Effects of Cheatgrass Treatment with Herbicide

Direct Effects	Indirect Effects
<p>Though this herbicide (Plateau) has not been used on this district before, results of its use in other locations in Wyoming suggest cheatgrass will be reduced markedly (65-95%) the growing season following treatment and that negative effects on native grasses and forbs will be light. The herbicide may continue to inhibit cheatgrass germination for several subsequent growing seasons, depending on the application rate of the herbicide and site characteristics.</p>	<p>If there were sufficient native grasses and forbs present on the site prior to reduction of the cheatgrass, they are expected to increase in density and vigor as they are released from the intense competition for moisture and nutrients. This should reduce the opportunity for surviving cheatgrass seeds to become established.</p> <p>If the native grass and forb component is very sparse in the treatment area, cheatgrass will likely regain dominance in a few years unless revegetation (seeding) with competitive native species is successfully carried out. Re-treatment with herbicide may even be needed if it is difficult to get the native plants to fill in.</p> <p>The permittee will need to keep livestock off the treated areas for one or more growing seasons to allow native herbaceous species to revegetate the site. This will mean some additional riding or temporary fencing, possibly both.</p>

Table 38. Effects of Timber Harvest and Associated Road Construction and Reconstruction

Direct Effects	Indirect Effects
<p>There will be a temporary increase in herbaceous forage production in clearcuts.</p>	<p>Possible small, temporary reduction of livestock grazing levels in some riparian areas and adjacent uplands, as cattle are attracted to the new transitory range in clearcuts.</p>
<p>Disturbed and/or compacted soils will result from logging, road construction, or reconstruction.</p>	<p>New noxious weed infestations are likely to occur on disturbed sites and/or existing infestations may increase in size. New infestations could include new sites for noxious weeds already in the project area or establishment of new species. On severely compacted sites, such as landings located in sagebrush openings or meadows, revegetation by desirable plant species may be very slow, even if weed control is carried out.</p>
<p>Livestock distribution may be negatively affected in the Big Creek Pasture of Big Creek Allotment and along the upper reaches of North Fork Big Creek on the Beaver Creek Allotment during logging and associated roadwork as cattle seek to avoid vehicle traffic, noise, and people. The permittee may have to compensate by riding more frequently; however, the areas affected are small and Big Creek Pasture is only used for a two-week period, so the impact should be very small.</p>	<p>In the longer term, livestock distribution may be slightly improved for a number of years, as cattle are attracted to new forage in clearcuts. This would make the permittees' job of maintaining good livestock distribution somewhat easier for a few years.</p>
<p>Locations of proposed harvest units will not breach any natural barriers of importance on the Big Creek or Beaver Creek (Med Bow) allotments, but harvest of those units southeast of Jerry Park has some potential to cause damage to the allotment boundary fence. If the fence is taken down during harvest activities, there may be some mixing of cattle between the two allotments. This can result in overgrazing of some areas and requires extra work by the permittees to sort cattle and get them back on the appropriate allotments.</p>	<p>Changes in timber stand structure brought about by timber harvest southeast of Jerry Park may cause problems with wind-throw trees on the fence. This would mean increased maintenance costs for the permittee and, if severe enough, may even require that some sections be reconstructed.</p>

Table 39. Effects of Road Decommissioning, Trailhead Relocation, and Watershed Restoration Projects (excluding cheatgrass control)

Direct Effects	Indirect Effects
<p>Ground disturbance and/or soil compaction will occur in localized areas.</p>	<p>Soil disturbance and/or compaction open niches for noxious weeds and other invasive plant species. Invasive species already present in the analysis area may become established on these sites or new invasive species may be introduced if equipment used on these projects is not cleaned of mud and/or plant debris, or if mulches or seed is not weed seed free.</p>
<p>There will be some small, short-term disturbance to livestock while these projects are being carried out, but the duration will be short and the area affected at any one time will be small.</p>	<p>Livestock use patterns on the allotments may be briefly affected as cattle seek quieter areas to forage and loaf.</p>
<p>Road decommissioning of many of the old open two-track roads within the analysis area will make quick access more difficult for the permittees and/or their employees. The permittee on Big Creek Allotment would be most affected since a majority of the roads proposed for decommissioning are on that allotment. The permittees will still be able to access all parts of the allotment via horseback and have limited off-road motorized access authorization through their grazing permits, but quick drive-through tours to check fence condition and/or livestock distribution or to locate strays will no longer be possible.</p> <p>There will be less motorized disturbance to livestock from forest users, and there will likely be fewer problems with Forest boundary gates being left open.</p>	<p>Cost of livestock management will go up as more time will be required to access the allotment via horseback for routine checking of fence condition, livestock distribution, and to check for stray cattle.</p> <p>There may be fewer problems keeping cattle in appropriate locations due to the decrease in motorized use and associated gate problems.</p>

Closure of some of the proposed roads would have the following effects upon livestock management on Big Creek Allotment and upon adjacent private ranchland. Closure of the short, dead-end spur roads will have little negative effect on livestock management or maintenance of fences, so long as closure methods on those roads that travel along fence corridors do not preclude the ability to travel along them with saddle and pack horses or to drive cattle along them. Closure of the major through roads that connect different grazing areas on the allotment will increase the amount of time it takes the permittee to check livestock distribution, move cattle, or place salt. Roads of concern include 418.1C, 418.5C, 418.2C, and 4480, plus 4396 or 4397 (connects Quimby Park and Casteel Park). If the decision is made to close any or all of these roads, the impact would be somewhat reduced if they were closed in such a way that horseback travel was not hindered and cattle could be trailed along them without great difficulty. Closure of some roads would be beneficial for the permittee from the standpoint of less motorized disturbance to cattle on the allotment and less trespass onto his adjacent private lands for hunting or fishing. Those the permittee would especially like to see closed include 4487, 4379, and 498.9D.

Alternative 2

Effects would be the same as for the Proposed Action, except that access for the permittee would not be reduced as much as under the Proposed Action. Under this alternative there would be 9.3 more miles of open roads available, making it somewhat easier for the permittees to do quick drive-through “tours” of the allotment for the purposes of checking improvements and livestock distribution.

Alternative 3

The effects of this alternative would be the same as the Proposed Action, except fewer acres of transitory range would be created and there would be less soil disturbance. Because there would be less ground disturbance, there would be less opportunity for weeds to become established or increase their populations. The failure to create transitory range on the Beaver Creek and Big Creek Allotments will not noticeably affect livestock use patterns, and will not in any way affect the number of livestock that are permitted on the allotment, since transitory range is not used in the estimation of allotment capacity. Rather, it is considered bonus forage that may help attract cattle from traditional concentration areas such as riparian zones, depending on the nature and abundance of herbaceous vegetation that develops in the cutting units.

Alternative 4

This alternative would include the broadcast burning, road decommissioning, and watershed restoration projects included in the Proposed Action. The effects would be the same as those listed under the Proposed Action for these activities.

CUMULATIVE EFFECTS

Proposed Action and Other Action Alternatives

Effects of past and future timber sales and prescribed burns in and around the project area are cumulative to the effects of the Proposed Action. The Holroyd Project is located adjacent to the Blackhall-McAnulty Project and includes timber harvest and prescribed burns tentatively scheduled for implementation in 2003 or 2004. In addition, a portion of the Black Cat pasture of Big Creek Allotment was burned in spring 2000 (Six Mile Project). Both these projects affect the Big Creek permittee in terms of planning for rest of these sites and managing use by cattle after the initial rest. Depending on the timing of implementation of this project and the Holroyd Project, the permittee may not be able to use a majority of the Big Creek Allotment for 4-5 consecutive years. Timber harvest recently begun by the State of Wyoming on Section 16, T.12N., R.83W. will also affect livestock distribution and transitory range on Beaver Creek Allotment.

The planned shrubland burns included in the Holroyd Project total 379 acres. When taken together with the proposed burns included in this project (assuming 50% of the delineated acres would be treated in the Blackhall-McAnulty Project), they bring the total treated shrubland acres to 1,681 acres, or 18% of the shrublands within the analysis area. This is still in compliance with the Forest Plan guideline of not treating more than 25% of a diversity unit within a ten-year period. However, the Holroyd burns are all within the 5A prescription area, and bring the total acres proposed for treatment within 5A to 1,314 acres.

Past and future timber harvest and prescribed burning projects will continue to provide transitory range and a variety of age classes of aspen and shrub plant communities and will continue to have long and short-term impacts on livestock distribution.

One of the most important cumulative effects of timber sales, burns, road maintenance, and other soil-disturbing activities on rangeland health has been in the introduction and spread of noxious weeds. Where disturbed soil from past activities has allowed Canada thistle and musk thistle to become established, a ready seed source exists to colonize newly disturbed areas. All activities that create soil disturbance, or merely increase the amount of exposed bare ground, contribute to the spread of weeds. This includes routine road and trail maintenance, erosion caused by off-road vehicle use, and localized areas of trampling and heavy grazing by livestock at fence corners and water developments.

Roads

AFFECTED ENVIRONMENT

Primary haul route for the proposed project would use Wyoming State Highway 230, which passes along the northern and eastern boundaries of the planning area. Any timber haul would pass over County Road 211 out the northern end of the area. National Forest System Roads (NFSR), which serve as arterial and collector roads, include NFSR 409, 404, 407, and 414.

Pre-use maintenance required on many existing system roads can include minor drainage maintenance, surface blading, roadside brushing, and minor earthwork repairs. Some roads may require little or no work, especially as a recent timber sale has maintained many of the same roads. Other roads may require more extensive maintenance to make them suitable for haul. Roadside brushing along arterial and collector roads (especially NFSR 404, 407, and 414) is a critical health and safety deferred maintenance item that needs correction before any haul can occur. Commercial aggregate material might be available at the County pit just east of the planning area, and also in a State pit just south of the Wyoming/Colorado State line. There is an existing Forest Service Pit on NFSR 409.1A. Very little existing aggregate is available; new material could be crushed if sufficient quantities are needed. A pit-run stockpile also exists and more is available.

Table 40. Miles of Road within the Planning Area by Functional Class

Road Type	Miles
Arterial	7.27
Collector	33.13
Local	80.50
Decommission	45.07
Undetermined	23.95
TOTAL MILES	189.92

Table 41. Miles of Road within the Planning Area by Maintenance Level

Maintenance Level	Miles
5	0
4	0
3	45.92
2	63.91
1	35.02
Decommission	45.07
TOTAL MILES	189.92

Travel management is another project considered under this analysis for the implementation of Phase 2 of the Forest-Wide Travel Management Environmental Assessment (October 16, 2000). Phase 2 analysis includes determinations on whether or not unplanned and unmanaged user-created roads and trails will be added to the Forest Transportation System, whether or not additional motorized opportunities should be developed, or if existing Forest Transportation System routes should be opened or closed. A preliminary roads analysis (ongoing Sierra Madre Travel Management Analysis) of the area has found there are a number of roads within the project area that have been identified as requiring maintenance or closure to reduce soil erosion and sediment entering creeks. High open road densities in the eastern portion of the area could potentially be degrading wildlife security areas and habitat effectiveness in big game winter range areas.

ENVIRONMENTAL CONSEQUENCES

Table 42. Summary of Alternatives - Effects

Blackhall-McAnulty Planning Area Roads	Miles of Road				
	Proposed Action	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Existing National Forest System Roads (Open & Closed)	189.9	189.9	189.9	189.9	189.9
Proposed Open Roads	71.2	109.8	80.5	71.2	71.2
Roads to Decommission	38.6	0	29.3	38.6	38.6
Percent of Open Road to Decommission	35	0	27	35	35
Reconstruction/Pre- use Maintenance	6.2	0	6.2	2.0	0
Specified Road Construction	0	0	0	0	0

Alternative 1 – No Action

The No Action alternative (Alternative 1) would continue to defer needed maintenance on the haul roads until funding becomes available. This includes roadside brushing along higher maintenance level roads. Roads identified for closure with previous decisions may continue to see unauthorized travel until funding becomes available to effectively close the roads. Road densities in this alternative would remain the same, 0.68 miles per square mile. Based on past, current, and reasonable foreseeable future activities in this area, there are no cumulative effects to the transportation system.

Proposed Action

The Proposed Action would have 6.2 miles of reconstruction/pre-use maintenance. No new construction of specified roads would be needed. Also, 38.6 miles of existing open road have been proposed for decommissioning. These roads were first identified under the ongoing Sierra Madre Travel Management roads analysis process. Most of the roads to be reconstructed are currently closed with physical closures. Likewise, most of the roads proposed for pre-use maintenance are closed with gates and would not require much work to be used for timber haul.

Reconstruction is needed to open up roads that were previously constructed for timber access and effectively closed to travel. These roads were either temporary roads from a previous entry, or system roads that were closed after the last entry. These roads are needed to provide long-term management and will be used for subsequent entries. They will be added to the Transportation System. They will be closed to travel after this entry and put in storage status (maintenance level 1). Methods of closure will provide for hydrologic stability and eliminate vehicle travel. Methods can include ripping and seeding, constructing berms and water diversion structures, removing culverts, pulling slash and stumps across the road bed, planting trees and shrubs in the roadbed, gates and signs. The most effective closure methods will be identified on the ground during the route review process. Closures can be completed as part of the timber sale or with post-sale funding. Road densities would become 0.65 miles per square mile.

Pre-use maintenance is needed on existing roads that are closed with gates. This maintenance would involve reshaping the roadway, reshaping and cleaning of drainage structures, roadside brushing, minor slump and slide clean up, and maintenance of structures such as cattleguards and gates.

A substantial amount of road decommissioning has been identified for this project area. In Alternative 2, twenty-seven percent of the open road system is proposed for closure, and in the other action alternatives, thirty-five percent of open roads would be closed. Most of these roads are level 2, user-created, very low standard roads. In a lot of cases, these are parallel roads or are short spurs going out on ridges. Short roads going to dispersed camping spots, if less than 300 feet in length, would be taken off inventory lists but not closed. Closing this many roads in the project area, even though they are high clearance type roads, could tend to concentrate recreation traffic to fewer roads. In a normal year, 4,000 to 5,000 vehicles travel in this area (traffic counts taken on Roads 404, 407, and 498). Also, travel management enforcement would need to be increased since it is difficult to create effective road closures in sagebrush habitat.

Alternative 2

The road system for Alternative 2 would be similar to the Proposed Action with the exception of 9.3 miles less road decommissioning; 29.3 miles of road is proposed for decommissioning instead of 38.6 miles in the proposed alternative. All other proposed projects are the same as in the Proposed Action alternative. Road densities under this alternative would become 0.66 miles per square mile.

Alternative 3

The road system for Alternative 3 would be similar to the Proposed Action, with the exception of 4.2 fewer miles of road reconstruction/pre-use maintenance. With the exception of no clearcutting, all other proposed projects are the same as in the Proposed Action alternative. Road densities would become 0.65 miles per square mile.

Alternative 4

This alternative includes the road decommissioning proposal in the Proposed Action alternative, but no timber harvest. Therefore, no road reconstruction/pre-use maintenance is needed in this alternative. Road densities would become 0.65 miles per square mile.

CUMULATIVE EFFECTS

Proposed Action and other Action Alternatives

Based on past, current, and reasonable foreseeable future activities in this area, there are no cumulative effects to the transportation system.

Forest Plan Compliance

All alternatives and the Proposed Action are consistent with the Medicine Bow National Forest Land and Resource Management Plan for transportation.

Wildlife

AFFECTED ENVIRONMENT

The analyses and discussions that follow are based on a combination of field investigations, observations and discussion during Interdisciplinary (ID) Team field trips, discussion during ID Team meetings, information contained in the RIS database, information contained in the scientific literature, personal communications with biologists from other agencies, and professional judgment. The sections are divided into two broad categories, roughly corresponding to management activities in the Forest Plan, which include: Vegetation Diversity/Habitat Management and Wildlife Resource Management. Contained within these broad categories is a discussion of the current situation, identification of potential problem areas where they exist, and a description of desired future conditions where applicable. Specific Forest Plan general direction and/or standards and guidelines pertinent to a particular resource are addressed. Page references to general direction and/or standards and guidelines contained in the Medicine Bow National Forest Land and Resource Management Plan (LRMP) are made (i.e., III-14). Also included in each broad category is discussion of any special requirements or effects relative to specific management areas.

Existing Condition and Wildlife Forest Plan Compliance

A. Vegetation Diversity/Habitat Management (III-14)(III-34 to III-36)

Diversity here refers primarily to the structural diversity of vegetation. Relative to the forested area within diversity units (sixth-level watersheds), the Forest Plan requires that in forested areas at least 20% is to provide vertical diversity, at least 30% is to provide horizontal diversity, at least 5% will be maintained in grass/forb stages, and at least 10 % will be maintained as true old growth in 30-acre or larger patches, preferably in spruce/fir stands. Comparisons of existing condition and Forest Plan requirements are displayed in Table 43 and in following text.

Table 43. Vegetation Diversity/Habitat Management Existing Condition and Forest Plan Requirements

Category	Existing Condition		Forest Plan Requirement		Meet Requirement (Y/N)
	Acres	%	Acres	%	
Vertical Diversity	5,001	14	7,037	20	N
Horizontal Diversity	≥ 25,000	≥ 71	10,556	30	Y
Grass/forb	837	2	1,759	5	N
Old Growth	3,696	11	3,518	10	Y
Hiding Cover	25,800	73	14,074	40	Y
Thermal Cover	4,796	14	7,037	20	N
Roads (mi/mi ²)	0.5		≤ 2.0		Y
4B Management Areas					
Old Growth	2,875	29	1,964	20	Y
Hiding Cover	8,262	84	4,910	50	Y
Thermal Cover	2,074	21	2,946	30	N
Roads (mi/mi ²)	0.1		≤ 1.2		
5A/5B Management Area					
Mature shrubs (5A)	5,464	91	1,800	30	Y
Young shrubs (5A)	543	9	600	10	N
Openings	>432	>30	1,440	30	Y
Hiding Cover (5B)	4,500	94	2,405	50	Y
Thermal Cover (5B)	396	8	962	20	N
Roads*	Forest and user-created		Allow new roads only if needed		N
9A Management Area					
Old Growth	0	0	82	20	N

* Forest Plan (III-148, III-157) Allow new roads in the management area only if needed to meet priority goals outside the management area or to meet big game goals on the management area. Obliterate temporary roads within one season after planned use ends.

Vertical Diversity

The Forest Plan Final Environmental Impact Statement (FEIS) defines vertical diversity as the diversity of an area that results from the complexity of the above-ground structure of the vegetation. A larger number of tiers (layers) of vegetation or a more diverse composition of species increase the degree of vertical diversity. That is, the degree of layering is not only determined by the arrangement of growth forms within the plant community, but also by the vertical distribution of trees of different species having distinct crown and height characteristics, and by trees of different ages of the same species (Hoover and Wills 1987).

Vertical diversity was evaluated using information contained in the RIS database. A minimum of 7,037 acres is needed to meet the Forest Plan requirement for vertical diversity in the project area watershed. The MBNF has developed an old growth scorecard. Old growth ratings with a scorecard value of at least 38 indicate fairly accurately a measure of good vertical diversity. A total of 5,001 acres of forested stands currently have an old growth rating of at least 38 in the project area watersheds. Forest Plan requirement for vertical diversity is not met.

Horizontal Diversity and Edge Contrast

Horizontal diversity is defined in the Forest Plan FEIS as the diversity in an area that results from the number of plant communities or successional stages, or both--the greater their number, the greater the horizontal diversity. That is, horizontal diversity or structure consists of a number of contiguous timber stands within a forested area, each being of a different species and/or having its own distinct age and size class. The extent to which these even-aged stands are intermixed in their distribution within a forested area determines the degree of horizontal diversity (Hoover and Wills 1987).

Hoover and Wills (1987) also define structural stage as any of several developmental stages of tree stands described in terms of tree age and the extent of canopy closure they create. Structural stages are divided further into canopy closure categories for use of the HABCAP model (Table 44). This information, which is used in the HABCAP (habitat capability) models for the purpose of evaluating wildlife habitat capability, was also used to evaluate horizontal diversity.

The Forest Plan requires that a minimum of 10,556 acres provide horizontal diversity in the combined watersheds. Review of vegetation categories, structural stages, and canopy closure categories indicates at least 25,000 acres provide horizontal diversity (Table 44). The large amount of horizontal diversity in the analysis area reflects the amount of past timber harvest. Considering all past silvicultural prescriptions, 27% of forested habitat in the analysis area has had some type of timber harvest. Horizontal diversity is "limited" only by the predominance of lodgepole.

Table 44. Existing Vegetation Structural Stage and Canopy Cover

PLANT COMMUNITY	Grass/forb	Seedling/Shrub	Stage 3A*	Stage 3B	Stage 3C	Stage 4A	Stage 4B	Stage 4C	Stage 5
Aspen	135	177	1,315	1,400	106	175	66	101	171
Douglas-fir	25	0	0	0	0	161	178	4	2
High Elevation Riparian	16	263	0	0	0	0	0	0	0
Lodgepole Pine	636	1,795	3,319	6,808	3,036	2,573	7,097	970	2,591
Mountain Grassland	215	0	0	0	0	0	0	0	0
Mountain Shrub	0	1,110	0	0	0	0	0	0	0
Limber Pine	0	0	15	4	0	0	0	0	0
Ponderosa Pine	0	12	18	0	0	0	0	0	0
Sagebrush	608	7,845	0	0	0	0	0	0	0
Spruce-fir	41	342	692	174	1	483	335	55	169

Adj. Road Density = 0.5 mi/mi²

* 3=1-9" DBH, 4=>9" DBH, 5=old growth, DBH varies

A=11-40%, B=41-70%, C=71-100% canopy cover

There is a lack of young shrubs in 5A Management Area.

Silvicultural prescriptions can be used to achieve specific vegetation diversity and wildlife habitat goals. Generally, clearcutting has the greatest effect on horizontal diversity since forested stands are converted to the grass/forb structural stage, and at times results in a forest type conversion (e.g., when aspen regenerates after a lodgepole pine stand is clearcut). These are desirable results when the goal of the silvicultural treatment is to create foraging areas, regenerate aspen, or enhance ponderosa pine. Partial cutting methods have varying degrees of effects on horizontal diversity, usually not changing the general age class of the stand but resulting in a lower canopy cover class. The amount that the canopy cover class changes depends on the percentage of basal area that is removed in the treatment. If a high percentage of the basal area is removed, then the age class of the stand may change. Partial harvest has less impact on horizontal diversity than clearcutting. It can be used to achieve vertical diversity goals when the development of a spruce/fir, multi-aged, or mixed conifer stand is desired.

The Forest Plan requires "Maintain edge contrast of at least medium or high along at least 30% of the edge next to all created and natural openings, roads, and riparian areas" (III-35). This criterion was evaluated using aerial photos and the RIS database. Edge contrast is being maintained.

Grass/forb

The Forest Plan requires a minimum of 1,759 forested acres to be maintained in the grass/forb stage in the project area watersheds. The grass/forb component was evaluated through a query of the RIS database. Results indicated that the watershed is below the minimum requirement, with 837 acres.

It should also be noted that several small patches (generally < 10 acres each) of cheatgrass have been identified in the Little Beaver Creek drainage (T.13N., R.82W., sec. 9) and Cunningham Park (T.13N., R.82W., sec. 6; T.12N., R.82W., sec. 1; and T.12N., R.81W., sec. 6). There are at least 44 acres of cheatgrass within the analysis area; 1 acre on Little Beaver along Skyline Road near the Forest boundary, 16 acres in the old prescribed burn units above Cunningham Park, and at least 27 acres in the old Big Creek wildfire area.

Old Growth

A minimum of 3,518 acres of conifers, designated as old growth, is needed in the watershed to meet the Forest Plan requirement. A query of the RIS database indicated that 3,696 acres of conifers are designated as old growth. Forest Plan requirement is being met.

A minimum of 1,964 acres of conifers, designated as old growth, is needed in 4B Management Areas to meet the Forest Plan requirement. A query of the RIS database indicated that 2,875 acres of conifers are designated as old growth. Forest Plan requirement is being met.

Forest Plan requirements also state that 20% (82 acres) of the forested area in 9A Management Area is to be maintained as designated old growth. Currently, none of the designated old growth in the analysis area occurs in 9A Management Area.

Reasons for maintaining a minimum amount of old growth include the protection of the functioning old growth ecosystem itself, as well as to maintain habitat for those species for which the ecosystem provides conditions or habitat features that contribute to the life history of the species. Current 1:24,000 scale maps of designated old growth are located in the planning file in the Brush Creek/Hayden District office.

Hiding and Thermal Cover

Item (III-34a) describes hiding cover requirements to be maintained along natural and created openings, arterial and collector roads, and streams and rivers. Not more than one-half of the hiding cover can be contiguous to another portion of the hiding cover; and, along streams and rivers, 20% or more of the edge must be in thermal cover. Also, Item (111-124 2.a) requires hiding cover along 75% of arterial and collector roads in Management Area 4B. These requirements were examined using RIS database and ArcView software. Hiding cover requirements are currently being met.

Item (III-34b) requires watersheds dominated by forested ecosystems have a minimum of 40% (50% in 4B and 5B) of the diversity unit maintained in deer or elk hiding cover, which is well distributed over the unit. In order to evaluate the amount and distribution of hiding cover in the watershed, several criteria were used to delineate hiding cover and non-hiding cover vegetation categories. Forest Plan requirements for hiding cover in the analysis area and 4B and 5B Management Areas are being met.

The Forest Plan requires that 20% (30% in 4B, 20% in 5B) of the diversity unit is to be maintained in thermal cover. Thermal cover is generally defined as trees greater than 39 feet with canopy closure greater than 69% in stands of 30 acres or larger (USDA 1985a). Thermal cover requirements are not being met for the analysis area, or 4B and 5B Management Areas. One hundred and ninety acres of thermal cover were lost in the Bear Mountain South fire in 2002. Thermal cover is noticeably lacking in the southwest quarter of the analysis area. Past harvest is concentrated in this quarter and eliminated some thermal cover.

Elk security has been an issue identified in response to scoping for most vegetation management activities on the District in recent years. Hillis et al. (1991) presented criteria for elk security areas. They should be at least 250 acres in size. Security areas should account for a minimum of 30% of the analysis area if it is to be managed for effective elk habitat. If existing security areas are smaller than 250 acres, management activities should be directed to achieve larger blocks. Effectiveness declines if security areas are within one-half mile of open roads or if closed roads bisect the area. Terrain features can mitigate impacts of roads to some degree. Security is further defined as the protection inherent in any situation that allows elk to remain in a defined area despite an increase in stress or disturbance associated with the hunting season or other human activities (Lyon and Christensen 1990).

The current Forest Plan does not have a land allocation for specific security areas. It does not contain standards and guidelines for minimum requirements. Designation of such areas would have to be accomplished through the Forest Planning process and is a guideline in the draft Revised Forest Plan, currently under public review. The draft EIS (USDA 2002) for the Revised Forest Plan indicates that Geographic Areas within the Sierra Madre Range average 23% security areas, and Beaver Creek Geographic Area is 11% security area. Low percentage of security area is somewhat due to the fact that 22% of the analysis area is composed of shrub and grassland communities.

Roads

Existing road density exceeds Forest Plan standards in the 5A/5B Management Areas. Forest Plan (III-148, III-157) states, "Allow new roads in the management area only if needed to meet priority goals outside the management area or to meet big game goals on the management area. Obliterate temporary roads within one season after planned use ends." Many roads created by Forest users, or by the Forest, were not effectively eliminated after authorized use.

Management Indicator Species (MIS)

B. Wildlife Resource Management (III-29 to III-33)

This section deals with capability of the existing habitat for vertebrate wildlife species and management indicator species. This discussion pertains to bird, reptile, and mammal species.

Habitat for Viable Populations of Existing Vertebrate Wildlife Species

Monitoring: 36CFR 219.19(a)(6) – Population trends of the management indicator species will be monitored and relationships to habitat changes determined. Monitoring of MIS included:

The Forest Service manages habitats within the Forest to support designated management indicator species (MIS). The Medicine Bow National Forest FEIS defines MIS as a species selected because changes in its population indicates effects of management activities on the plant and animal community or a species whose condition can be used to assess the impacts of management actions on a particular area. MIS selected for analysis may include featured species (species which have certain attributes which meet specific management goals such as sport, commercial, and/or aesthetic values), recovery species (T&E), and ecological indicators (species having a narrow range of ecological tolerance and, therefore, serve as barometers of ecological conditions within a management unit). These definitions are taken from the Medicine Bow National Forest LRMP (1985) and Hoover and Wills (1987). It is not necessary to address all MIS in a project level analysis, but rather it is important to select species that are most likely to respond to management actions or “no actions” specific to the project. Since the forested habitat in the analysis area is 82% lodgepole pine and only 6% spruce-fir, species strongly associated with spruce-fir forest were not included in the analysis. Species selected as MIS for this analysis include Rocky Mountain elk, northern goshawk, and hairy woodpecker. These species were selected because they are most likely to respond to changes from management actions based on existing vegetation conditions.

Selection of Management Indicator Species

All Management Indicator Species (MIS species) listed in the Forest Plan were reviewed to determine which species would be selected and further analyzed as project specific MIS. The table below summarizes the full list of Management Indicator Species and applies one of the following 3 categories to each species.

Category A: Certain Forest MIS species were not further analyzed in this project. Pre-field review was adequate to determine that these species were not affected, or are extremely unlikely to be affected by the project proposal. One of the following reasons applies to those MIS species eliminated from further review, and is documented in the table.

1. The project proposal is outside of the known range of the species and/or the species is not likely to occur.
2. There are no documented records of species occurrence, habitat is generally not provided, and the species is unlikely to be present in the project area.
3. Larger scale evaluations suggest that a strong and viable population of the species exists, and the project is expected to retain habitat in a condition that is suitable to occupancy in the analysis area, and site-specific population estimates are not available for the species.
4. Habitat used by the species is different than that being disturbed by the project proposal. Effects/impacts are not expected to occur to individuals within known existing populations.
5. Disturbance to habitat or individuals is sufficiently marginal, small in size and/or length of time that effects would not represent measurable effects to Forest-wide populations.
6. Timing of the project proposal is such that no effects/impacts are expected.
7. Effects to this species is better represented by other MIS due to specific Forest Plan standards and guidelines for those other MIS species or known specific known impacts to those other MIS species.

Category B: These species are both Forest MIS species and Region 2 Forest Service Sensitive Species, or Federally Listed or Proposed species. Impacts/effects were addressed (or dismissed) in the biological evaluation or biological assessment portion of this analysis.

Category C: These Forest MIS species are analyzed in further detail within the wildlife specialist report. Measurable impacts to habitat are expected, and some estimates of local habitat, population and/or viability are available.

Table 45. Summary of Management Indicator Species Consideration

Species Common Name	Suitable habitat	Category of Analysis (see earlier description)	Remarks
Elk	Forest, shrublands, grasslands.	Category C – Evaluated in wildlife specialist report.	
Mule deer	Forest, shrublands, grasslands.	Category A7 - Not selected as an MIS.	Thermal and hiding cover, road analysis more applicable to elk.
Bighorn sheep	Shrublands, rock outcrops.	Category A1 – Not selected as an MIS.	
Turkey	Deciduous and ponderosa pine forest.	Category A1 – Not selected as an MIS.	
Bald eagle	Generally near larger bodies of water.	Category B- Addressed in Biological Assessment.	

Species Common Name	Suitable habitat	Category of Analysis (see earlier description)	Remarks
Peregrine falcon	Cliff habitat nearby.	Category A4 – Not selected as an MIS.	
Black-footed ferret	Prairie-dog towns.	Category A1 – Not selected as an MIS.	
Pine marten	Mature conifer forest.	Category B – Impacts analyzed in biological evaluation.	
Beaver	Riparian areas.	Category A5 – Not selected as an MIS.	Minimal potential effects to wetlands.
Red-backed vole	Coniferous forests with downed timber	Category A5 – Not selected as an MIS.	Mitigation adds more coarse woody debris than Forest Plan standards and guidelines require.
Long-tailed vole	Wet meadows, riparian, aspen, riparian shrub.	Category A5 – Not selected as an MIS.	Minimal potential impacts to wet meadows and riparian areas.
Dwarf shrew	Talus slopes.	Category A1 – Not selected as an MIS.	Habitat will not be affected.
Western jumping mouse	Marshy areas and riparian shrub.	Category A5 – Not selected as an MIS.	Minimal potential impacts to wet meadows and riparian areas.
Osprey	Near larger bodies of water.	Category A5 – Not selected as an MIS.	No habitat near large water bodies affected.
Goshawk	Mature forest with open understory, water nearby.	Category C – Evaluated in wildlife specialist report.	
White-tailed ptarmigan	High elevation areas.	Category A1 – Not selected as an MIS.	
Sage grouse	Sagebrush flats.	Category A5 – Not selected as an MIS.	Location and elevation limit use to rare, late summer, nonbrood-rearing.
Blue grouse	Forested areas.	Category A3 – Not selected as an MIS.	Hunting season structure and harvest results indicate species is abundant.
Hairy woodpecker	Aspen, conifer forests.	Category C - Evaluated in wildlife specialist report.	

Species Common Name	Suitable habitat	Category of Analysis (see earlier description)	Remarks
Yellow-bellied sapsucker	Migrant, low elevation woodlands.	Category A5 – Not selected as an MIS.	Small potential effects to low elevation woodlands, effects to woodpeckers better represented by hairy woodpecker.
Lewis woodpecker	Open ponderosa pine forests.	Category A1 – Not selected as an MIS.	
White-crowned sparrow	Dense thickets of willow, sagebrush, or subalpine fir in the mountains.	Category A5 – Not selected as an MIS.	Potential effects to habitat minimal.
Ruby-crowned kinglet	Coniferous forests.	Category A7– Not selected as an MIS.	Effects to hairy woodpecker and goshawk better represent changes to conifer forest.
Yellow warbler	Brushy stream-sides, willow.	Category A5 – Not selected as an MIS.	Minimal potential impacts to riparian areas.
Cedar waxwing	Open woodlands with berries.	Category A5 – Not selected as an MIS.	Minimal potential impacts to open woodlands with berries.
Sandhill crane	Large wetlands.	Category A5 – Not selected as an MIS.	No potential effects to large wetlands
Boreal toad	Mountain wetlands.	Addressed in Fish/hydrology reports.	
Wood frog	Mountain wetlands.	Addressed in Fish/hydrology reports.	
Smooth green snake	Lush riparian vegetation in Sierra Madre Range.	Category A1 – Not selected as an MIS.	

Highlights indicate those Forest MIS species analyzed in further detail in the wildlife specialist report.

Elk was selected as an MIS for this analysis because of its importance to Wyoming as a game species, the analysis area contains elk winter range, the possibility that timber harvest could reduce hiding or thermal cover, changes in road density could affect habitat capability, and potential treatment of shrub stands could affect habitat capability. Elk will use virtually all structural stages of all forest types for feeding. However, early successional stages (grass/forb, shrub/seedling), meadows, more open pole-size and mature stands, and all aspen stands provide optimal feeding areas. More dense pole-size and mature stands provide optimal hiding cover for elk. Elk are found within the analysis area year-round, with winter range occurring along the lower elevations of the Big Creek and Bear Creek subwatersheds.

The northern goshawk is a Sensitive Species in Region 2. Goshawk was selected as an MIS for this analysis because it is highly associated with mature lodgepole pine and aspen forest, and it may respond to potential effects from no action or proposed management actions. The goshawk is primarily a summer resident; however, some birds may be present in winter. Studies conducted at the Forest Service Research Laboratory in Laramie indicated that this species showed tendencies for both elevation and latitudinal migrations (Squires and Ruggiero 1995). The goshawk uses all forest types for both foraging and cover. Most stands selected for nesting are older lodgepole and lodgepole/aspen stands at lower elevations (District records, Squires and Ruggiero 1996).

Hairy woodpecker was selected as a MIS for this analysis because it is dependent on large lodgepole pine or aspen for cavity nests and its response to recently burned forest and salvage logging. The hairy woodpecker is a yearlong resident. This species uses pole size to old growth conifer stands and mature to old growth aspen stands for foraging. This species uses large pole size to old growth conifer stands and mature to old growth aspen stands for cover (nesting).

It should be noted that American marten was considered a poor MIS for this analysis area. Marten was not selected as an MIS because the analysis area is dominated by a dry, lodgepole pine forest type that is low quality habitat for martens. Martens prefer spruce-fir forest but will use wetter lodgepole pine forest (see Raphael et al. 1991, Ruggiero et al. 1998). Based on all habitat (forested and non-forested) the analysis area is 63% lodgepole pine forest (predominantly dry type), 21% sagebrush and mountain shrub, and only 5% spruce-fir.

Wildlife Surveys

Field surveys for all wildlife occurrences were conducted in 1993, 2001, and 2002. Wildlife documented during surveys included: broad-tailed hummingbirds, hairy woodpeckers, northern flickers, American robins, yellow warblers, hermit thrush, chipping sparrow, dark-eyed juncos, mountain chickadees, western tanagers, common yellowthroat, house wren, Townsend's solitaire, western wood peewee, red-breasted nuthatches, red-tailed hawk, Clark's nutcracker, gray jays, red squirrels, mule deer, elk, coyotes, black bear, moose, porcupine, and snowshoe hare.

The Wyoming Game and Fish Department (WGFD) conducts bald eagle surveys annually for the entire upper North Platte River valley. In addition, the Forest Service annually monitors nests that are known or suspected to occur on the Forest. The Forest has conducted these surveys in the analysis area since 1997.

Breeding Bird Survey route in the adjacent North Platte River valley has been surveyed each year since 1994.

Surveys for northern goshawks are conducted annually across the Forest. Annual monitoring of nests has occurred since the initiation of a goshawk research project on the District in 1992. In addition, all suitable nesting habitat within the Blackhall-McAnulty Analysis Area and that might include a proposed action was surveyed intensively following protocol established in Kennedy and Stahlecker (1993). One new inactive nest was located in 2001 and was not active in 2002. Six other previously known inactive nests were inactive in 2002.

WGFD annually monitors the Sierra Madre elk herd, which includes the project area watershed, with hunter harvest surveys and winter aerial herd composition flights. The Sierra Madre elk herd population was estimated at 5,500 postseason 2001, with a population objective of 4,200 (WGFD 2002).

Extensive radio telemetry aided studies of American marten were conducted from 1985 through 1995 in the adjacent Coon Creek and East Fork Encampment River watersheds. Ninety-six individuals were captured during the study. Mean home range sizes were 1,652 acres in summer and 1,462 acres in winter for females, and 4,494 acres in summer and 3,602 acres in winter for males.

District records, Wyoming Game and Fish Department records (Luce et al. 1999), and Wyoming Natural Diversity Database records (Scholl and Smith 2000) were reviewed for additional observations and surveys of wildlife species.

The Forest Plan requires that habitat capability for vertebrate wildlife species on the forest will be maintained at least at 40% or more of potential. These standards provide direction at the "planning unit" or National Forest level; however, analyses are conducted at the analysis area level (Blackhall-McAnulty) in order to provide a baseline with which to compare the effects of any proposed action.

Habitat potential is evaluated using the Forest Service Region 2 Habitat Capability model (HABCAP). This model is not expected to produce accurate predictions of actual populations of wildlife species, but is useful in comparing the relative magnitude of changes in existing habitat brought about by silvicultural treatment alternatives and make some landscape scale interpretations. Table 46 shows existing condition habitat capability values for the analysis area.

Table 46. Existing Condition for Analysis Area and Management Areas Habitat Capability Values

SPECIES	Analysis Area	Mgt. Area 4B	Mgt. Areas 5A & 5B
Elk – summer/winter	0.60/0.55	0.57/--	0.52/0.67
Goshawk – summer/winter	0.48/0.48	0.46/0.46	--
Hairy woodpecker - yearlong	0.63	0.69	--

Existing condition habitat capability values are currently above the Forest Plan requirement (0.40) for elk, goshawk, and hairy woodpecker. Winter habitat was included for elk because the lower elevation portions of the analysis area include winter range.

4B Management Area

Management area direction for Management Area 4B (emphasis on wildlife habitat for one or more MIS, page III-124) further requires that habitat capability be maintained at a minimum of 80% of potential in 4B areas on the planning unit (National Forest).

Management Area 4B occupies approximately 12,000 acres in the analysis area. Habitat capability information for MIS and vegetation structural stage information provide a general index of the quality of the habitats in the 4B Management Areas in the analysis area. It should be noted that meeting the 4B standard, even existing conditions, has presented considerable difficulty since it was incorporated into the 1985 Forest Plan. The basis for this standard is not clearly known. Difficulties associated with this Forest Plan standard are beyond the scope of this project to address.

The 4B Management Area consists of approximately 19% non-forested and 81% forested in the analysis area. The distribution of acres among the different structural stages within the 4B is similar to the entire analysis area. Distribution among forest types is different. Aspen makes up 8% of the analysis area, but there is no aspen in the 4B Management Area. Most of the aspen stands in the analysis area are in Management Area 4D (91%). There is little spruce-fir and no mountain grassland in 4B; however, these habitat types are very limited in the analysis area also.

Habitat capability for goshawk and hairy woodpecker differ only a small amount between the analysis area and 4B area. Road density does not affect habitat capability values for northern goshawk or hairy woodpecker. Habitat capability is below Forest Plan standard for goshawk (80%) due to a lack of aspen, a lack of riparian foraging habitat, and low amounts of older and larger lodgepole pine (structural stages 4C and 5) for cover (nesting).

Habitat capability for hairy woodpecker is below 80%, predominantly due to low amounts of older and larger lodgepole pine (structural stages 4C and 5) for cover (nesting).

Habitat capability for elk is below 80%, due to lack of aspen as forage, lack of young lodgepole age classes as forage (structural stages grass-3A), and too much mature sagebrush. Mature sagebrush is considered average to low quality habitat during summer.

Winter Range (5A and 5B Management Areas)

Management area direction for Management Area 5A (non-forested big game winter range, page III-143) and 5B (forested big game winter range, page III-150) requires that habitat capability be maintained at a minimum of 80% of potential year-round for big game in these areas on the planning unit (National Forest). Analysis has been combined for these areas since both are winter range and the areas are individually too small to provide meaningful wildlife habitat analysis. Management Area 5A occupies approximately 6,110 acres and 5B occupies 4,815 acres in the analysis area. These areas are winter range within the Sierra Madre elk herd. Habitat capability information for MIS and vegetation structural stage information provide a general index of the quality of the habitats on the winter range management area in the analysis area.

Winter range consists of approximately 56% non-forested and 44% forested in the analysis area. The distribution of acres among the different structural stages within the winter range is not similar to the entire analysis area, due to the higher percentage of shrubs on winter range. Distribution among forest types is different. There is no spruce-fir on winter range, for example.

Moderate differences in habitat capability between winter range and the analysis area for elk in summer are related to lodgepole pine, sagebrush, and aspen. The grass through 3A stage of lodgepole pine and all stages of aspen, except 4C, are considered excellent forage stands. The analysis area has a higher percentage of these stands than does the winter range. Mature sagebrush is considered average to low quality summer habitat for elk relative to other potentially available forage. The winter range has a much higher percentage of mature sagebrush. Another factor that decreases habitat capability below Forest Plan requirements on winter range during summer is road density. Forest Plan requirement for roads in 5A/5B was mentioned earlier.

Forest Plan requirement for habitat capability on winter range during winter is not met for those same reasons identified above--lack of aspen, lack of young lodgepole age classes, too much mature sagebrush, and road density. The area is currently open for snowmobile travel during winter. It should be noted that meeting the 80% habitat capability winter range standards, even existing conditions, has presented considerable difficulty since it was incorporated into the 1985 Forest Plan. The basis for this standard is not clearly known. Difficulties associated with this Forest Plan standard are beyond the scope of this project to address.

Other Forest Plan Direction/Standards

Items a-f in the Forest Plan (p. III-31 & 32) identify standards and guidelines for management activities in proximity to raptor nests, including bald eagle, peregrine falcon, golden eagle, ferruginous hawk, Swainson's hawk, northern goshawk, prairie falcon, and osprey.

A bald eagle nest existed in the analysis area in 1997, but the nest blew down in 1998. No other nest site was selected in the analysis area.

Goshawk surveys and general wildlife surveys have been conducted in the analysis area. No active raptor nests were discovered. One new inactive goshawk nest was discovered, and 6 previously known inactive goshawk nests were found to be inactive again.

Items g & h (p. III-32) identify standards and guidelines for management activities in proximity to rookeries and grouse leks. There are no known rookeries or leks in the analysis area.

Items i, j, and k (p. III-32 & 33) relate to shrublands. Treated blocks of sagebrush and mountain shrub shall be no larger than 80 acres in areas that are used by sage grouse or sharp-tailed grouse, or are classified as winter range. There is elk winter range in the analysis area, and mature and older age classes dominate the shrub community types.

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Existing conditions described earlier would not change under Alternative 1 in the short term. Aspen stands would continue to age and be lost through succession to conifer stands over several decades. The patchy network of some aspen stands would continue as stands become smaller and less extensive. Only periodic natural wildfire would promote and restore significant aspen acreage and increase patch size.

The grass/forb component of the Forest would continue to be below Forest Plan requirements. There could be a small but very slow, long-term increase in grass/forb component due to dwarf mistletoe and endemic mountain pine beetle-caused tree mortality. However, the potential rate of grass/forb increase may not exceed the rate of conifer regeneration and expansion. Periodic natural wildfires would increase significantly the grass/forb component in a shorter term.

The current patchy network of some conifer stands, as a result of timber harvest from the last 5 decades, would continue but decline for approximately 80 to 100 years as stand characteristics become similar among aging patches. Natural mortality from dwarf mistletoe or mountain pine beetles may increase patch size over decades through stand death and regeneration. Secondly, patch size may increase from periodic natural wildfires, if these fires were allowed to burn.

Lodgepole pine would continue to dominate the forested landscape, but there could be some increase in spruce-fir. Spruce-fir acres might increase from the current 2,292 acres to approximately 5,800 acres over several centuries, based on a coarse assessment of Romme and Knight's (1981) estimate of fire frequency and spruce-fir occurrence in relation to elevation and topography.

Snag density and availability of coarse woody debris would increase through time as stands matured and were affected by mistletoe and bark beetles.

Proposed Action

A. Vegetation Diversity/Habitat Management (III-14)(III-34 to III-36)

No harvest will occur in stands identified as thermal cover. Thermal cover would remain below Forest Plan requirements.

Vertical diversity would decline under the Proposed Action. Boundary treatment unit #3 would harvest 14 acres of mature, 41-70% canopy cover, lodgepole that is designated as old growth. Forest Plan requirements for acres of old growth would still be met.

However, this boundary treatment unit would not meet Forest Plan requirement for 4B Management Areas to "maintain habitat for old-growth dependent species" (III-125). A suitable replacement stand is available that could be designated to meet this requirement. The stand at locsite 2050030026 in the RIS database is an 18-acre mature lodgepole with canopy cover of 10-40%. The additional 4 acres would also move the analysis closer to the vertical diversity requirement.

Twenty-four acres of clearcutting would occur in lodgepole stands with an old growth score ≥ 38 but these stands are not designated old growth. The 234 total acres of clearcutting and 35 acres of overstory removal would reduce vertical diversity, but the acres of grass/forb would increase. Acres of grass/forb are currently below Forest Plan requirements. Twenty acres of shelterwood seed harvest would occur in spruce-fir stands with an old growth score ≥ 38 but these stands are not designated old growth. The 155 total acres of shelterwood seed harvest would reduce vertical diversity. These harvest methods would reduce vertical diversity from 5,001 acres to 4,577, while the Forest Plan requirement is 7,037.

There are sufficient stands in the 9A Management Areas to meet Forest requirements for old growth. However, no acres are designated (timber code 871) as old growth. At least 82 acres should to be designated as old growth. Two stands of large lodgepole pine and one stand of large spruce-fir would be acceptable candidates for designation as old growth. These stands are a combined 84 acres, identified as locsites 2051170009, 2051170010, and 2051170028 in the RIS database. They occur along the Middle Fork of Big Creek.

Horizontal diversity is well above Forest Plan requirements due to past harvest. Horizontal diversity would decline due to the loss of snags and damaged trees (future snags) in the fire salvage and boundary treatment. Horizontal diversity would initially increase due to clearcuts and overstory removal. However, horizontal diversity would decline over decades, since most proposed harvest units occur between or within existing harvest units from the past. Only clearcut harvest units 25, 52, 66, and 69 (38 acres) add new polygons to horizontal diversity. Overall harvest unit placement will reduce the number of patches and increase patch size over time as stands mature. This goal was identified under Purpose and Need. Horizontal diversity will remain above Forest Plan requirements.

Clearcut, overstory removal, commercial thin, precommercial thin, boundary treatment, shelterwood seed, and sanitation salvage harvest would reduce the 25,800 acres of hiding cover in the analysis area by 1,289 acres. Hiding cover would remain well above Forest Plan requirements.

Clearcut, commercial thin, and boundary treatment would reduce the 8,262 acres of hiding cover by 54 acres in 4B Management Area. Forest Plan requirements would still be met. Boundary treatment would reduce the 4,500 acres of hiding cover by 28 acres in 5A/5B Management Areas. Forest Plan requirements would still be met.

Boundary treatment would not meet Forest Plan standards for snag retention in the 116 treated acres.

The extent of mature shrubs would decrease and young shrubs would increase by as much as 783 acres from the prescribed burning of 10% to 50% of the proposed shrub stands in 5A/5B Management Areas. This action would meet Forest Plan requirements.

Moving the Big Creek trailhead to a better location where existing trail use already occurs would have no effect to wildlife habitat, Forest Plan standards for wildlife, or individual wildlife species. Therefore, there is no further analysis for this project.

The control of cheatgrass with Plateau would return these stands to grass/forb and sagebrush, which are useful wildlife habitats. Wildlife would not benefit from persistence or increase of cheatgrass stands.

Removal of mine spoils from Turnbull Gulch might improve water quality of that stream; however, it is unknown what effects these spoils have on water quality. There should be no change in wildlife habitat. All terrestrial wildlife species would be expected to be displaced 25m to 50m during project work, based on the wildlife biologist's professional opinion of the noise levels at the site. Wildlife would return after project completion. There would be no additional effect to wildlife habitat, Forest Plan standards for wildlife, or individual wildlife species. Therefore, there is no further analysis for this project.

Roads

Roads are known to negatively affect wildlife. Effects are usually identified as direct loss of habitat, changing landscape pattern of habitat, increased predation, parasitism, reduced fitness from disturbance, collision with vehicles, harassment, or other disturbance.

Direct loss of habitat in the analysis area is 182 acres, based on a road width of 18 ft. for arterial roads, 15 ft. for collector roads, and 12 ft. for local (primitive) roads. However, other research (in Tinker et al. 1998) found that effects of edge extend more than 50 meters into the forest. Total habitat loss from roads is 4,675 acres in the analysis area, based on the 50-meter influence. It is assumed that effective closure of proposed road decommissioning will return these routes to vegetated wildlife habitat over time.

Roads distributed across the landscape (*as in the Blackhall-McAnulty Analysis Area*) have a greater effect on that landscape than roads concentrated within parts of the landscape. The effect of road edges may extend more than 50 meters into the adjacent forest. Edges created by roads and clearcuts are different from edges created by natural events such as fire because road-created edges are abrupt. Reed et al. (1996a) studied the Tie Camp area immediately west of the Blackhall-McAnulty Analysis Area. They found that roads added to forest fragmentation more than clearcuts by creating smaller patches, more patches, and converting interior habitat to edge habitat. Roads increased the number of patches by 179% and decreased patch size by 65% since 1950. Roads increased the distance between patches of interior habitat. Whereas natural and clearcut patches become progressively less defined, road edges exist long term and are more frequently disturbed. They recommended Forest-wide evaluation of roads with systematic obliteration and revegetation of old, little-used roads.

As mentioned earlier, there are too many roads in the 5A/5B Management Areas to meet Forest Plan requirements. Forest Plan (III-148, III-157) states, "Allow new roads in the management area only if needed to meet priority goals outside the management area or to meet big game goals on the management area. Obliterate temporary roads within one season after planned use ends." Many roads created by Forest users, or by the Forest, were not effectively eliminated after authorized use.

Elk prefer a buffer zone of 800m from pedestrians and 400m from moving traffic; mule deer prefer 180m from pedestrians and 90m from moving traffic. These distances may increase on winter ranges where timber is not accessible for cover. Most disturbing is traffic that is slow moving and where people are more apt to stop and get out of vehicles when they see animals.

Road density was also given strong consideration in the analysis. The analysis area contains elk winter range, is popular for fall elk hunting, and extensive research (as identified above) has shown a negative effect between road use and the quality of elk habitat. Elk security has been a concern raised in several previous Forest projects. Elk security is addressed specifically in *B. Wildlife Resource Management*. The relationship between elk and road density is reflected in the HABCAP model. Habitat capability for elk in the analysis area during hunting season increases from 0.41 to 0.46 when only the proposed road closures are considered. All Forest roads receive primary road use levels during hunting season.

Another evaluation compared existing condition to only the proposed road closures in the 5A/5B big game winter range management areas during hunting season. Habitat capability improves from 0.30 to 0.37 during hunting season.

Alternative 2

All effects described for the Proposed Action would occur under Alternative 2, except that benefits from road decommissioning would be reduced. Alternative 2 would result in only 29 miles of restoration. Habitat regained from 29 miles of proposed road closure and revegetation would be 42 acres, based on a 12 ft. width for primitive roads. Habitat regained would be 1,153 acres considering the 50-meter edge effect described by Tinker et al. (1998) and Reed (1996). There would be a smaller reduction in Forest fragmentation, since fewer roads would be decommissioned. Reed et al. (1996a) analysis indicated that roads were a major contributor to fragmentation. This alternative would accomplish less of the Forest Plan requirements for 5A/5B Management Areas to “Allow new roads in the management area only if needed to meet priority goals outside the management area or to meet big game goals on the management area. Obliterate temporary roads within one season after planned use ends” (III-148, III-157). Many roads created by Forest users, or by the Forest, were not effectively eliminated after authorized use.

HABCAP analysis indicated essentially no difference in elk habitat capability (0.01) from 9 miles less road decommissioning in Alternative 2 for the analysis area. However, these numbers describe only a small portion of the effects identified by Ward, Hillis et al., and Leptich and Zager described earlier.

Alternative 3

Effects of Alternative 3 would be the same as the Proposed Action, except for the following. Vertical diversity would decline less. Boundary treatment unit #3 would not be harvested. It is designated old growth. There would be no clearcutting of the 24 acres of lodgepole stands with an old growth score ≥ 38 (these stands are not designated old growth).

Horizontal diversity would decline less from the loss of snags and damaged trees (future snags) since there would be no fire salvage and no boundary treatment at Skyline. Most obvious, horizontal diversity would initially decline less since there is no clearcutting (234 acres) or overstory removal (35 acres). Over decades, however, horizontal diversity would be higher than the Proposed Action since most clearcut and overstory removal units were placed between or within existing units to reduce the number of patches and increase patch size.

Boundary treatment would not meet Forest Plan standards for snag retention in the 74 treated acres.

Alternative 4

Effects of Alternative 4 would be the same as the Proposed Action except for the following. There is no harvest proposed under Alternative 4. Vertical diversity would remain at the existing condition level and not meet Forest Plan requirements.

Horizontal diversity would remain well above Forest Plan requirements due to past harvest. Horizontal diversity would not decline due to the loss of snags and damaged trees (future snags) in the fire salvage and boundary treatment. Horizontal diversity would initially be lower than the Proposed Action, since there would be no clearcuts or overstory removal. However, horizontal diversity would be higher than the Proposed Action over decades, since most harvest units in the Proposed Action would have occurred between or within existing harvest units from the past.

Forest Plan standards for snag retention in treated areas would be met, since there is no boundary treatment.

B. Wildlife Resource Management

Habitat for Viable Populations of Existing Vertebrate Wildlife Species

The primary quantitative tool used to analyze the effects of the proposed treatments on wildlife habitat is the habitat capability model (HABCAP). This model is not expected to produce accurate predictions of actual populations of wildlife species but is useful in comparing the relative magnitude of existing habitat brought about by vegetation treatments. Management indicator species (MIS) selected for analysis included Rocky Mountain elk, northern goshawk, and hairy woodpecker. Habitat capability improves for elk and is unchanged for goshawk and hairy woodpecker under the Proposed Action (Table 47).

Table 47. Habitat Capability for MIS Species

	Elk		Goshawk		Hairy woodpecker
	Summer	Winter	Summer	Winter	Yearlong
Existing Condition					
Analysis Area	0.60	0.55	0.48	0.48	0.63
4B Mgt. Area	0.57	-	0.46	0.46	0.69
5A/5B Mgt. Area	0.52	0.67	-	-	-
Proposed Action					
Analysis Area	0.63	0.58	0.48	0.48	0.62
4B Mgt. Area	0.58	-	0.46	0.46	0.69
5A/5B Mgt. Area	0.62	0.73	-	-	-

	Elk		Goshawk		Hairy woodpecker
	Summer	Winter	Summer	Winter	Yearlong
Alternative 2					
Analysis Area	0.63	0.58	0.48	0.48	0.62
4B Mgt. Area	0.58	-	0.46	0.46	0.69
5A/5B Mgt. Area	0.60	0.73	-	-	-
Alternative 3					
Analysis Area	0.63	0.57	0.48	0.48	0.63
4B Mgt. Area	0.58	-	0.46	0.46	0.69
5A/5B Mgt. Area	0.62	0.70	-	-	-
Alternative 4					
Analysis Area	0.63	0.57	0.48	0.48	0.63
4B Mgt. Area	0.58	-	0.46	0.46	0.69
5A/5B Mgt. Area	0.62	0.70	-	-	-

Elk

Alternative 1 - No Action

No action would continue the scenarios described under Existing Condition. There would be a general maturing of conifer stands, expected losses due to beetles and mistletoe, loss of limited aspen to conifers, maturing and decadence of shrub stands, and continued current road use.

CUMULATIVE EFFECTS

No action would maintain present habitat for a few decades. Aspen would continue to degenerate and be lost to conifers. The result would be decreasing amounts of foraging habitat and increasing amounts of cover through time. Some lodgepole would be lost to mistletoe and pine beetles. Lost stands of aspen would not return until an agent such as wildfire restarted succession. Lost lodgepole would be replaced most often with lodgepole unless aspen occurred nearby. Cover would increase unless beetle and mistletoe losses became widespread or unless large wildfires removed cover.

Proposed Action

Habitat capability values for elk increased toward or above Forest Plan requirements under the Proposed Action due to decreased road density, prescribed burning, and increases in other foraging habitat. Previous analysis in this document indicated that hiding cover was well above requirements, so conversion of some hiding cover to foraging habitat through timber harvest increases habitat capability values.

The pole size to mature stands of lodgepole pine common in the watershed provide little elk foraging habitat. All harvest strategies proposed would allow greater light penetration and more available nutrients and moisture to promote grass/forb production. This would be particularly true for clearcuts, overstory removal, and boundary treatments. Still, these treatments would create only 386 acres (<1%) of new foraging habitat in the analysis area. There would also be a small increase in aspen from these treatments to provide foraging habitat.

Prescribed burning of as much as 1,302 acres (50% of 2,604 acres) of shrub stands would promote grass/forb and a small amount of aspen habitat. This would increase the grass/forb component of shrub stands in the analysis area by 8%. There is an abundance of cover but a lack of foraging habitat in the analysis area. Currently, about 75% of the analysis area is forested. Hoover and Wills (1984) suggest elk habitat should generally be 40% forested and 60% foraging habitat.

Cheatgrass treatment would return these 44 acres to useful foraging habitat for elk.

The value of hiding cover to big game is in affording areas for bedding, foraging, calving/fawning, escape, thermal relief, and sometimes security. Hiding cover is currently about 10,000 acres above the Forest Plan requirement in the analysis area. Hence, hiding cover is not limited in acreage or distribution after proposed harvest.

Thermal cover, weather sheltering that reduces energy expenditure, is below requirements--but none was proposed for harvest. One limitation to the amount of thermal cover (≥ 30 -acre patches) was the size of existing forest patches as a result of past harvest. Proposed harvest units were designed to combine past harvest units and create larger patches after several decades. This will provide future thermal cover if canopy closure $\geq 69\%$ can be achieved. Existing thermal cover is distributed throughout the analysis area, except where limited by shrub stands in the southeast or by past harvest in the southwest.

Elk habitat effectiveness, the percentage of available habitat that is usable, would initially decrease in the area as a result of activities directly associated with temporary road construction, road reconstruction, timber harvest, log hauling, Turnbull Gulch stream restoration, and prescribed burning. These short-term negative effects should not result in long-term negative effects to resident elk or the Sierra Madre elk herd. There would be temporary displacement of elk, expected to be a few weeks to the following summer after activities have ended (Lyon and Ward 1982).

Roads have been documented to negatively affect elk populations by removing habitat, increasing disturbance, and increasing vulnerability (Christensen et al. 1991). Existing road density is limiting habitat capability for elk as reflected by HABCAP. Road density is being evaluated by the USFS Sierra Madre Travel Management roads analysis currently in progress. The Blackhall-McAnulty Proposed Action includes road closures from that analysis, particularly in winter ranges. Thirteen miles of road needed for harvest operations would be closed or obliterated (temporary roads) after use. There will likely be some use of closed roads by hikers, hunters, and other recreationists. There may be occasional illegal motorized use and administrative use of some roads. However, there would be long-term positive effects to elk due to road closure. Proposed road decommissioning would increase security habitat.

There would be some small changes to habitat for elk in 4B Management Areas as a result of proposed actions. The only harvests proposed in this management area are 14 acres of boundary treatment, 32 acres of commercial thinning, and 23 acres of shelterwood preparation. Harvest effects would be minimal, but they would increase foraging habitat.

There would be 6 miles of road closed and 123 acres of prescribed burning of shrub stands in 4B Management Areas. These two activities would have a greater effect on elk, a positive effect, than proposed harvest.

There would be an increase in habitat quality for elk in 5A/5B Management Areas as a result of road closures, prescribed burning of shrub stands, and the 1 unit of 28-acre boundary treatment. Road closure would improve habitat effectiveness and increase security areas. Burning and boundary treatment would improve forage conditions.

CUMULATIVE EFFECTS

Twenty-seven percent of the forested habitat in the watershed has been harvested in the past, with an additional 9% proposed under this project. As already mentioned, Forest Plan required amounts of hiding cover will exist, considering all past and proposed events. Thermal cover was below requirements, but none is proposed for harvest. There would also be a desired increase in grass/forb component toward Forest Plan requirement. Security cover does not meet the 30% suggestion of Hillis et al. (1991), but improves with road decommissioning.

The Sierra Madre elk herd population was estimated at 5,500 postseason 2001, with a population objective of 4,200 (WGFD 2002). The population has been decreasing toward the objective for several years due to harvest strategies. The project described and analyzed above is expected to increase elk habitat effectiveness in the analysis area due to road closures (and security area increases), prescribed burning, and harvest in decreasing order of effect. Beyond habitat capability modeling, elk will benefit immediately from other effects of road closure described earlier and, in several decades, from the consolidation of many smaller patches of past harvest due to proposed harvest. This would meet one of the requirements of security habitat (blocks of vegetation ≥ 250 acres). Habitat could become thermal cover and security habitat if future vegetation and road management allow this progression.

Alternative 2

Effects of Alternatives 2 would be similar to effects described for the Proposed Action, except for the following: Elk habitat capability and security habitat would increase less under Alternative 2 because there is less road decommissioning. Habitat capability decreases slightly in summer in the 5A/5B Management Areas under Alternative 2 because there is less road decommissioning.

Alternative 3

Effects of Alternatives 3 would be similar to effects described for the Proposed Action, except for the following: Habitat capability decreases slightly in winter in the analysis area and 5A/5B Management Areas under Alternatives 3 because there is less harvest creating foraging areas. Cumulative effects would include harvest of 817 acres (2%) of the forested habitat under Alternative 3. There would be more hiding cover retained in the analysis area and greater opportunity for security areas in the near future due to less harvest.

Alternative 4

Effects of Alternative 4 would be similar to effects described for the Proposed Action, except for the following: Habitat capability decreases slightly in winter in the analysis area and 5A/5B Management Areas under Alternative 4 because there is less harvest creating foraging areas. The cumulative amount of forested habitat that is harvested in the analysis area will not change from the existing condition under Alternative 4, since no harvest is proposed. There would remain a lack of grass/forb habitat for the analysis area under Alternative 4 caused by no conversion of forested habitat by timber harvest.

Northern Goshawk***Alternative 1 - No Action***

Endemic levels of insects and pathogens play significant ecological roles, including tree mortality, defoliation, decay, and deformity. These processes are important attributes in goshawk foraging and nesting habitat. No action will result in positive and negative effects to northern goshawks. No action may result in continued nesting habitat, unless characteristic stands are lost to mistletoe and beetle mortality, or nesting habitat in aspen is lost through natural succession. Natural regeneration of lodgepole or aspen after beetle, disease, or wildfire events could reproduce nesting habitat 80 years after these events. Natural tree mortality would attract woodpecker prey species, while there would be a decline in red squirrel prey. Loss of aspen would result in loss of prey species such as blue grouse. Lodgepole and aspen regenerating after natural disturbances would create short-term habitat for snowshoe hare prey species. Overall, it is expected that foraging habitat and associated prey species will be available consistently with one exception, cheatgrass. Cheatgrass does not provide quality habitat for any prey species. The persistence or expansion of cheatgrass is limiting alternate prey habitat by 44 acres.

CUMULATIVE EFFECTS

No action would maintain present nesting habitat for a few decades. Limited aspen would continue to degenerate and be lost to conifers. Some lodgepole would be lost to mistletoe and pine beetles. Lost stands of aspen would not return until an agent such as wildfire restarted succession. Lost lodgepole would be replaced most often with lodgepole unless aspen occurred nearby. Regeneration to nesting habitat would occur 80 years after loss of either tree species.

Proposed Action

Habitat capability values for goshawk are above Forest Plan requirements in the analysis area, but not the 4B Management Area. There is no change among alternatives, due to the small amount of proposed vegetation change, the limited amount of nesting habitat available in the analysis area based on existing vegetation and elevation, and the fact that road density does not affect HABCAP values. The stands proposed for harvest do not include any known active or inactive nests. There are 6 known nests in the analysis area. There is an inactive nest within ¼ mile of proposed sanitation salvage unit #47 and commercial thin unit #54. Forest Plan requirements (III-31) for protection of this nest will be implemented (i.e., no disturbance within ¼ mile from March 1 through July 31).

Other proposed harvest units do include potential nesting habitat. There are currently 4,077 acres of nesting habitat in the watershed. Clearcuts and overstory removal proposed within potential nesting habitat will prohibit nesting in these stands until regeneration to mature lodgepole or aspen, approximately 80 years. This would affect 58 acres of nesting habitat (aspen and lodgepole 4B, 4C and 5, as identified in Table 44). This would also affect 96 acres of nesting habitat from the partial thinning harvest methods (shelterwood prep and sanitation salvage), but these stands could still be used for nesting.

Overall, harvest could affect 3 goshawk nesting territories--the known inactive nest described above, and 2 areas that have suitable habitat but no known nests. These territories are adjacent within suitable nesting habitat, and there is no proposed harvest within any other potential territories. Clearcut and overstory removal would affect 2 of the 3 territories. Measures described above for prohibiting disturbance would provide protection for these areas. There are more than 150 other known active or inactive nest sites that have been identified on the District.

Proposed harvest would affect foraging habitat by reducing forest structure, reducing snags, dead topped trees and coarse woody debris, reducing understory cover until regeneration occurs, and promoting aspen as regeneration occurs. Primary prey species (Squires 2000), the red squirrel and northern flicker, would decline from these habitat changes. The resulting grass/forb stands would benefit alternate prey species such as golden-mantled ground squirrels, deer mouse, and montane vole. Later regeneration to a shrub-like understory would benefit alternate prey species such as snowshoe hare and blue grouse. Prescribed burning would follow the grass/forb to shrub scenario.

Fire salvage of 144 acres of mature lodgepole, spruce/fir, and aspen trees and snags may affect the primary and secondary cavity nester prey base, particularly woodpeckers. However, cavity nester habitat will be available in the remaining 362 acres of burned forest.

Road decommissioning would turn bare ground to potential habitat for prey species over time.

Proposed prescribed burning would eliminate habitat for some alternate prey species such as jackrabbit and blue grouse, but create habitat for alternate prey species such as deer mouse and montane vole. Overall, there should be no change in the availability of habitat for alternate prey species.

Overall, habitat capability does not change for goshawk, due to the small amount of harvest in nesting habitat and the ability of goshawks to continue to forage for primary and secondary prey species in other harvest units.

There would be little change to habitat in 4B Management Areas as a result of proposed actions. The only proposed harvests in this management area are 14 acres of boundary treatment, 32 acres of commercial thinning, and 23 acres of shelterwood preparation. The only proposed harvest that is within the management area and within goshawk nesting habitat is the 14 acres of boundary treatment. These would have little effect to foraging habitat, and nesting habitat would decrease by 14 acres.

There would be 6 miles of road closed and 123 acres of prescribed burning of shrub stands in 4B Management Areas. These 2 activities would return bare ground to future foraging habitat and provide grass/forb habitat for alternate prey species.

CUMULATIVE EFFECTS

Twenty-one percent of the forested habitat in the cumulative analysis area has been treated with some type of harvest in the past, with an additional 4% proposed under this project. There are 10 known or suspected territories in the cumulative analysis area, including 8 territories on the Brush Creek/Hayden District and 2 territories on the Hahns Peak/Bears Ear District (Colorado). There are also more than 150 territories on the Brush Creek/Hayden District, 9 on the adjacent Parks District, and 50 on the adjacent Hahns Peak/Bears Ear District in Colorado. Most nests searched in these Districts in any given year have been inactive. Harvest has and will temporarily eliminate nesting areas within territories. These areas are expected to regenerate to nesting habitat within 80 years of harvest and include some aspen. Graham et al. (1997) indicated that the intent of goshawk recommendations was to maintain mosaic forest conditions that would sustain the goshawk and its suite of prey species. Regeneration of lodgepole and some aspen stands would be consistent with this intent.

Population data for the goshawk results from the National Breeding Bird Survey (BBS) (Sauer et al. 2001). Populations of goshawks are considered stable to declining in Wyoming (-1.7%/year, $p=0.84$, 95% C.I. -16.5 to 13.0) and declining in the southern Rockies, which includes the Medicine Bow-Routt National Forest (-14.9%/yr, $p=0.22$, 95% C.I. -25.5 to -4.4). These results are consistent with the low annual occupancy rate that has been found for nests on the Forest.

Habitat analysis results are consistent with HABCAP evaluations, which indicate no changes in habitat capability. Population data from BBS follow this analysis, with populations stable to declining. Analysis indicates that habitat is sufficient to support viable populations of goshawks, considering the availability of existing vegetation for providing nesting habitat.

Alternative 2

Effects of Alternative 2 would be similar to effects described for the Proposed Action, except for the following: Habitat capability does not change, since road density does not affect this value. There would be fewer acres restored to alternate prey habitat under Alternative 2, due to less road decommissioning.

Alternative 3

Effects of Alternative 3 would be similar to effects described for the Proposed Action, except for the following: Habitat capability does not change, since road density does not affect this value, and proposed treatments under this alternative affect less habitat than the Proposed Action (which did not change habitat capability values). Only 14 acres (boundary treatment) of goshawk nesting habitat would be eliminated for 80 years, since there are no proposed clearcut or overstory removal units under these alternatives. Partial thinning (shelterwood prep and sanitation salvage) would affect 73 acres of nesting habitat under Alternative 3. This harvest would affect 2 goshawk nesting territories--the known inactive nest described above, and 1 area that has suitable habitat but no known nests.

Primary prey species, red squirrel and northern flicker, would be expected to decline less from habitat changes of reduced forest structure, and reduced snags, dead topped trees, and coarse woody debris, since Alternative 3 has no clearcuts, overstory removal, and boundary treatment at Skyline. Habitat for primary and secondary cavity nester prey base would be affected less under Alternative 3, since there would be no fire salvage.

There would be no decrease in nesting habitat in 4B Management Areas, since boundary treatment at Skyline does not occur under Alternative 3.

Alternative 4

Effects of Alternative 4 would be similar to effects described for the Proposed Action, except for the following: Habitat capability does not change, since road density does not affect this value, and proposed treatments under this alternative affect less habitat than the Proposed Action (which did not change habitat capability values). Forested vegetation would not change from the existing condition under Alternative 4, since there is no proposed harvest.

Hairy Woodpecker

Alternative 1 - No Action

Endemic levels of insects and pathogens play significant ecological roles, including tree mortality, defoliation, decay, and deformity. These processes are important attributes in hairy woodpecker prey, and foraging and nesting habitat. No action will result in positive and negative effects to hairy woodpeckers.

No action would result in the gradual decline and loss of aspen stands through succession. Hairy woodpeckers have been found to be highly dependent on mature aspen for nesting on the Forest (Loose and Anderson 1995). There would also be a gradual increase and maturing of lodgepole pine. The maturing lodgepole and its associated populations of prey species would benefit hairy woodpeckers. The endemic populations of mountain pine beetles and dwarf mistletoe would provide prey insects, habitat for prey insects, and future snag habitat for cavity nesting. Periodic natural wildfires would provide snags for nesting and foraging. Mature age classes of timber are abundant in the analysis area. This habitat is well distributed across the analysis area.

CUMULATIVE EFFECTS

No action would maintain present habitat for a few decades. Limited aspen would continue to degenerate and be lost to conifers. Some lodgepole would be lost to mistletoe and pine beetles. Lost stands of aspen would not return until an agent such as wildfire restarted succession. Lost lodgepole would be replaced most often with lodgepole unless aspen occurred nearby. Nesting habitat could be provided from snags created by fire, insects, or disease as long as snags remained standing. Foraging habitat would parallel the amount of mountain pine beetle, snags, and downed logs in the analysis area.

Proposed Action

Habitat capability values for hairy woodpecker are above Forest Plan requirements in the analysis area for all alternatives. The small decline from existing condition to proposed action is due to harvest (clearcut, overstory removal) of large pole size and mature lodgepole pine used for foraging and nesting. This encompasses 252 acres. These stands would become suitable for nesting again after maturing and having some decay that allows cavity excavation in approximately 90 years. This small 252-acre effect coincides with the 0.01 decline in habitat capability for the Proposed Action.

Beyond HABCAP results, habitat quality would decline, due to removal of beetle infected or diseased trees containing prey and the burning of slash, also likely to contain prey. Burning of slash would benefit hairy woodpeckers in the future if burning occurred in areas where aspen would be promoted.

The partial harvest methods (sanitation salvage and shelterwood prep) will reduce canopy cover on an additional 624 acres of hairy woodpecker habitat but not reduce habitat structural stage. Some potential cavity-nesting trees and foraging sites would be lost but Forest Plan standards for snag retention (III-15) will be followed.

There would be a large decline in the quality of hairy woodpecker habitat from boundary treatment due to the removal of most or all dead trees that would be used for nesting or foraging. This action would affect 42 acres of hairy woodpecker habitat.

There would be a loss of foraging and potential nesting sites from the 144 acres of fire salvage within the 506 acres of the Bear Mountain South wildfire. The burn area will provide an exceptional source of prey and a promising source of nesting trees. Hairy woodpeckers are known to respond positively to fires in conifer stands (Murphy and Lehnhausen 1998).

Commercial thinning and precommercial thinning do not occur in habitat used by hairy woodpeckers for nesting or foraging, and prey species do not use these stands. Therefore, these actions would not affect hairy woodpeckers.

Road decommissioning would turn bare ground to potential habitat for prey species over time as trees revegetated the sites and matured sufficiently to host beetles.

Cheatgrass is not used by hairy woodpeckers or their insect prey. Returning these stands to native vegetation would not affect the hairy woodpecker.

Prescribed burning could reduce prey availability unnoticeably if individual trees that exist within sagebrush shrub burn units were infected with prey and were burned.

There would be little change to habitat in 4B Management Areas as a result of timber harvest; too little, in fact, to be measured by HABCAP. The only proposed harvest that is within the management area and within hairy woodpecker habitat is the 14 acres of boundary treatment. This would have little effect to foraging habitat, and nesting habitat would decrease by 14 acres.

CUMULATIVE EFFECTS

Twenty-seven percent of the analysis area has been harvested in the last 50 years. There will be adequate distribution of suitable habitat for 130 potential nest areas after proposed harvest, if acreage is the only limiting factor. Harvest has and will temporarily eliminate some nesting and foraging habitat. Some future nesting will be created by aspen regeneration in clearcut units. There is Forest Plan required retention of replacement snags to provide some habitat quality.

Hairy woodpeckers have been found to be well distributed within suitable habitat. Two hairy woodpeckers were located during wildlife surveys in the analysis area. Population data for the hairy woodpecker results from the National Breeding Bird Survey (BBS) (Sauer et al. 2001). Populations of hairy woodpeckers are considered stable to slightly increasing in Wyoming (4.1%/year, $p=0.52$, 95% C.I. -8.1 to 16.3) and stable to slightly decreasing in the southern Rockies, which includes the Medicine Bow-Routt National Forest ($-2.2\%/yr$, $p=0.61$, 95% C.I. -10.5 to 6.1). These results are consistent with habitat capability (HABCAP) and habitat structural stage analysis just described. The hairy woodpecker would be minimally affected by the proposed treatments. Analysis indicates that habitat is sufficient to support viable populations of hairy woodpeckers, considering the availability of existing vegetation for providing habitat.

Alternative 2

Effects of Alternative 2 would be similar to effects described for the Proposed Action except for the following: There would be fewer acres restored to potential future habitat under Alternative 2, due to less road decommissioning.

Alternative 3

Effects of Alternative 3 would be similar to effects described for the Proposed Action, except for the following: In Alternative 3, habitat capability improves to existing condition values because alternatives 3 does not include clearcuts or overstory removal, which eliminated some nesting and foraging habitat in the Proposed Action. Road density does not affect this value. No hairy woodpecker nesting habitat would be eliminated for 90 years, since there are no proposed clearcut or overstory removal units under this alternative. Partial thinning (shelterwood prep and sanitation salvage) would affect 205 acres of nesting habitat under Alternative 3. This harvest could affect 2 nesting areas; however, nesting habitat would not be eliminated. There is no boundary treatment in hairy woodpecker habitat under Alternative 3, so habitat quality will not be greatly reduced there. Prey species and potential nesting trees would be expected to decline less from habitat changes of reduced forest structure, reduced snags, dead topped trees, and coarse woody debris, since Alternative 3 has no clearcuts, overstory removal, fire salvage, and boundary treatment at Skyline. There would be no decrease in nesting and foraging habitat in 4B Management Areas, since boundary treatment at Skyline does not occur under Alternative 3.

Alternative 4

Effects of Alternative 4 would be similar to effects described for the Proposed Action, except for the following: In Alternative 4, habitat capability improves to existing condition values because Alternative 4 does not include clearcuts or overstory removal, which eliminated some nesting and foraging habitat in the Proposed Action. Road density does not affect this value. No hairy woodpecker nesting habitat would be eliminated for 90 years, since there are no proposed clearcut or overstory removal units under this alternative. Forested vegetation would not change from the existing condition under Alternative 4, since there is no proposed harvest.

Forest Plan Consistency

Existing condition and Proposed Actions for resource values examined in this report are in compliance with Forest Plan general direction and standards and guidelines, with the following exceptions:

- Vertical diversity - Proposed actions would continue to decrease vertical diversity. Boundary treatment unit #3 is designated old growth. 9A Management Area does not have sufficient old growth. Designation of 18 acres and 82 acres as old growth for mitigation described later would reduce the further decline of vertical diversity.
- Snag retention – Boundary treatments would not retain snags in 116 acres. This also reduces vertical diversity.
- Percent grass/forb - Proposed prescribed burn treatments will increase the grass/forb component, moving toward desired condition.
- Thermal cover – No harvest is proposed in existing thermal cover.
- 4B Management Area thermal cover - No harvest is proposed for existing thermal cover.
- 4B Management Area habitat capability – HABCAP is below 0.80 for elk, goshawk, and hairy woodpecker in the existing condition, but does not decrease for goshawk and hairy woodpecker under the Proposed Action and increases for elk.
- 4B old growth – harvest of boundary unit #3 would not meet Forest Plan requirement of “maintain habitat for old-growth dependent species” (III-125).
- 5A Management Area young age class shrubs – Proposed prescribed burn will provide young shrub stands in several years.
- 5B Management Area thermal cover – No harvest is proposed for existing thermal cover.
- 5A/5B Management Area roads – Existing condition does not follow Forest Plan requirement (III-148, III-157). Allow new roads in the management area only if needed to meet priority goals outside the management area or to meet big game goals on the management area. Obliterate temporary roads within one season after planned use ends. Proposed Action moves analysis area toward this requirement; Alternative 2 does so to a lesser degree.

- 5A/5B Management Areas habitat capability – HABCAP is below 0.80 for elk in existing condition, but increases to varying degrees under each alternative.
- 9A old growth – No harvest is proposed in 9A Management Area; however no old growth is designated in 9A. Twenty percent is required. Three units, totaling 84 acres, are recommended as mitigation to meet this requirement.

The Proposed Action will be consistent with Forest Plan standards and guidelines, with proper implementation of the mitigation measures formulated and listed in the *Mitigation Common to All Action Alternatives* section of this EIS (pp. 37-38).

Proposed, Endangered, Threatened and Sensitive Species

AFFECTED ENVIRONMENT

Section 7 of the Endangered Species Act of 1973, as amended, requires federal agencies to use their authorities to carry out programs to conserve endangered and threatened species, and to insure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of listed or proposed species, or result in the destruction or adverse modification of their critical habitats. A Biological Assessment must be prepared for federal actions that are “major construction activities” (defined under NEPA as a project significantly affecting the quality of the human environment) to evaluate the potential effects of the proposal on listed or proposed species. The contents of the BA are at the discretion of the federal agency, and will depend on the nature of the federal action (50 CFR 402.12(f)).

Species Considered and Their Status

Field surveys for all wildlife occurrences were conducted in 1993, 2001, and 2002. Wildlife documented during surveys included: broad-tailed hummingbirds, hairy woodpeckers, northern flickers, American robins, yellow warblers, hermit thrush, chipping sparrow, dark-eyed juncos, mountain chickadees, western tanagers, common yellowthroat, house wren, Townsend’s solitaire, western wood peewee, red-breasted nuthatches, red-tailed hawk, Clark’s nutcracker, gray jays, red squirrels, mule deer, elk, coyotes, black bear, moose, porcupine, and snowshoe hare.

The Wyoming Game and Fish Department (WGFD) conducts bald eagle surveys annually for the entire upper North Platte River valley. In addition, the Forest Service annually monitors nests that are known or suspected to occur on the Forest. Forest Service conducted the most recent surveys in April 2003. No active nests were found in the analysis area.

Breeding Bird Survey route in the adjacent North Platte River valley has been surveyed each year since 1994.

Surveys for northern goshawks are conducted annually across the Forest. Annual monitoring of nests has occurred since the initiation of a goshawk research project on the District in 1992. In addition, all suitable nesting habitat within the Blackhall-McAnulty Analysis Area was surveyed intensively, following protocol established in Kennedy and Stahlecker (1993). One new inactive nest was located in 2001, which was not active in 2002. Six other previously known inactive nests were inactive in 2002. All known nests were inactive in 2003.

Extensive radio telemetry aided studies of American marten were conducted from 1985 through 1995 in the adjacent Coon Creek and East Fork Encampment River watersheds. Ninety-six individuals were captured during the study. Mean home range sizes were 1,652 acres in summer and 1,462 acres in winter for females, and 4,494 acres in summer and 3,602 acres in winter for males.

District records, Wyoming Game and Fish Department records (Luce et al. 1999), and Wyoming Natural Diversity Database records (Scholl and Smith 2001) were reviewed for additional observations and surveys of wildlife species.

The following list includes threatened, endangered, proposed, and candidate terrestrial wildlife species located on the Medicine Bow National Forest. Amphibians, fish, Platte River depletions, and plant species are contained in other biological evaluations. A pre-field review was conducted of available information to assemble occurrence records, describe habitat needs and ecological requirements, and determine what field reconnaissance was needed to complete the Biological Evaluation. Sources of information included Forest Service records and files, the State Natural Heritage Program database (Scholl and Smith 2001, WYNDD) state wildlife agency information (Luce et al. 1999), and published research.

All threatened, endangered, proposed, and candidate terrestrial wildlife species were reviewed to determine which species would be selected and further analyzed. The table below summarizes the full list of threatened, endangered, proposed, and candidate terrestrial wildlife species and applies one of the following categories to each species.

The reason any species was eliminated from analysis includes one of the following:

1. The project proposal is outside of the known range of the species and/or the species is not likely to occur.
2. Habitat used by the species is different than that being disturbed by the project proposal.
3. Disturbance to habitat is marginal, very small in size and/or length of time, thus unlikely to affect species.
4. Species is associated with Platte River water depletions and the project proposal does not affect Platte River water supply.
5. Timing of the project proposal is such that it will not affect species.
6. There are no documented records of species occurrence, habitat is marginal, and the species is unlikely to be present in the project area.

Table 48. Threatened, Endangered, or Proposed Terrestrial Wildlife Species Selected for Further Analysis

Common Name (<i>Scientific Name</i>)	Status	Known/suspected to be present?	Suitable habitat present?	Dominant rationale if not carried forward for analysis
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Threatened	Yes	Yes	
Canada lynx (<i>Lynx canadensis</i>)	Threatened	Possible	Yes	
Black-footed ferret (<i>Mustela nigripes</i>)	Endangered	No	No	1
Preble's meadow jumping mouse (<i>Zapus hudsonius preblei</i>)	Threatened	No	No	1
Mountain plover (<i>Charadrius montanus</i>)	Proposed	No	No	1
Black-tailed prairie dog (<i>Cynomys ludovicianus</i>)	Candidate	No	No	1

Consultation History

On April 8, 2003, a list of threatened, endangered, and proposed species that may be present on the Medicine Bow National Forest Brush Creek/Hayden District was received from the U.S. Fish and Wildlife Service (FWS) (letter from Jodi Bush to Mary Peterson, br/W.19/WY6877). This list was confirmed with USFWS representative Audrey Taylor on April 28, 2003.

ENVIRONMENTAL CONSEQUENCES

Bald Eagle

Outside of Alaska, the bald eagle is listed as threatened by the U. S. Fish and Wildlife Service. Breeding populations now exist in all Canadian provinces, all but two states in the United States, and in Mexico. Wyoming forms part of the core winter/year-round range. The species is a resident breeder in scattered locations throughout the state, but most pairs are in the northwest along the Snake River, and in the southeast along the upper North Platte River; the Bighorn, Green, and Wind Rivers also support breeding concentrations. In winter, individuals are widely distributed and may be observed near any large stream or impoundment.

Wintering bald eagles are observed in the North Platte River valley annually. There was one known nest in the analysis area. This nest was most recently active in 1997, with 1 young. The nest was not active in 1998, and was completely blown down by 1999. No new nest was found in the area during annual bald eagle surveys in 2001, 2002, and 2003, or during 2001, 2002, and 2003 raptor surveys. No winter roost sites have been identified.

Field surveys indicated that likely potential nesting sites exist only along the eastern boundary of the analysis area (in the area of the current blown-down nest) due to similarity with other known nesting sites on the Forest, elevation, and availability of appropriate large nesting trees and large water sources. There is also 1 known active nest on Forest on the North Platte River and 1 inactive in the Platte River Wilderness. The analysis area is neither a federally designated critical habitat area, nor a Regional Forester, Region 2, designated essential habitat area. No viable population now exists on the planning area. The bald eagles that use the Medicine Bow NF are a small part of a larger population along the North Platte River System.

Alternative 1 – No Action

No action would allow current Forest conditions to continue or mature. Sagebrush shrub stands would continue to age and a larger percentage of this community would become mature and decadent over time. Lodgepole pine community would be comprised of a greater percentage of mature stands over time. However, there would be no increase in large trees within ¼ mile of large water bodies (potential nesting sites), since these water bodies do not exist in the analysis area. There may be a small increase in spruce-fir stands but this forest type would be limited by elevation and aspect within the analysis area.

No action would prevent the addressing of forested and non-forested habitat related to soil, water, and wildlife resources from the watershed restoration and travel management activities of the Proposed Action. Forested and non-forested habitat would not be improved or restored under no action.

Proposed Action

Proposed prescribed burns of sagebrush stands would occur at least 1.1 miles from the known blown-down nest. Prescribed burn would occur along ridges that face away from this known nest. This would occur, therefore, within Zone II: Primary Use Area (GYBEWG 1996). Human activity levels would be light and consist of individuals carrying drip torches for 3 to 6 days of burning. Prescribed burning would not affect preferred nesting or foraging habitat. There is no other known or suspected nest within 8 miles of any proposed treatments.

Longer-term effects from the increase in grass/forb stands could include habitat improvements for elk and mule deer (winter carrion) prey species.

The nearest proposed timber harvest of any kind is a commercial thinning of 32 acres of young lodgepole pine 2.2 miles from the known blown-down nest. This would occur within Zone III: Home Range. The thinning would not be a major habitat alteration relative to bald eagles, human activity would be moderate; and, it would not alter habitat that degrades the availability of prey. Timber harvest would not remove any large trees within ¼ mile of lakes or rivers.

Activities necessary to restore Turnbull Gulch would occur more than 5 miles from likely potential bald eagle nesting habitat and would not occur in any foraging habitat. This project would not affect bald eagles.

Prescribed fire and harvest treatments would not degrade habitat for prey species, particularly the large adjacent water sources (Big Creek Reservoir (private), North Platte River, Encampment River) where eagles have been observed foraging on and off the Forest.

Interrelated and interdependent activities would be human and vehicle activity associated with prescribed burning and timber harvest. There would be road reconstruction and temporary road construction. There would also be slash burning or scattering with harvest treatments. None of these activities would displace eagles from nesting habitat, due to distance and the small extent of activities. These activities would not affect foraging habitat, due to distance and location and extent of activities.

Travel management would improve the condition of existing roads and streams and reduce road density. Habitat for potential prey that would be restored by road closures would be 56 acres. Elimination of known cheatgrass would restore 44 acres of native sagebrush grassland habitat for potential prey species.

Reduced road density may reduce traffic disturbance, if a new nest is established along the northeast boundary of analysis area. Approximately 3.5 miles of road would be closed near likely potential nesting habitat identified during field surveys.

CUMULATIVE EFFECTS

Cumulative effects include all future state, tribal, or private actions that are reasonably certain to occur in the analysis area. There are 1,631 acres of private land. Land use is livestock grazing and summer cabins. There are no other activities proposed at this time. There are 619 acres of State land. Land use is livestock grazing. There are no other activities proposed at this time. The cumulative effect of these activities would be minor relative to habitat use by the bald eagle. Indeed, these activities occurred when the known nest in the analysis area was active.

Alternative 2

All effects described for the Proposed Action would occur under Alternative 2, except that benefits from road decommissioning would be reduced. Alternative 2 would result in only 29 miles of restoration. Habitat regained from 29 miles of proposed road closure and revegetation would be 42 acres. There would be 2 miles less road decommissioning within 1 mile of the blown-down nest. Still, there would be less human activity associated with roads than currently exists.

Alternative 3

Effects of Alternative 3 would be the same as the Proposed Action, except for the following. There would be more perching trees available due to less harvest. There would be no change in nest tree habitat, since no proposed harvest occurred in suitable nesting habitat.

Alternative 4

Effects of Alternative 4 would be the same as the Proposed Action, except for the following. There is no harvest proposed under Alternative 4, therefore forested vegetation would be the same as the no action scenario described earlier. There would be no change in available perching trees. There would be a small decrease in human activity in Zone III caused by no 32-acre commercial thinning in this zone.

Determination of Effect and Rationale

For **bald eagle**, based on the following:

- Bald eagle and raptor surveys indicate the known nest in the eastern part of the analysis has not been used for several years, has blown down, and no new nest has been established.
- Field surveys indicate there is little nesting habitat available, and all nesting habitat in the analysis area is at least 3 miles from large water sources.
- Proposed prescribed burning would have light human disturbance and would occur ≥ 1.1 miles from known blown-down nest (Zone II).
- Proposed harvest units are ≥ 2.2 miles from the known blown-down nest (Zone II and Zone III).
- Bald eagle surveys will continue to be conducted annually in potential nesting habitat in the analysis area.

A “**may affect, not likely to adversely affect**” determination is made.

Canada Lynx

The boreal forests of Canada and Alaska are the primary habitat of lynx in North America. Populations occurring in the western mountains of the conterminous United States occupy peninsular extensions of this distribution (Koehler and Aubry 1994). The lynx's historic range included the northern portions of the conterminous United States in the Cascade Range of Washington and Oregon, south in the Rocky Mountains to Utah and Colorado, and east along the Canadian border to the Lake States (McCord and Cardoza 1982, and Quinn and Parker 1987 cited in Koehler and Aubry 1994). Except for the southern boundary of its range, the distribution of lynx in North America probably has not changed much during historical times.

Existing records clearly show that lynx are rare at the southernmost extensions of its range in Wyoming, Utah, and Colorado, both historically and at present, and that any populations that occur in this area are disjunct and isolated in distribution (Koehler and Aubry 1994). It is possible that existing records represent short-term residents or individuals wandering and dispersing, rather than reproductively stable populations. Viable lynx populations may never have occurred in historic times in the southern Rocky Mountains. Koehler and Aubry (1994) also suggest that lynx conservation efforts may best be directed at populations occurring in northeastern Washington, northern Idaho, and western Montana.

In 1998, a cooperative effort between the Colorado Division of Wildlife (CDOW), the Forest Service, the U.S. Fish and Wildlife Service, the BLM, and the National Park Service developed a draft reintroduction conservation strategy for the Canada lynx. During 1999 and 2000, 96 lynx were introduced in Colorado. Thirty-two more lynx were released in 2003. All lynx were introduced into southwestern Colorado.

There are four records for Canada lynx on the Medicine Bow National Forest contained in Neighbors (1998), three of which are from the Snowy Range. There is also one record from Colorado near the analysis area. One of these is an unverified record in the Rock Mountain area in 1987. There are two verified records from 1856 in the Turpin Reservoir and Stillwater Park areas of the District (specimen records). The fourth is a verified record for one adult trapped in the south end of Pole Mountain in 1963. None of these are within the analysis area.

Alternative 1 - No Action

No action would allow current Forest conditions to continue or mature. Sagebrush shrub stands would continue to age, and a larger percentage of this community would become mature and decadent over time. This would not produce quality habitat for most potential prey species due to the reduced grass/forb component that has been observed within other dense, decadent sagebrush shrub communities on the Forest. However, lynx have been found to prey on Wyoming ground squirrels in sagebrush in western Wyoming (in Ruediger et al. 2000). Lodgepole pine community would be comprised of a greater percentage of mature stands over time. These conditions would not benefit lynx much, since these stands are dry, climax lodgepole pine that do not produce vegetation or structural conditions favorable to lynx. Hence, none of the analysis area is within a LAU, and little of the analysis area is within a linkage corridor.

The limited aspen stands would continue to age and be lost through succession to conifer stands over several decades. Only periodic natural wildfire would promote and restore significant aspen acreage and increase patch size. The continued loss of aspen would have a small effect on lynx. It was previously identified that aspen is poor foraging habitat for lynx. Some snowshoe hares may be found in aspen due to the complex understory in some stands, but aspen stands provide only marginal hare habitat in winter. This prey would be more abundant in young and older than mature conifer stands that have complex understory structure. Aspen stands in the analysis area do not occur in the linkage corridor.

Lodgepole pine would continue to dominate the forested landscape but there could be some increase of spruce-fir. Spruce-fir acres might increase from the current 2,292 acres to approximately 5,800 acres over several centuries, based on a coarse assessment of Romme and Knight's (1981) estimate of fire frequency and spruce-fir occurrence in relation to elevation and topography. Approximately 1,100 acres of spruce-fir occur in the linkage corridor.

No action would prevent the addressing of issues related to soil, water, and wildlife resources identified under watershed restoration and travel management.

Proposed Action

Proposed prescribed burning of dense, decadent shrub stands will promote grass/forb production for some potential prey species. However, burning will also reduce habitat for Wyoming ground squirrels. Lynx have been observed hunting Wyoming ground squirrels in western Wyoming (in Ruediger 2000). No burning is proposed for willow riparian habitat. Burned stands will return to dense sagebrush over time. Overall, prey density is not expected to change. All prescribed burning occurs outside LAUs and linkage corridors, so impacts to lynx, if any, would be small.

Watershed restoration proposals that reduce cheatgrass and erosion and improve stream flow, and travel management proposals that reduce road density would increase future habitat for potential prey species. Reduced road density would also decrease the already highly unlikely chance that a lynx would be struck by a vehicle.

Proposed harvest units and all other proposed actions do not occur within a LAU; there is no LAU within the analysis area. The nearest LAU is in the Encampment River watershed in Colorado. The nearest Proposed Action, shelterwood harvest, is 1.5 miles from this LAU. Approximately 2,234 acres (7%) of the 32,698-acre Sierra Madre linkage corridor occur in the analysis area. There are 139 acres of shelterwood harvest proposed in the linkage corridor. This would affect 0.4% of the linkage corridor. This amount of harvest will not change habitat use by lynx.

Past harvest from 1963 to 1992 occurred across approximately 45% of these 2,234 acres, and included both lodgepole pine and spruce-fir. The majority of harvest occurred previous to 1980. Clearcuts have regenerated to sapling and pole size. Partial harvest stands are pole size or mature with open canopies. There is still cover in sufficient quantity and arrangement to allow lynx movement; however, quality is reduced. Proposed partial cutting units should not change connectivity. The proposed actions are not of sufficient scale (such as highway construction or private land developments) in the Sierra Madre linkage corridor to place connectivity at risk. Therefore, landscape connectivity among LAUs will be maintained.

Other harvest units do not occur in the Sierra Madre linkage corridor. Clearcut and overstory removal units would provide habitat for snowshoe hares during regeneration. However, there would be little, if any, benefit to lynx, since regeneration would not occur in any identified lynx habitat.

Partial harvest units (shelterwood prep, shelterwood seed, fire salvage, and boundary treatment) would open the overstory and decrease the amount of slash in these stands. Relatively open, mature lodgepole pine is not suitable lynx habitat. Open canopy lodgepole pine with very open understory is very poor travel habitat. These are characteristics of much of the analysis already and would continue to be so under these partial harvest units. Thus, vegetation that is currently not lynx habitat would continue to not be lynx habitat. This open sparse vegetation would also continue to be very poor quality habitat for snowshoe hares.

Commercial thinning to the 9 ft. x 9 ft. spacing (for future goshawk habitat) is not expected to produce snowshoe habitat. Release of conifers or generation of shrubs in the understory is not expected to be substantial. This harvest does not occur in any lynx habitat; so, this activity would have little, if any, impact to lynx.

Precommercial thinning is expected to decrease the quality of snowshoe hare habitat as described in the Lynx Conservation Assessment and Strategy (LCAS). Again, however, this treatment does not occur in any lynx habitat. So, this activity would have little, if any, impact to lynx.

The southern Rockies are characterized as naturally patchy in LCAS (Ruediger 2000). Due to the scattered locations of harvest units and their limited occurrence in the linkage corridor, any displacement effect would be incidental and seasonal. Logging and hauling occur only when roads are firm in late spring through mid-fall. The likelihood of a lynx being struck by logging traffic is too slight to be a logical concern, due to the low probability that a lynx would be present in the analysis area.

There are no anticipated direct adverse effects to individual lynx, since there are no known individuals historically recorded or recently observed in the project area. Any direct effects would be to potential habitats and the relative recoverability for future individuals. No stands currently providing potential denning or foraging habitat would be affected by the project.

There is an extremely small potential for displacement effect during project implementation. Lynx would be rare and likely transient in the analysis area. None of the observations on the Medicine Bow occurred in the analysis area. One sighting was within 14 air miles, but in 1973. Lynx hair patch surveys, in conjunction with the National Lynx Survey, were performed on a 2 by 2 mile grid in potential lynx denning habitat modeled on this forest. The survey grid was established on the Forest in the Snowy Range, approximately 25 miles north of the analysis area. Results revealed that samples from 2 mountain lions and 1 black bear were collected in 2000, and 1 coyote, 1 bobcat, and 1 ungulate in 2001. Samples collected in 2002 included 1 bobcat, 2 coyotes, and 1 domestic cow.

The potential for lynx transplanted into southwest Colorado to move into the analysis area is extremely small. This conclusion is based on the travel distance between locations, the interstate, highway systems, and human developments impeding movement, and the frequency and amount of non-habitat for lynx along any movement corridor.

Slash treatments include lopping and scattering immediately after harvest, piling and burning in late fall, or broadcast burning. Lopping and scattering would be completed before any natal dens could be established, although likelihood of denning is extremely low. Likewise, burning would occur before any natal denning could occur. Also, it was already discussed that limited harvest will occur within travel corridors, and none within an LAU where denning habitat exists due to vegetation, topography, and climate characteristics.

Interrelated and interdependent activities would include human and vehicle activity associated with harvest and watershed restoration. There would be road reconstruction and temporary road construction. All temporary and specified roads created for harvest would be closed (spec) or eliminated (temp) after harvest. Skid trails will not be maintained after harvest, some slash will be scattered across these trails as a result of harvest, and trails will revegetate naturally. These activities would have little effect on lynx, due to distance from LAU or linkage corridor, and the small extent of activities in the linkage corridor. These activities will cause no substantial or permanent habitat changes that would affect lynx, other predators, or human presence.

Weed treatments and native grass treatments are proposed to maintain native vegetation in the analysis area. These activities would occur during or immediately after harvest, so there would be no potential additional disturbance to lynx. Maintaining native understory vegetation on harvest units, skid trails, and roads would maintain these understory characteristics at or near the Environmental Baseline.

Traffic is discussed under Incidental Take.

Other short-term effects would be limited to the unlikely incidental disturbance or displacement of a lynx traveling within the linkage corridor as a result of harvest activity and reduction in overhead cover. Harvest units are small and scattered and the time period is short, so the period of disturbance within any unit would be short.

The existing condition (Environmental Baseline) of the analysis area and, therefore, harvest units, is not highly productive for snowshoe hare. Otherwise, the analysis area would have been included in an LAU and not a linkage corridor. Still, some small parcels of habitat would become temporary snowshoe hare habitat from regenerating lodgepole pine or spruce-fir in clearcut/overstory removal units. This habitat change would provide the opportunity for a traveling lynx to harvest an occasional snowshoe hare. This habitat would be transient, and maturing timber would not be hare habitat in the long term.

CUMULATIVE EFFECTS

Previously mentioned programmatic screening for 7 projects in the analysis area and previous observations represent accumulation of all past federal actions for the environmental baseline, established in 2000. There is no LAU in the analysis area. Cumulative effects include all future state, tribal, or private actions that are reasonably certain to occur in the analysis area. State and private lands in the analysis area do not occur in an LAU or a linkage corridor. There are 1,631 acres of private land. Land use is livestock grazing and summer cabins. There are no other known activities planned for this land. There are 619 acres of State land. Land use is livestock grazing. There are no other known activities planned for this land. These activities have a limited effect on lynx since they do not occur in an LAU or linkage corridor.

Incidental Take

The potential for incidental take with the project is extremely small. Historic records and current wildlife surveys suggest that lynx are extremely rare and at low density, if they occur on the Forest, and use the analysis area for travel, at best. It is not apparent that lynx regularly exist in the analysis area. The project affects a small portion of the analysis area. The project does not affect suitable denning habitat, so direct effects to reproduction are unlikely. Potential for other direct mortality such as vehicle collisions is very low. Road characteristics, topography, and size of logging equipment limit traffic speed. It is unusual to observe road-killed animals on the Forest road network. Therefore, it appears that there are no reasonable and prudent measures necessary, because no incidental take is anticipated.

No conservation measures are identified. Mitigation for Management Indicator Species (MIS) and Sensitive Species include designating stands for old growth management, no slash burning in clearcut units, and retention of additional snags in some harvest units. These measures could also benefit lynx, if they occurred in the analysis area.

Alternative 2

Effects of Alternative 2 would be similar to effects described for the Proposed Action, except for the following: There would be fewer acres restored to potential prey habitat (42 acres) under Alternative 2, due to less road decommissioning.

Alternative 3

Effects of Alternative 3 would be similar to effects described for the Proposed Action, except for the following: Snowshoe hare and red squirrel would be expected to decline less from habitat changes of reduced forest structure, and reduced snags, dead topped trees, and coarse woody debris, since Alternative 3 has no clearcuts, overstory removal, and boundary treatment at Skyline. Habitat for snowshoe hare would be affected less under Alternative 3, since there would be no fire salvage.

Alternative 4

Effects of Alternative 4 would be similar to effects described for the Proposed Action, except for the following: Forested vegetation would not change from the existing condition (Environmental Baseline) under Alternative 4, since there is no proposed harvest.

Determination of Effect and Rationale

For **Canada lynx**, based on the following:

- There are no anticipated direct adverse effects to individual lynx, since there are no known individuals historically recorded or recently observed in the project area. Canada lynx are not predicted to occupy the area in the near future (within next 5 years or more). It is not likely that animals will disperse into Wyoming from the reintroduction in southwest Colorado for a long period of time, if ever. There are no reintroduction plans in Wyoming. Any direct effects would be to potential habitats and the relative recoverability for future individuals. No stands currently providing potential denning or foraging habitat would be affected by the project.

- The analysis area and proposed harvest units do not occur in a LAU, so do not affect defined lynx habitat.
- Proposed harvest, shelterwood prep cut, would affect 0.4% of the Sierra Madre linkage corridor.

A “may affect, not likely to adversely affect” determination is made.

US Fish and Wildlife Service Concurrence

In accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), this project was submitted for formal consultation with the US Fish and Wildlife Service on August 26, 2003. The final Biological Opinion, received on January 23, 2004, confirmed that the vegetative treatments are not likely to jeopardize the continued existence of the Canada lynx and that no critical habitat for Canada lynx will be affected.

Sensitive Species

District records, Wyoming Natural Diversity Database records (WYNDD 2001), and the Atlas of Birds, Mammals, Reptiles and Amphibians in Wyoming (Luce 1997) were examined. Sensitive species potentially occurring in the District were considered for inclusion in analysis (Table 49). Those species that may be affected directly, indirectly, or cumulatively by proposed actions were selected for further analysis. Other species were not selected because:

1. Suitable habitat, elevation, or range (distribution) does not exist for the species in the project area.
2. The type or intensity of the activity in the proposed actions is expected to have no impact to the species or its habitat.

Table 49. Forest Service Sensitive Species Possibly Occurring in the Blackhall-McAnulty Analysis Area

Common Name	Scientific Name	Habitat*	Selected
Northern goshawk	Accipiter gentilis	SF, AS, LPP, RIP	Yes
Yellow-billed cuckoo (USFWS Candidate)	Coccyzus americanus	RIP, WET	No-2
Ferruginous hawk	Buteo regalis	MS, FM	No-2
Merlin	Falco columbarius	PP, RIP, MS	Yes
Boreal owl	Aegolius funereus	SF, LPP	Yes
Greater sandhill crane	Grus canadensis	RIP, WET	No-2
Three-toed woodpecker	Picoides tridactylus	SF, LPP, AS	Yes
Black-backed woodpecker	Picoides arcticus	SF, PP	Yes
Lewis’ woodpecker	Melanerpes lewis	PP	No-2
Pygmy nuthatch	Sitta pygmaea	PP	No-2
Olive-sided flycatcher	Contopus borealis	SF, LP, WET, FM	Yes
Golden-crowned kinglet	Regulus satrapa	SF	Yes

Common Name	Scientific Name	Habitat*	Selected
Columbian sharp-tailed grouse	Tympanuchus phasianellus columbianus	MS	No-1
Fox sparrow	Passerella iliaca	RIP, AS,	No-2
Loggerhead shrike	Lanius ludovicianus	MS, RIP	Yes
Peregrine falcon	Falco peregrinus	RO	No-1
White-faced ibis	Plegadis chihi	RIP, WET	No-2
Western snowy plover	Charadrius alexandrinus nivosus	RIP, WET	No-2
American bittern	Botaurus lentiginosus	RIP, WET	No-2
Long-billed curlew	Numenius americanus	RIP, WET	No-2
Upland sandpiper	Bartramia loicauda	RIP, WET	No-2
Dwarf shrew	Sorex nanus	AL, RO	No-2
Pygmy shrew	Sorex hoyi	SF, WET	Yes
American marten	Martes americana	SF, AS, LPP, RIP	Yes
Fisher	Martes pennati	SF	Yes
Wolverine	Gulo gulo	SF, AL, AS, LPP, RO	Yes

*AL-alpine, AS-aspen, FM-forest meadow, LPP-lodgepole pine, MS-mountain shrub, PP-ponderosa pine, RIP-riparian, RO-rock/cliff/cave, SF-spruce-fir, WET-wetland

The U.S. Forest Service is required to provide habitats that are necessary to support viable populations of Sensitive Species and other wildlife. According to the National Forest Management Act (36 CFR 219.19):

For planning purposes, a "viable population" shall be regarded as one that has the estimated numbers and distribution of reproductive individuals to ensure its continued existence is well distributed in the planning area. In order to ensure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals, and that habitat must be well distributed so that those individuals can interact with others in the planning area.

As a consequence, this analysis is an assessment of the existing condition, projected impacts, and future condition of the habitats favored by Forest Service Sensitive species, rather than of the populations. Populations fall under the auspices of cooperating agencies. Because sensitive species cannot exist without supporting habitats, these habitats can be readily predicted, and unoccupied habitats provide potential for future populations. This approach provides a conservative assessment of impacts on individuals and populations.

Northern Goshawk

Goshawk/raptor surveys were conducted in 2001, 2002, and 2003. All suitable nesting habitat within the Blackhall-McAnulty Analysis Area was surveyed intensively following protocol established in Kennedy and Stahlecker (1993). One new inactive nest was located in 2001, and was not active in 2002. Six other previously known inactive nests were inactive in 2002. All known nests were inactive in 2003.

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Endemic levels of insects and pathogens play significant ecological roles, including tree mortality, defoliation, decay, and deformity. These processes are important attributes in goshawk foraging and nesting habitat. No action will result in positive and negative effects to northern goshawks. No action may result in continued nesting habitat until characteristic stands are lost to mistletoe and beetle mortality, or nesting habitat in aspen is lost through natural succession. Natural regeneration of lodgepole or aspen after beetle, disease, or wildfire events could reproduce nesting habitat 80 years after these events. Cheatgrass does not provide quality habitat for any prey species. The persistence or expansion of cheatgrass is limiting alternate prey habitat by 44 acres.

Proposed Action

The stands proposed for harvest do not include any known active or inactive nests. There are 6 known nests in the analysis area. There is an inactive nest within ¼ mile of proposed sanitation salvage unit #47 and commercial thin unit #54. Forest Plan requirements (III-31) for protection of this nest will be implemented (i.e., no disturbance within ¼ mile from March 1 through July 31).

Other proposed harvest units do include potential nesting habitat. There are currently 4,077 acres of nesting habitat in the watershed. Clearcuts and overstory removal proposed within potential nesting habitat will prohibit nesting in these stands until regeneration to mature lodgepole or aspen, approximately 80 years. This would affect 58 acres of nesting habitat (aspen and lodgepole 4B, 4C and 5). This would also affect 96 acres of nesting habitat from the partial thinning harvest methods (shelterwood prep and sanitation salvage) but these stands could still be used for nesting.

Overall, harvest could affect 3 goshawk nesting territories--the known inactive nest described above and 2 areas that have suitable habitat but no known nests. These territories are adjacent within suitable nesting habitat, and there is no proposed harvest within any other potential territories. Clearcut and overstory removal would affect 2 of the 3 territories. Measures described above for prohibiting disturbance would provide protection for these areas. There are more than 150 other known active or inactive nest sites that have been identified on the District.

Proposed harvest would affect foraging habitat by reducing forest structure, reducing snags, dead topped trees and coarse woody debris, reducing understory cover until regeneration occurs, and promoting aspen as regeneration occurs. Primary prey species (Squires 2000), the red squirrel and northern flicker, would decline from these habitat changes. The resulting grass/forb stands would benefit alternate prey species such as golden-mantled ground squirrels, deer mouse, and montane vole. Later regeneration to a shrub-like understory would benefit alternate prey species such as snowshoe hare and blue grouse. Prescribed burning of 1,302 acres of sagebrush shrub stands (50% of 2,604 acres) would follow the grass/forb to shrub scenario.

Fire salvage of 144 acres of mature lodgepole, spruce/fir, and aspen trees and snags may affect the primary and secondary cavity nester prey base, particularly woodpeckers. However, cavity nester habitat will be available in the remaining 362 acres of burned forest.

Direct loss of habitat in the analysis area to roads is 182 acres, based on a road width of 18 ft. for arterial roads, 15 ft. for collector roads, and 12 ft. for local (primitive) roads. Road decommissioning would turn bare ground to potential habitat for prey species over time. Habitat regained from the 38 miles of proposed road closure and revegetation would be 55 acres, based on a 12 ft. width for primitive roads.

Proposed prescribed burning would eliminate habitat for some alternate prey species such as jackrabbit and blue grouse, but create habitat for alternate prey species such as deer mouse and montane vole. Overall, there should be no change in the availability of habitat for alternate prey species.

Cheatgrass does not provide quality habitat for any prey species. The persistence or expansion of cheatgrass is limiting alternate prey habitat by 44 acres. Restoration of native grass species and eventual succession to sagebrush shrubland would restore habitat for alternate prey species.

CUMULATIVE EFFECTS

Twenty-one percent of the forested habitat in the cumulative analysis area has been harvested in the past, with an additional 4% proposed under this project. There are 10 known or suspected territories in the cumulative analysis area, including 8 territories on the Brush Creek/Hayden District and 2 territories on the Hahns Peak/Bears Ear District (Colorado). There are also more than 150 territories on the Brush Creek/Hayden District, 9 on the adjacent Parks, and 50 on the adjacent Hahns Peak/Bears Ear Districts in Colorado. Most nests searched on these Districts in any given year have been inactive. Harvest has and will temporarily eliminate nesting areas within territories. These areas are expected to regenerate to nesting habitat within 80 years of harvest and include some aspen. Graham et al. (1997) indicated that the intent of goshawk recommendations was to maintain mosaic forest conditions that would sustain the goshawk and its suite of prey species. Regeneration of lodgepole and some aspen stands would be consistent with this intent.

Alternative 2

Effects of Alternative 2 would be similar to effects described for the Proposed Action, except for the following: There would be fewer acres restored to alternate prey habitat (42 acres) under Alternative 2, due to less road decommissioning.

Alternative 3

Effects of Alternative 3 would be similar to effects described for the Proposed Action, except for the following: Only 14 acres (boundary treatment) of goshawk nesting habitat would be eliminated for 80 years, since there are no proposed clearcut or overstory removal units under this alternative. Partial thinning (shelterwood prep and sanitation salvage) would affect 73 acres of nesting habitat under Alternative 3. This harvest would affect 2 goshawk nesting territories--the known inactive nest described above, and 1 area that has suitable habitat but no known nests.

Primary prey species, red squirrel and northern flicker, would be expected to decline less from habitat changes of reduced forest structure, and reduced snags, dead topped trees, and coarse woody debris, since Alternative 3 has no clearcuts, overstory removal, and boundary treatment at Skyline. Habitat for primary and secondary cavity nester prey base would be affected less under Alternative 3, since there would be no fire salvage.

Alternative 4

Effects of Alternative 4 would be similar to effects described for the Proposed Action, except for the following: Forested vegetation would not change from the existing condition under Alternative 4, since there is no proposed harvest.

Determination of Effect and Rationale

A “**may adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide**” determination is made for northern goshawk based on the following:

- Forest Plan requirements will provide protection around known nests.
- Harvest will potentially affect habitat for 3 of more than 150 known nests.
- There will be negative and positive changes to foraging habitat.

Merlin

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

No action would maintain current amount of habitat, except that cheatgrass could expand into more prey habitat. A natural wildfire event would eliminate affected nesting habitat for 80 years until regeneration provided appropriate ponderosa pine.

Proposed Action

Potential habitat for the merlin occurs along a small portion of the northeastern part of the analysis area, but does not occur within the vicinity of most proposed actions. Proposed prescribed burning, road closures, and cheatgrass treatment do occur within foraging habitat and nesting habitat (road closures only). Individuals may be temporarily displaced by disturbance of prescribed burn implementation, but could return after completion. Conversion of shrub stands to grass/forb stands would increase currently limited habitat for prey species such as horned larks. As such, prey species composition may change to reflect habitat change, but prey abundance should be consistent. Road closure would return bare ground to potential foraging habitat (14 acres) and, over time, to nesting habitat in some areas. Cheatgrass (44 acres) does not currently provide habitat for prey species. Return of cheatgrass to native grass/forb and sagebrush shrub vegetation would provide prey habitat.

Proposed harvest units do not occur within suitable habitat for merlins.

Compliance with Forest Plan standards and guidelines for raptors and for management of riparian areas will ensure effective management of merlin habitat for nesting and prey species.

CUMULATIVE EFFECTS

Cumulative effects would be limited, since shrublands comprise less than 20% of the analysis area. Some of the existing grass/forb vegetation in the analysis area is the result of previous prescribed burns. Some has already succeeded to shrubland and some has converted to cheatgrass. Cheatgrass also occurs in areas that did not burn. Prescribed burning would initially change no more than 1,302 acres from shrubland to grass/forb. This conversion would affect less than 15% of the shrubland within the analysis area.

Other Action Alternatives

Effects of Alternatives 2, 3, and 4 would be similar to effects just described for the Proposed Action, except for the following: There would be fewer acres restored to prey habitat and possible future nesting habitat (11 acres) under Alternative 2, due to less road decommissioning. Alternative 4 is the same as the Proposed Action, since harvest units of the Proposed Action do not occur in merlin habitat.

Determination of Effect and Rationale

A “**may adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide**” determination is made for merlin based on the following:

- Forest Plan requirements for management of riparian areas will maintain foraging habitat.
- Forest Plan requirements for management of habitat at raptor nests will ensure potential nesting opportunities.
- Only road closure would occur within suitable nesting habitat.
- There will be positive and negative changes to foraging habitat.

Loggerhead Shrike

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

No action would maintain current amount of habitat, except that cheatgrass could expand into more suitable habitat. A natural wildfire event would provide foraging habitat but eliminate affected nesting habitat for 20 years until regeneration provided appropriate shrublands.

Proposed Action

Habitat for this species will change as a result of proposed prescribed burning, road closures, and cheatgrass treatment. Nesting habitat (up to 1,302 acres) would be temporarily lost due to prescribed burning of shrublands. Burning would create a mosaic of new grasses, forbs, and shrub regeneration within mature and old shrub stands. This would provide increased prey sources of insects, seeds, and small vertebrates. Individuals may be affected by the prescribed burning, but would only be dispersed from the area into adjacent habitat. Closure of approximately 9 miles of road in shrub habitats would restore 13 acres of bare ground to foraging grass/forb vegetation and eventually nesting shrubland. Burning is expected to occur in the spring, before the nest building period has started. However, shrikes will be displaced from the area while burning is occurring. Treatment of cheatgrass will return 44 acres to grass/forb foraging habitat and eventually nesting habitat shrubland.

Proposed harvest units do not occur within suitable habitat for loggerhead shrikes.

Compliance with Forest Plan standards and guidelines for management of riparian areas will ensure effective management of some shrike habitat for nesting and prey species.

CUMULATIVE EFFECTS

Cumulative effects would be limited, since shrublands comprise less than 20% of the analysis area. Some of the existing grass/forb vegetation in the analysis area is the result of previous prescribed burns. Some has already succeeded to shrubland and some has converted to cheatgrass. Cheatgrass also occurs in areas that did not burn. Prescribed burning would initially change no more than 1,302 acres from shrubland to grass/forb. This conversion would affect less than 15% of the shrubland within the analysis area.

Other Action Alternatives

Effects of Alternatives 2, 3, and 4 would be similar to effects just described for the Proposed Action, except for the following: There would be fewer acres restored to prey habitat and possible future nesting habitat (9 acres) under Alternative 2, due to less road decommissioning. Alternative 4 is the same as the Proposed Action, since harvest units of the Proposed Action do not occur in merlin habitat.

Determination of Effect and Rationale

A “may adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide” determination is made for loggerhead shrike based on the following:

- Forest Plan requirements for management of riparian areas will maintain foraging and nesting habitat.
- There will be positive and negative changes to nesting and foraging habitat.
- Road closures will increase foraging and, potentially, nesting habitat.

Boreal Owl

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

No action could result in an increase in boreal owl habitat over time if natural wildfires or insect epidemics do not reduce habitat. Aging and mortality of lodgepole pine would improve habitat quality for boreal owls, but it would still remain low quality habitat.

Proposed Action

The Bear Mountain South Fire of 2002 eliminated 55 acres of higher quality habitat from potential nesting. The openings created by the fire may be used for foraging immediately after spring thaw, when vole density is greater than in forested stands (Hayward and Hayward 1993). Otherwise, boreal owl habitat would be reduced until forest structure returns to mature or older forest. This would be the condition under Alternative 1 (no action). Fire salvage is planned for 40 of the 55 acres. Slash treatment of lopping and scattering will retain these acres as habitat for prey species.

Shelterwood seed and shelterwood prep harvest will reduce overstory cover and reduce higher quality nesting habitat to lower quality nesting habitat in 154 acres. Slash treatment of lopping and scattering will retain habitat for prey species. These stands will return to higher quality in approximately 50 years when tree canopy increases.

Clearcut and overstory removal will eliminate lower quality nesting habitat, all lodgepole pine in 77 acres. These stands will return to low quality nesting habitat in more than a hundred years. Mitigation identified for MIS included no burning of slash in clearcuts to provide habitat for small mammals. This mitigation would retain these units as foraging habitat.

Sanitation salvage and shelterwood prep harvest would remove overstory but would retain the existing lower quality habitat characteristics in the 115 acres. Slash treatment of lopping and scattering would retain these acres as habitat for prey species.

Cheatgrass treatment, Turnbull Gulch improvement, and prescribed burning of shrublands do not occur in boreal owl or prey habitat, so there would be no effect.

Road decommissioning of 2 miles would occur in boreal owl habitat. This action would restore foraging habitat on these 3 acres in 10 to 20 years, and nesting habitat in several hundred years. However, elimination of traffic on a corridor only 12 feet wide would incorporate these acres almost immediately into boreal owl habitat on either side of the road.

Forest Plan requirements include the retention of snags in harvest units, and mitigation for MIS includes additional snag retention. Forest Plan requires old growth in riparian areas, and mitigation for MIS includes designating riparian stands as old growth to meet this requirement. These measures will improve the quantity and quality of boreal owl habitat after harvest.

CUMULATIVE EFFECTS

Cumulative effects would relate most appropriately to spruce-fir forest, since this vegetation type provides quality habitat for boreal owls. Past harvest has occurred in 1,342 acres of spruce-fir in the analysis area since 1954, with clearcuts, overstory removal, and shelterwood-final removal accounting for 1,130 acres of this. All harvest has occurred across 58% of all spruce-fir in the analysis area and heavily influences the existing condition of vegetation. Grass/forb through open canopy pole timber size classes of spruce-fir account for 47% of all spruce-fir in the analysis area. Overall, 350 acres of higher quality habitat will remain after the Bear Mountain South Fire and proposed harvest, and 4,121 acres of lower quality habitat will exist after proposed harvest.

Other Action Alternatives

Effects of Alternatives 2, 3, and 4 would be similar to effects just described for the Proposed Action, except for the following: Alternative 2 would result in 0.5 acres less boreal owl habitat restored by road decommissioning. Alternative 3 affects only lower quality habitat, since there was no clearcut or overstory removal in high quality habitat in the Proposed Action. Related, Alternative 3 would not eliminate 77 acres of low quality habitat proposed for complete removal under the Proposed Action. Alternative 4 would have the same effect as only the road decommissioning of the Proposed Action.

Determination of Effect and Rationale

A “**may adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide**” determination is made for boreal owl based on the following:

- Forest Plan requirements for retention of old growth are followed.
- Additional old growth will be designated as mitigation for MIS.
- Slash will not be burned in clearcuts as mitigation for MIS.
- A substantial amount of spruce-fir has been harvested in the past with an additional small amount proposed.

Black-backed and Three-toed Woodpeckers

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

No action would result in a decline and loss of aspen over time, which does not appear to be important to these woodpeckers, although a very few nest sites have been located in aspen. However, aspen would be replaced by lodgepole pine, which is a common nesting and foraging substrate. More than 80 years would pass before establishing lodgepole trees would be large enough or old enough for nesting or useful as habitat for prey insects. Potential future increase and maturing of spruce-fir, as described for boreal owl, would provide nesting and foraging habitat for the species. Potential wildfires in conifer stands would create exceptional foraging habitat and future nesting snags. The spread of existing bark beetle endemic would increase prey availability. Resulting snags would provide nesting habitat if sufficient density of live and dead trees remained.

Proposed Action

The Bear Mountain South Fire eliminated 64 acres of nesting habitat, but this remains as foraging habitat. There was also an additional 400 acres of foraging habitat created by the Bear Mountain South Fire. Fire salvage is planned for 40 of these 464 acres. Harvest goals are to eliminate or greatly reduce beetle infected trees. However, most snags would be retained and would provide foraging sites for woodpeckers. Overall, there would be a small reduction of quality in 40 acres of foraging habitat.

Clearcuts and overstory removal will eliminate 86 acres of habitat. These stands would not return to existing condition for foraging or nesting for at least 80 years.

Shelterwood seed, shelterwood prep, and sanitation salvage harvest have goals to greatly reduce or eliminate dead or beetle infested trees. These goals would also greatly reduce or eliminate suitability as woodpecker habitat. These treatments would affect 513 acres of suitable habitat. It can be expected that these woodpeckers would not find suitable nest trees and would have greatly reduced opportunity to forage in these stands. For example, it is known that black-backed nesting is much reduced in salvage-logged forest (Saab and Dudley 1998). These stands would not return to the existing condition for 20 to 80 years, depending on return of beetles and overstory canopy filling.

Cheatgrass treatment, Turnbull Gulch improvement, and prescribed burning of shrublands do not occur in woodpecker or prey habitat, so there would be no effect.

Road decommissioning of 2 miles would occur in woodpecker habitat. This action would restore foraging habitat on these 3 acres in 80 years when mature trees could attract beetles. Nesting habitat could occur in the following decade as appropriate weakened trees and snags are created.

Forest Plan requirements include the retention of snags in harvest units, and mitigation for MIS includes additional snag retention. Forest Plan requires old growth in riparian areas, and mitigation for MIS includes designating riparian stands as old growth to meet this requirement. These measures will improve the quantity and quality of woodpecker habitat after harvest.

CUMULATIVE EFFECTS

Cumulative effects would relate most appropriately to lodgepole and spruce-fir forest, since these vegetation types provide quality habitat for woodpeckers. Past harvest has occurred in 9,364 acres of lodgepole and spruce-fir in the analysis area since 1954, with clearcuts, overstory removal, and shelterwood-final removal accounting for 5,971 acres of this. All harvest has occurred across 58% of all spruce-fir and 28% of all lodgepole in the analysis area and heavily influences the existing condition of vegetation. Grass/forb through open canopy pole timber size classes account for 47% of all spruce-fir and 20% of all lodgepole in the analysis area. Overall, 6,595 acres of foraging habitat will remain after the fire and proposed harvest, with 553 acres of this having lower foraging qualities. There would be 6,018 acres of nesting habitat remaining.

Other Action Alternatives

Effects of Alternatives 2, 3, and 4 would be similar to effects just described for the Proposed Action, except for the following: Alternative 2 would result in 0.5 acres less habitat restored by road decommissioning. Alternative 3 would not eliminate 86 acres of nesting habitat proposed for complete removal under the Proposed Action.

Determination of Effect and Rationale

A “**may adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide**” determination is made for black-backed woodpecker and three-toed woodpecker based on the following:

- Forest Plan requirements for retention of old growth and snags are followed.
- Additional old growth will be designated as mitigation for MIS.
- A substantial amount of spruce-fir has been harvested in the past, a lesser percentage of lodgepole, with an additional small amount proposed.
- Few acres of highly desired burnt forest are affected by proposed activities.

Olive-sided Flycatcher

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

The olive-sided flycatcher is likely to benefit from continued expansion of bark beetle and mistletoe mortality of lodgepole pine under no action. These processes would result in the creation of snags and forest openings near existing forest. This flycatcher would also benefit from the potential expansion of spruce-fir under no action, described earlier.

Proposed Action

The Bear Mountain South Fire eliminated 64 acres of nesting habitat, but this remains as highly desired foraging habitat, since burnt conifer forest with abundant snags is an important component in flycatcher habitat. There was also an additional 400 acres of foraging habitat created by the Bear Mountain South Fire. Fire salvage is planned for 40 of these 464 acres. Harvest goals are to eliminate or greatly reduce beetle infected trees. However, most snags would be retained and would provide perches for foraging sites and habitat for prey insects. Overall, there would be a small reduction of quality in 40 acres of foraging habitat.

Clearcuts and overstory removal will eliminate 86 acres of nesting habitat. These stands will retain a limited usefulness as foraging sites, since some snags will be retained to meet Forest Plan requirements. These stands would not return to existing condition for foraging or nesting for at least 80 years. Mitigation identified for MIS included no burning of slash in clearcuts to provide habitat for prey. This mitigation would also retain some prey habitat.

Shelterwood seed, shelterwood prep, and sanitation salvage harvest have goals to greatly reduce or eliminate dead or beetle infested trees. These goals would also greatly reduce suitability as flycatcher habitat. These treatments would affect 513 acres of suitable habitat. These stands would not return to the existing condition for 20 to 80 years, depending on return of beetles and overstory canopy filling. It can be expected that flycatchers would find few suitable nest trees and would have reduced opportunity to forage in these stands. Forest Plan requirements for snag retention would ensure some foraging availability. Slash treatment of lopping and scattering would also retain some habitat for prey species. Finally, mitigation identified for MIS included additional snag retention in shelterwood prep unit #14. This would provide additional perching sites and prey habitat across 116 acres.

Cheatgrass treatment, Turnbull Gulch improvement, and prescribed burning of shrublands do not occur in flycatcher or prey habitat, so there would be no effect.

Road decommissioning of 2 miles would occur in flycatcher habitat. This action would restore foraging habitat on these 3 acres in 80 years when mature trees could serve as perches. However, elimination of traffic on a corridor only 12 feet wide would incorporate these acres almost immediately into habitat. Nesting habitat could occur in the following decade as appropriate weakened trees and snags are created.

Forest Plan requirements include the retention of snags in harvest units, and mitigation for MIS includes additional snag retention. Forest Plan requires old growth in riparian areas, and mitigation identified for MIS includes designating riparian stands as old growth to meet this requirement. These measures will improve the quantity and quality of habitat after harvest.

CUMULATIVE EFFECTS

Cumulative effects would relate most appropriately to lodgepole and spruce-fir forest, since these vegetation types provide quality habitat for flycatchers. Past harvest has occurred in 9,364 acres of lodgepole and spruce-fir in the analysis area since 1954, with clearcuts, overstory removal, and shelterwood-final removal accounting for 5,971 acres of this. All harvest has occurred across 58% of all spruce-fir and 28% of all lodgepole in the analysis area and heavily influences the existing condition of vegetation. Grass/forb through open canopy pole timber size classes account for 47% of all spruce-fir and 20% of all lodgepole in the analysis area. Overall, 6,595 acres of habitat will remain after the Bear Mountain South Fire and proposed harvest, with 553 acres of this having lower foraging or nesting qualities.

Other Action Alternatives

Effects of Alternatives 2, 3, and 4 would be similar to effects just described for the Proposed Action, except for the following: Alternative 2 would result in 0.5 acres less habitat restored by road decommissioning. Alternative 3 would not eliminate 86 acres of habitat proposed for complete removal under the Proposed Action.

Determination of Effect and Rationale

A “may adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide” determination is made for olive-sided flycatcher based on the following:

- Forest Plan requirements for retention of old growth and snags are followed.
- Additional old growth will be designated as mitigation for MIS.
- Additional slash will be retained in clearcut units as mitigation for MIS.
- A substantial amount of spruce-fir has been harvested in the past, a lesser percentage of lodgepole, with an additional small amount proposed.
- Few acres of highly desired burnt forest are affected by proposed activities.

Golden-crowned Kinglet

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

No action would result in increased density of mature lodgepole pine and increased acres of mature mixed aspen/conifer over time. These conditions would be low quality habitat for golden-crowned kinglets. Natural wildfires would reduce habitat but would provide some winter habitat. Breeding densities are known to decline in burned areas (USDA 2003a). Mature spruce stands, the primary habitat, would change little over time. Spruce-fir acres might increase from the current 2,292 acres to approximately 5,800 acres over several centuries, based on a coarse assessment of Romme and Knight's (1981) estimate of fire frequency and spruce-fir occurrence in relation to elevation and topography. This succession would provide additional habitat for kinglets. Beetle mortality and mistletoe would affect habitat conditions little, unless tree mortality increased to a point where dense conifer forest stands were greatly reduced.

Proposed Action

The Bear Mountain South Fire of 2002 eliminated 55 acres of higher quality habitat. Habitat would be eliminated until forest structure returns to mature or older forest. Fire salvage is planned for 40 of the 55 acres. Salvage would reduce habitat for prey species, but individual prey would not be important to kinglets unless the prey moved into mature forest. Slash treatment of lopping and scattering will retain some habitat for prey species but, again, individual prey would have to move to mature forest to be consumed.

Shelterwood seed and shelterwood prep harvest will reduce overstory cover and reduce higher quality nesting habitat to lower quality nesting habitat in 154 acres. Forest Plan requirements for snag retention would provide some prey habitat, and roost sites if cavities were present. Slash treatment of lopping and scattering will retain some habitat characteristics for prey species. These stands will return to higher quality in approximately 50 years when tree canopy increases.

Clearcut and overstory removal will eliminate lower quality nesting habitat, all lodgepole pine in 77 acres. These stands will return to low quality in more than a hundred years. Forest Plan requirements for snag retention would provide some prey habitat. Mitigation identified for MIS included no burning of slash in clearcuts to provide habitat for prey, but prey would have to move to other habitat to be eaten.

Sanitation salvage and shelterwood prep harvest would remove overstory but would retain the existing lower quality habitat characteristics in the 115 acres. Forest Plan requirements for snag retention would provide some prey habitat, and roost sites if cavities were present. Slash treatment of lopping and scattering would provide some prey habitat. Mitigation identified for MIS included additional snag retention in shelterwood prep unit #14. This would provide additional prey habitat and potential roost sites across 116 acres.

Cheatgrass treatment, Turnbull Gulch improvement, and prescribed burning of shrublands do not occur in appropriate habitat, so there would be no effect.

Road decommissioning of 2 miles would occur in kinglet habitat. This action would restore foraging habitat on these 3 acres in 10 to 20 years, and nesting habitat more than a hundred years. However, elimination of traffic on a corridor only 12 feet wide would incorporate these acres almost immediately into foraging habitat on either side of the road.

Forest Plan requirements include the retention of snags in harvest units, and mitigation for MIS includes additional snag retention. Forest Plan requires old growth in riparian areas, and mitigation identified for MIS includes designating riparian stands as old growth to meet this requirement. These measures will improve the quantity and quality of habitat after harvest.

CUMULATIVE EFFECTS

Cumulative effects would relate most appropriately to spruce-fir forest, since this vegetation type provides quality habitat. Past harvest has occurred in 1,342 acres of spruce-fir in the analysis area since 1954, with clearcuts, overstory removal, and shelterwood-final removal accounting for 1,130 acres of this. All harvest has occurred across 58% of all spruce-fir in the analysis area and heavily influences the existing condition of vegetation. Grass/forb through open canopy pole timber size classes of spruce-fir account for 47% of all spruce-fir in the analysis area. Overall, 350 acres of higher quality habitat will remain after the Bear Mountain South Fire and proposed harvest, and 4,121 acres of lower quality habitat will exist after proposed harvest.

Other Action Alternatives

Effects of Alternatives 2, 3, and 4 would be similar to effects just described for the Proposed Action, except for the following: Alternative 2 would result in 0.5 acres less habitat restored by road decommissioning. Alternative 3 affects only lower quality habitat since there was no clearcut or overstory removal in high quality habitat in the Proposed Action. Related, Alternative 3 would not eliminate 77 acres of low quality habitat proposed for complete removal under the Proposed Action.

Determination of Effect and Rationale

A “may adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide” determination is made for golden-crowned kinglet based on the following:

- Forest Plan requirements for retention of old growth and snags are followed.
- Additional old growth will be designated as mitigation for MIS.
- Additional slash will be retained in clearcut units as mitigation for MIS.

- A substantial amount of spruce-fir has been harvested in the past, a lesser percentage of lodgepole, with an additional small amount proposed.

Pygmy Shrew

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

No action could result in an increase in shrew habitat over time if natural wildfires or insect epidemics do not reduce habitat. Spruce-fir acres might increase from the current 2,292 acres to approximately 5,800 acres over several centuries, based on a coarse assessment of Romme and Knight's (1981) estimate of fire frequency and spruce-fir occurrence in relation to elevation and topography.

Proposed Action

The Bear Mountain South Fire of 2002 eliminated 55 acres of habitat. Habitat would be reduced until matured forest structure returns in more than a hundred years. Fire salvage is planned for 40 of the 55 acres. Slash treatment of lopping and scattering will retain some usefulness for these acres as habitat for prey. However, prey would have to move into shrew habitat to be available.

Shelterwood seed and shelterwood prep harvest will reduce overstory cover, and, therefore reduce habitat quality in 154 acres. Slash treatment of lopping and scattering will retain habitat for prey species as described previously. These stands will return to higher quality in approximately 50 years when tree canopy increases.

Clearcut and overstory removal do not occur in suitable habitat. Mitigation identified earlier for MIS included no burning of slash in clearcuts to provide habitat for small mammals. This mitigation would provide some habitat for prey as described previously.

Sanitation salvage and 10 acres of shelterwood prep harvest, 115 acres total, occur in suitable habitat. Slash treatment of lopping and scattering will retain habitat for prey species as described previously.

Cheatgrass treatment, Turnbull Gulch improvement, and prescribed burning of shrublands do not occur in shrew or prey habitat, so there would be no effect.

Road decommissioning of 2 miles would occur in shrew habitat. This action would restore foraging habitat on these 3 acres in 10 to 20 years, and other habitat characteristics in more than a hundred years.

Forest Plan requirements include the retention of snags in harvest units, and mitigation for MIS includes additional snag retention. Forest Plan requires old growth in riparian areas, and mitigation for MIS includes designating riparian stands as old growth to meet this requirement. These measures will improve the quantity and quality of shrew habitat after harvest.

CUMULATIVE EFFECTS

Cumulative effects would relate most appropriately to spruce-fir forest. Past harvest has occurred in 1,342 acres of spruce-fir in the analysis area since 1954, with clearcuts, overstory removal, and shelterwood-final removal accounting for 1,130 acres of this. All harvest has occurred across 58% of all spruce-fir in the analysis area and heavily influences the existing condition of vegetation. Grass/forb through open canopy pole timber size classes of spruce-fir account for 47% of all spruce-fir in the analysis area. Overall, 350 acres of habitat will remain after the Bear Mountain South Fire and proposed harvest.

Other Action Alternatives

Effects of Alternatives 2, 3, and 4 would be similar to effects just described for the Proposed Action, except for the following: Alternative 2 would result in 0.5 acres less habitat restored by road decommissioning. Alternative 3 would only affect potential habitat for prey species, since there was no clearcut or overstory removal in shrew habitat in the Proposed Action. Related, Alternative 3 would not reduce the quality of 77 acres of prey habitat identified for complete removal under the Proposed Action.

Determination of Effect and Rationale

A “**may adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide**” determination is made for pygmy shrew based on the following:

- Forest Plan requirements for retention of old growth are followed.
- Additional old growth will be designated as mitigation for MIS.
- Slash will not be burned in clearcuts as mitigation for MIS.
- A substantial amount of spruce-fir has been harvested in the past with an additional small amount proposed.

American Marten

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

No action would result in a decline and loss of aspen over time, which is not an important vegetation type to martens. However, aspen would be replaced by lodgepole pine, which can be suitable habitat. More than 80 years would pass before establishing lodgepole trees would be large enough or dense enough for use by prey species such as red squirrel. More time would pass before these lodgepole stands aged sufficiently to provide coarse woody debris for red-backed voles, a primary prey source, and for marten denning and resting sites. The spread of existing bark beetle and mistletoe endemic would increase cavities available for dens and coarse woody debris over time. However, these same stands would not be useful habitat to martens if loss of canopy closure became extensive. Natural wildfires could also reduce marten habitat. Aging and mortality of existing lodgepole pine would improve habitat quality in many stands. Spruce-fir acres might increase from the current 2,292 acres to approximately 5,800 acres over several centuries, based on a coarse assessment of Romme and Knight’s (1981) estimate of fire frequency and spruce-fir occurrence in relation to elevation and topography.

Proposed Action

The Bear Mountain South Fire of 2002 affected 64 acres of suitable habitat. Loss of canopy closure would reduce habitat quality. These stands still provide some habitat to forage for prey. Habitat quality would be reduced until forest structure returns to mature or older forest. Fire salvage is planned for 40 of the 64 acres. This action would further reduce canopy closure. Slash treatment of lopping and scattering will retain these acres as habitat for prey species.

Shelterwood seed, shelterwood prep, and sanitation salvage harvest will eliminate marten habitat in 398 acres, due to the lower canopy cover already existing in these stands. These harvest methods will also reduce habitat quality in another 115 acres. Harvest will open overstory canopy, eliminate some potential den and rest sites, and reduce prey habitat by harvesting beetle-infected, mistletoe-infected, and dead trees. Slash treatment of lopping and scattering will retain some habitat for prey species. These 115 acres will return to current habitat quality in approximately 80 to 100 years when stand characteristics return. The 398 acres will likely require an additional 50 to 80 years to create sufficient canopy cover.

Clearcut and overstory removal will eliminate 86 acres of habitat. These stands will return to marten habitat in more than a hundred years. Mitigation identified for MIS included no burning of slash in clearcuts to provide habitat for small mammals. This mitigation would retain these units as prey habitat, but prey would have to travel to adjacent marten habitat to be eaten.

Cheatgrass treatment, Turnbull Gulch improvement, and prescribed burning of shrublands do not occur in marten or prey habitat, so there would be no effect.

Road decommissioning of 2 miles would occur in marten habitat. This action would restore foraging habitat on these 3 acres in 10 to 20 years as vegetation and small woody debris accumulate and restore denning habitat in several hundred years as larger woody debris accumulates. However, elimination of traffic on a corridor only 12 feet wide would incorporate these acres almost immediately into habitat on either side of the road.

Forest Plan requirements include the retention of snags in harvest units, and mitigation for MIS includes additional snag retention. Forest Plan requires old growth in riparian areas, and the mitigation identified for MIS includes designating riparian stands as old growth to meet this requirement. These measures will improve the quantity and quality of marten habitat after harvest.

CUMULATIVE EFFECTS

Cumulative effects would relate most appropriately to lodgepole and spruce-fir forest, since these vegetation types provides habitat for martens. Past harvest has occurred in 9,364 acres of lodgepole and spruce-fir in the analysis area since 1954, with clearcuts, overstory removal, and shelterwood-final removal accounting for 5,971 acres of this. All harvest has occurred across 58% of all spruce-fir and 28% of all lodgepole in the analysis area and heavily influences the existing condition of vegetation. Grass/forb through open canopy pole timber size classes account for 47% of all spruce-fir and 20% of all lodgepole in the analysis area. Some information indicates that habitat suitability reaches a threshold for martens at a landscape level when 25-30% of forest cover is lost (see USDA 2003). Grass/forb through open pole size classes of spruce-fir and lodgepole, which do not contribute to forest cover, account for 22% of the lodgepole and spruce-fir cover in the analysis area. This percentage is close to the threshold. Overall, 6,133 acres of habitat will remain after the Bear Mountain South Fire and proposed harvest, with 115 acres of this having reduced habitat quality as a result of partial harvest described above.

Other Action Alternatives

Effects of Alternatives 2, 3, and 4 would be similar to effects just described for the Proposed Action, except for the following: Alternative 2 would result in 0.5 acres less habitat restored by road decommissioning. Alternative 3 would not eliminate 86 acres of habitat proposed for complete removal under the Proposed Action.

Determination of Effect and Rationale

A “**may adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide**” determination is made for American marten based on the following:

- Forest Plan requirements for retention of old growth and snags are followed.
- Additional old growth will be designated as mitigation for MIS.
- Additional slash will be retained in clearcut units as mitigation for MIS.
- A substantial amount of spruce-fir has been harvested in the past, a lesser percentage of lodgepole, with an additional small amount proposed.

Fisher

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

No action could result in an increase in fisher habitat over time if natural wildfires or insect epidemics do not reduce habitat. Spruce-fir acres might increase from the current 2,292 acres to approximately 5,800 acres over several centuries, based on a coarse assessment of Romme and Knight’s (1981) estimate of fire frequency and spruce-fir occurrence in relation to elevation and topography.

Proposed Action

The Bear Mountain South Fire of 2002 eliminated 55 acres of habitat. Habitat would be reduced until matured forest structure returns in more than a hundred years. Fire salvage is planned for 40 of the 55 acres. Slash treatment of lopping and scattering will retain some usefulness for these acres as habitat for prey. However, prey would have to move into adjacent fisher habitat to be available.

Shelterwood seed and shelterwood prep harvest will reduce overstory cover, and therefore reduce habitat quality in 154 acres. Slash treatment of lopping and scattering will retain habitat for prey species as described previously. These stands will return to higher quality in approximately 50 years when tree canopy increases.

Clearcut and overstory removal do not occur in suitable habitat. Mitigation identified for MIS included no burning of slash in clearcuts to provide habitat for small mammals. This mitigation would provide some habitat for prey as described previously.

Sanitation salvage and 10 acres of shelterwood prep harvest, 115 acres total, occur in suitable habitat. Slash treatment of lopping and scattering will retain habitat for prey species as described previously.

Cheatgrass treatment, Turnbull Gulch improvement, and prescribed burning of shrublands do not occur in fisher or prey habitat, so there would be no effect.

Road decommissioning of 2 miles would occur in fisher habitat. This action would restore foraging habitat on these 3 acres in 10 to 20 years, and other habitat characteristics in more than a hundred years.

Forest Plan requirements include the retention of snags in harvest units, and mitigation for MIS includes additional snag retention. Forest Plan requires old growth in riparian areas, and mitigation is included for designating riparian stands as old growth to meet this requirement. These measures will improve the quantity and quality of shrew habitat after harvest.

CUMULATIVE EFFECTS

Cumulative effects would relate most appropriately to spruce-fir forest. Past harvest has occurred in 1,342 acres of spruce-fir in the analysis area since 1954, with clearcuts, overstory removal, and shelterwood-final removal accounting for 1,130 acres of this. All harvest has occurred across 58% of all spruce-fir in the analysis area and heavily influences the existing condition of vegetation. Grass/forb through open canopy pole timber size classes of spruce-fir account for 47% of all spruce-fir in the analysis area. Overall, 350 acres of habitat will remain after the fire and proposed harvest.

Other Action Alternatives

Effects of Alternatives 2, 3, and 4 would be similar to effects just described for the Proposed Action, except for the following: Alternative 2 would result in 0.5 acres less habitat restored by road decommissioning. Alternative 3 would only affect potential habitat for prey species, since there was no clearcut or overstory removal in fisher habitat in the Proposed Action. Related, Alternative 3 would not reduce the quality of 77 acres of prey habitat identified for complete removal under the Proposed Action.

Determination of Effect and Rationale

A “**may adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide**” determination is made for fisher based on the following:

- Forest Plan requirements for retention of old growth are followed.
- Additional old growth will be designated as mitigation for MIS.
- Slash will not be burned in clearcuts as mitigation for MIS.
- A substantial amount of spruce-fir has been harvested in the past, with an additional small amount proposed.

Wolverine

ENVIRONMENTAL CONSEQUENCES

Proposed Action

As suggested by Banci (1994), “Until more information becomes available, habitat management prescriptions that successfully provide for the life needs of species such as the American marten, fisher, and lynx and their prey will also provide for the needs of wolverine at the stand level. However, it is not known whether this will provide for wolverine habitat needs at the landscape or larger scales.” The marten, fisher and lynx have been analyzed in this document. The effects for wolverine would be similar to the effects described for these species described. These analyses are not repeated here. The Proposed Actions will have a small effect to travel corridors. There will be a loss of 86 acres of habitat from clearcuts and overstory removal and a reduction in habitat quality in 513 acres. Forest Plan requirements for snag retention and old growth would ensure future denning substrate.

Determination of Effect and Rationale

A “**may adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide**” determination is made for wolverine based on the following:

- Forest Plan requirements for retention of old growth and snags are followed.
- Additional old growth will be designated as mitigation for MIS.
- Additional slash will be retained in clearcut units as mitigation for MIS.
- A substantial amount of spruce-fir has been harvested in the past, a lesser percentage of lodgepole, with an additional small amount proposed.

Neotropical Migratory Birds

A recent executive order (EO) (dated 1/11/01) directs Federal agencies to protect migratory birds. A follow-up Memorandum of Understanding (MOU) between the USFS and USFWS (dated 1/16/01) was developed to complement and implement this executive order in a collaborative effort between the two agencies. The EO and MOU have been reviewed. This analysis and project are consistent with criteria in these documents for the protection of migratory birds. Many of the migratory birds likely to occur in the area are included in the Specialist's Report for MIS or the Biological Evaluation. The chance for any intentional or unintentional take of any migratory bird is extremely minimal.

Fragmentation

AFFECTED ENVIRONMENT

Landscapes are commonly described as having three kinds of structures that are referred to collectively as landscape elements: a matrix, corridors, and patches. Usually vegetation (community type and successional stage) is the most obvious feature of a landscape element, sometimes as modified by landforms or other factors. In addition to the characteristics of individual landscape elements, their arrangement or pattern on the landscape is of interest (Diaz and Apostol 1992).

The pattern of the matrix, patches, and corridors in landscapes is of primary interest, since it is really the spatial arrangement of these elements that determines the function of a landscape as an ecological system. The disruption, or fragmentation, of ecological systems is the topic of numerous studies. Fragmentation has been described in several ways, and the definition of fragmentation is currently a subject of considerable debate.

Fire, more than any other single factor, is responsible for the establishment, structure, and long-term maintenance of the forests in the Blackhall-McAnulty Analysis Area. Fire suppression during much of this century and, to a much lesser extent, timber harvest during the last four decades probably have had the greatest effect on vegetation in the project area. Eighty-five percent of the known-aged forested area in the analysis area originated in the last 140 years (RIS Database). Sixty-four percent originated 81-140 years ago during the period of post-settlement fire activity.

Several studies have also examined changes in patches and habitats within a predominantly forested landscape (the matrix), such as is the case of the MBNF. This type of fragmentation is often called perforation. Baker (1994) evaluated changes in landscape structure resulting from timber harvest on the Medicine Bow National Forest. The trends identified in his study were a decrease of interior habitat and patch size, and an increased patch density and perimeter (edge). This pattern reflected the effects of dispersed-patch clearcutting, strip-clearcutting, and group selection harvest, which were most common silvicultural methods used in the 1950's to 1980's.

The historic range of variation (HRV) of an area must be considered in an analysis of forest fragmentation. Dr. Steve Buskirk commented at the November 1997 fragmentation symposium held at Colorado State University that fragmentation in the Central Rocky Mountains (CRM) is different than fragmentation in other parts of the country (e.g., the Pacific Northwest) because landscapes are naturally patchy, patches of human caused disturbance are "perforations" in an otherwise connected forest, and most of the forest is a product of natural disturbance. Because the CRM are naturally diverse, it is more difficult to describe and understand fragmentation. Some human-caused disturbances are almost indistinguishable from natural patchiness, while others differ sharply. In the CRM, we have tended to be concerned with the fragmentation of late successional forest with early successional forest. Fragmentation is more than variation in stand age. Concerns of effects of forest fragmentation on diversity relate to: genetics, loss of populations, and loss of species and subspecies. In Colorado and Wyoming, forests are rare and obligate forest species are rare. Species rare to us are more common to the north where forests are more common.

Plant and animal species have likely adapted to this highly variable and dynamic landscape and are able to tolerate changes within much of the range of natural variability without profound effects on population viability or distribution (Hann 1990). In spite of this adaptability, marked alterations of animal and plant abundance and distribution may result from rare natural events at the extremes of the range of natural variability, or from human activities that alter landscape or ecosystem characteristics beyond the natural range.

Dr. Dennis Knight also considered HRV. He concluded that large, undisturbed forest patches are becoming rarer. The significance of the scientific concern is less clear. The CRM are naturally patchy. Patchiness is caused by elevation variation, site variation (slope, aspect), soils (type, texture), moisture (riparian areas, meadows, beaver), geologic factors (parent material, glacial moraines), alluvial areas, wind and snow deposition (ribbon forest), avalanche, landslides, natural species diversity, insect outbreaks, fire, and timber harvest. Forest cover type is tied to zones. Early succession following fire will follow a different pathway, depending on the wind, soils (moisture and texture), snow distribution, etc. Abrupt transitions or borders are often a result. Human caused disturbances superimposed on naturally occurring patchiness has made it more difficult to interpret.

Dillon et al. (2003) concluded that several aspects of the Medicine Bow National Forest are outside the HRV as related to fragmentation (1600 to 1850 A.D.), including:

- Tree cover is lower and density and size of canopy gaps is higher in harvested stands.
- Snag density and amount of coarse woody debris is lower where timber harvest has occurred.
- Age and size structure of managed stands in ravines and north facing slopes is skewed toward smaller and younger trees.
- Harvest rotations are shorter than natural disturbances.
- Old-growth is less common.

- Rate of patch formation and size of disturbances is higher since harvest produces patches more frequently than natural disturbances.
- Edge is higher and interior forest is lower due to roads and harvest.

Baker (1994) also discussed approaches to counter fragmentation and restore the landscape to its range of natural variability (RNV, also called historic range of variability, HRV) in a managed forest. One solution was a protection approach such that current old growth and old forest areas that have interior forest should be maintained, and there needs to be planning to produce future old forest. Baker (1994) also discusses silvicultural options to counter fragmentation. These approaches address changing the pattern and size of cut areas, and minimizing the road network. Simply increasing the mean patch size through aggregation of cutting units would be a step in the direction of the natural disturbance regime. Aggregation of cutting units has been proposed as an effective silvicultural technique to decrease the effect of fragmentation (Li et al. 1993, cited in Baker 1994). Mimicking some aspects of natural disturbances (e.g., fire) in the harvest regime will help keep areas subjected to silviculture within the RNV for landscape structure (Hunter 1993, cited in Baker 1994).

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

In Alternative 1, there would be no timber harvest, and the areas of undisturbed forest matrix would remain relatively unchanged. However, since there is no harvest under this alternative, more time would be required for past harvest units to mature sufficiently to blend into existing adjacent mature forest than the time required if these adjacent stands were harvest units. In the absence of disturbance (assuming effective fire control), plant succession would continue and we could expect a continuing decline in aspen and a modest increase in spruce-fir over time. Though this alternative maintains the existing amount of mature interior forest, since no road closures are proposed, this alternative would do nothing to address Forest fragmentation due to roads, especially along the northeast edge of the analysis area.

Proposed Action

The Proposed Action increases forest perforation by a moderate amount. Most harvest units of the Proposed Action attempt to consolidate previous harvest units so that average patch size would be larger in the future. This action would decrease edge. This action would increase the size and amount of mature interior forest and cause less perforation of forest habitat in 4 to 10 decades, depending on harvest type. Road effects to forest fragmentation would be addressed to the greatest extent by this alternative (and alternatives 3 and 4). Decommissioning would have the greatest effect to National Forest land (both forest and shrubland) in the northeast end of the analysis area where the road proposal is concentrated.

Alternative 2

With the same harvest treatments as the Proposed Action, Alternative 2 would also increase forest perforation by a moderate amount. As with the Proposed Action, most harvest units attempt to consolidate previous harvest units so that average patch size would be larger in the future. This alternative would decrease edge, increase the size and amount of mature interior forest, and cause less perforation of forest habitat in 4 to 10 decades, depending on harvest type. The action alternative with the least amount of road decommissioning, Alternative 2 would have the smallest effect on reducing the effects of the existing road system on fragmentation.

Alternative 3

Alternative 3 would decrease forest perforation/fragmentation. Alternative 3 has the proposed amount of road decommissioning, but does not include clearcuts or boundary treatment at Skyline. Leaving more intact forest would initially decrease perforation, increase average patch size, decrease edge, and maintain more interior forest than the Proposed Action. However, more time would be required for past harvest units to mature sufficiently to blend into existing mature forest than the time required for past harvest units to blend into proposed harvest. Road decommissioning effects would be the same as the Proposed Action.

Alternative 4

Alternative 4 would not change this discussion of perforation of forest habitat, since it does not include any proposed harvest. Forest perforation effects would mimic Alternative 1 (no action). This alternative would address habitat fragmentation as it relates to roads, since this alternative includes road decommissioning equal to the Proposed Action. Efforts to address the issues identified for wildlife include consolidating proposed harvest units with past harvest units to maintain more mature interior forest, reduce edge, reduce roads, and increase patch size over time.

CUMULATIVE EFFECTS

The Encampment River and Mount Zirkel Wilderness Areas are in watersheds adjacent to the Blackhall-McAnulty Analysis Area. Neither of these areas will be affected by the proposed timber sale. Blackhall-McAnulty Analysis Area also contains the entire Bear Mountain Inventoried Roadless Area and a small portion of the East Fork of the Encampment Inventoried Roadless Area. There is no proposed harvest or road construction proposed under the Proposed Action or any other action alternative within these areas. Currently, 43 percent of the forested area is providing mature or old growth forest habitat. The proportion of the forested area affected by timber harvest associated with the proposed timber sale is small, and would range between 0 (Alternative 1 - No Action & Alternative 4) to 6.0 percent (Proposed Action & Alternative 2). Cumulative harvest in the analysis area would range between 27 (Alternative 1 - No Action & Alternative 4) and 33 percent (Proposed Action & Alternative 2) of the forested area, depending on the alternative. Sufficient habitat will remain for habitat specialists.

Economic Efficiency

The Blackhall-McAnulty Analysis Area is situated on the Brush Creek/Hayden Ranger District of the Medicine Bow-Routt National Forests, in the Sierra Madre Range, Carbon County, Wyoming. Situated directly north of the Colorado-Wyoming state line, the communities of Pearl, Cowdrey, and Walden in Jackson County, Colorado, along with Encampment, Riverside, and Saratoga in Wyoming, are most likely to be directly affected by the project activities because of their proximity to the project area, and are the focus of the following social and economic analysis. Some residents of these communities depend upon a variety of forest resource-related activities, and access to resources, for their economic livelihood. These forest resource-related activities include: water diversions, wood products, mining, hunting and outfitter guiding, grazing, and tourism activities. Some residents who live around the project area may also consider the forest resources and access an important part of their quality of life.

ENVIRONMENTAL CONSEQUENCES

The following three-part analysis highlights both social and economic issues, and potential impacts, to the greatest degree possible. In some cases, quantitative measures have been used, but in most cases, the discussion is qualitative.

Financial Efficiency

Financial efficiency is a comparison of those costs and benefits that can be quantified in terms of actual dollars spent or received within the project area. When considering quantitative issues, financial efficiency analysis offers a consistent measure in dollars for comparison of alternatives. This type of analysis does not account for non-market benefits, opportunity costs, individual values, or other values, benefits, and costs that are not easily quantifiable. This is not to imply that such values are not significant or important--but to recognize that non-market values are difficult to represent with appropriate dollar figures. The values not included in this part of the analysis are often at the center of disagreements and the interest people have in forest resource projects. Therefore, financial efficiency should not be viewed as a complete answer, but as one tool decision makers use to gain information about resources, alternatives, and trade-offs between costs and benefits.

The main criteria used in assessing economic efficiency is Present Net Value (PNV), which is defined as the value of discounted benefits, minus discounted costs. A PNV analysis includes all outputs, including timber, grazing, and recreation, to which a monetary value is assigned. The monetary values include both market and non-market values. In addition, a financial efficiency analysis is completed to determine the financial returns of each alternative. A financial efficiency analysis is the PNV of Federal revenues and costs.

Present Net Value (PNV) is an economic measure that accounts for all current and future costs and benefits, within the treated units, in a single dollar figure. Future costs and benefits are estimated and discounted into today's dollars, and added to the current project costs and benefits. The result is a figure that can be compared across alternatives, representing the total financial impact over the life of the project. Because a dollar is worth more now than it would be in the future, (would you rather have a dollar now, or a dollar in 50 years?) discounted costs and benefits are small figures. For example, a benefit of \$1,000,000 in 100 years is worth about \$20,000 today, using the standard government discount rate of four percent.

For the Blackhall-McAnulty analysis, the output level of nonmarket goods (e.g., recreation, hunting, water production) is not expected to change in any of the alternatives. In addition, there are no non-Forest Service costs associated with this project. Thus, for all alternatives, the economic efficiency analysis is the same as the financial efficiency analysis. All costs, timing of the activities and outputs were developed by the specialists on the interdisciplinary team.

Table 50 displays the PNV and benefit/cost ratio for each Blackhall-McAnulty alternative. All monetary values are expressed in constant dollars, with no allowance for inflation. A 4% discount rate was used over a 44-year period (2003-2046). A 44-year period was used because this is the timeframe for the activities, and outputs proposed by the alternatives. The reduction of PNV in any alternative, as compared to the most efficient solution, is the economic trade-off, or opportunity cost, of achieving that alternative.

Table 50. Economic Efficiency by Alternative (in Thousands of Dollars)

	Alternative 1 No Action	Proposed Action	Alternative 2	Alternative 3	Alternative 4
Present Net Value	N/A	\$509,897	\$522,410	\$106,117	-\$167,466
Benefit/Cost Ratio	N/A	1.26	1.27	1.18	0

Source: Quicksilver Economic Analysis

Economic Efficiency

Economic efficiency compares costs and benefits of resources, quantifiable or not. This measure considers positive and negative resource externalities, passive uses, non-consumptive use, and opportunity costs at various scales. An economic efficiency analysis includes national, as well as local issues and concerns. Many of these benefits and costs are not valued through the market or exchange of money, and can be difficult to quantify or summarize. Often, the same impact may be considered a cost to some and a benefit to other, depending on individual values. Economic efficiency is another tool used in the decision making process to gain full information about a project, both quantitative and qualitative, and differences between alternatives.

Alternative 1 – No Action

Since no costs or outputs are associated with the No Action alternative, the PNV is zero and the benefit/cost ratio is not applicable.

Proposed Action and Action Alternatives

Table 50 indicates that all of the action alternatives except Alternative 4 have a positive PNV and benefit/cost ratio greater than 1, and are therefore economically efficient. Alternative 4 has a negative PNV and benefit/cost ratio because it just includes watershed restoration project costs. Alternative 2 has the highest PNV and benefit/cost ratio because it has the same commercial treatments as the Proposed Action but less cost associated with road decommissioning. When evaluating trade-offs, the use of economic efficiency measures is one tool used by the decision maker. Many things cannot be easily quantified with a monetary value, such as effects to wildlife, forest health, plant diversity, etc. The decision maker takes these and many other factors into account in making the decision.

CUMULATIVE EFFECTS

There are many elements that influence and affect local economies. Population growth, economic growth, and economic diversity and dependency of individual counties and communities all affect local economies. Due to the relatively small scope of this project, it is not expected to add any existing cumulative effect to the local economy.

Distribution Analysis

Distribution analysis is not concerned with costs and benefits directly, or with direct values of resources, but with the equity in which resources are distributed. In essence, it is the balancing of local, regional, and national uses. By identifying local impacts and being aware of national values, decision makers can balance the benefits and costs among geographical, political, social, ethnic, and economic sectors of society. In this project area analysis, the distribution impact is considered from several perspectives, impacts of employment and income by alternative, and environmental justice.

Employment and Income

In general, the impact of this project will have little impact, positive or negative, to the local economy of Carbon County. There will be little overall change in terms of economic activity. Under any of the other alternatives, the situation is similar; the total impact to the local economy of any alternative will be minimal to forest resource-related industries.

Environmental Justice

A specific consideration of equity and fairness in resource decision-making is encompassed in the issue of environmental justice. As in Executive Order 12898 (Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations), all Federal actions will consider potentially disproportionate effects on minority or low-income communities. Consideration of environmental justice issues should be highlighted for decision makers. Potential impacts or changes to low-income or minority community in the project area due to the Proposed Action should be considered. Where possible, measures should be taken to avoid impact to these communities or mitigate the adverse effects.

Within the project area, there are no communities with significant low-income or minority populations, so specific actions to address environmental justice concerns were not implemented for this project.

Tribal Consultation

The appropriate Native American tribes were contacted during scoping for the proposal. No known Native American cultural sites, sacred sites, or burials are within the proposed areas of potential direct effect.

Short-term Uses and Long-term Productivity ---

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Short-term uses are those expected to occur on the Forest during the next ten years. These include, but are not limited to, recreation use, grazing, mineral development, timber harvest, and prescribed burning. Long-term productivity refers to the capability of the land to provide resource outputs beyond the ten-year period.

The minimum management requirement established by regulation (36 CFR 219.27) provides for the maintenance of long-term productivity of the land. Minimum requirements assure that long-term productivity of the land will not be impaired by any of the short-term uses that are proposed by this project.

Unavoidable Adverse Effects ---

The application of the Forest Plan Standards and Guidelines and the listed mitigation measures will limit the extent and duration of any adverse environmental effects due to this project. However, it is impossible to avoid all potential impacts completely. Refer to the discussion of Environmental Consequences for each resource in the EIS for the disclosure of all environmental effects.

Irreversible and Irretrievable Commitments of Resources ---

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line right-of-way or road.

There are no identifiable commitments of resources for this proposed action that are irretrievable or irreversible, as determined by the Interdisciplinary Team.

Cumulative Effects

See preceding Environmental Consequences discussions for cumulative effects under each resource area.

Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with ...other environmental review laws and executive orders.”

The Proposed Action complies with other laws and regulations such as the Clean Water Act, Endangered Species Act, and the National Historic Preservation Act. There will be no adverse effects on any threatened or endangered species or on cultural resources. The best management practices will be applied to meet state water quality standards.

This proposal has been compared to the preferred Alternative D, along with the other action alternatives included in the December 2002 Medicine Bow Forest Plan Revision Draft EIS (40CFR 1506.4). The analysis found that this project will not forego future decisions to be made under the Forest Plan Revision (see project record for Consistency Analysis; see Appendix A for map of management areas under Alternative D).

CHAPTER 4. CONSULTATION AND COORDINATION

Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

ID TEAM MEMBERS:

NAME/AREA EXPERTISE AND EXPERIENCE (YRS.)	RESOURCE AREA	PROFESSIONAL EDUCATION
Terry DeLay (19)	Project Leader/ Silviculture	BS Natural Resource Mgt
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Todd Allison (4)	Fisheries	BS Wildlife Biology, Aquatics
Paula Guenther-Gloss (13)	Fisheries	BS Zoology MS Water Resource Mgt
Carol Purchase (15)	Hydrology	BS Botany MS Forest Hydrology
Deana Wood (19)	Archaeology	BS Geology MA American Studies, Archaeology
Sarah Crump (13)	Archaeology	BA Anthropology/Archeology
Steve Mottus (27)	Information Management	BS Agriculture BS Forest Mgt
Ken Keeth (22)	Engineering	BS Wildlife Ecology
Jim Barott (15)	Hydrology/Soils	BS Recreation Resource Mgt & Soil Science
Mick Hood (17)	Fire/Fuels	BS Forestry
Angela Safranek (16)	Range Management	BS Range Ecology
Wendy Haas (22)	Range Management	BS Wildlife Biology MS Wildlife Biology
John Baumchen (19)	Recreation	BS Forest Management
John Proctor (8)	Botany	BS Biology
Penny Walters (2)	Lands/Minerals/Special Uses	BS General Studies

FEDERAL, STATE, AND LOCAL AGENCIES

WY Dept of Environmental Quality	WY Game & Fish Department
WY State Historic Preservation Office	U.S. Department of the Interior
U.S. Environmental Protection Agency	U.S. Fish & Wildlife Service
Town of Saratoga Mayor	Natural Resources Conservation Service
WY Office of Federal Land Policy	Dave Freudenthal, Governor

OTHERS

Wyoming Outdoor Council	Biodiversity Conservation Alliance
Sierra Club, Snowy Range	Conservancy of the Phoenix
American Lands Alliance	Sierra Club, Wyoming Chapter
Collision of Bulolshit Growth	Upper Arkansas & South Platte Project
Zone 4 Inc.	Wyoming Wilderness Assn
SINAPU	Friends of the West
Center for Native Ecosystems	Bighorn Lumber Company
Marion County Water Watch	
Mary Forrester	Bill Baker
Nina Johnson	Eric Wagner
James Shaw	Mary Beth Baptiste
Wendell Funk	John Manley
Ruth Niswander	Robert & Elissa Angell
F. Earline Hittel	Scott Bohle
Ed Sherline	Tomas Jensen
Sigrid Mayer	Keith Rittle
Barbara Rugotski	John Winkel
John Kuzel	Nina Johnson
Sabine Jordan	Ashley Martens
Ruth Mains	James Lindzey
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Marilyn Dinger	Ken Bauer
Naomi Rachel	Patricia Dowd
Ken Driese	Robert Hatton
Shelly & John Ellis	Julie O'Donnell
Dennis Grasso	Jim Stone
Jennifer Stansbury	Mark Dunning
David Moenkhaus	Randy Bruns
Jim Maucker	Bob & Carol Meadows
James Willms	Randall Cox
James Rittmueller	Jonathan Matthews

Andrew Orahoske	Matthew Caires
Donald Faggiani	Evert Brown
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Bart Geerts	Doug Alley
Lisa Cox	Thomas Strider
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Jane Warren, Rep. District 13	Josh Thompson
Dana Eberhard	Jonathan B. Ratner
J. P. Cavigelli	Birgit F. Burke
Kate Inman	David Willms
Angel & Ruth Muzzin	Ted Zukoski
Jack Clinton	Richard Perue
Thomas Walker	Gail Harmon
Cindy Bonds	Denis O'Mahoney
Robert Handelsman	Eric Dalton
Abigail B. Wiebenson	Rock Schuler
Dean Roddick	George Van Sickly & Stephanie White
Mimi McMillen	Chad Doverspike
Kim Peterson	Teresa Kurtzhall
F. W. Cooper	Evelyn Dye-Garcia
Ron Harden	Patrick Whelan
Paul Richards	Bobbie D. Flowers
Storm Waters	Betty Jean Herner
Kerry Brinkerhoff	Libby Langston
Marc Madow	Steve & Eddie Hoadley
Billy & Stephanie Wagoner	Dave & Diane Pauli
Kristin Belko	Tom Hoadley
J. M. Rudder	Kathy Moriarty
Lisa Archer	Holly Stadtler
Christopher Hiemstra	Madeline Dalrymple
Kelly Lotts	Charles and Kaye Barrett
Chuck Pezeshki	Shane Smith
Bryan Wyberg	Marian Paxton
Red Desert Audubon	Mary McCombs
Joyce Harkness	Mark Jenkins
Nancy Brown	Leila Bruno
Damon Montano	Dana Dreinhofer
Greg Sauer	Mark Johnson
Ann Hicks	Dennis Lenz

Distribution of the Environmental Impact Statement

This environmental impact statement has been distributed to individuals who specifically requested a copy. In addition, copies have been sent to the following Federal agencies, State and local governments. Those who submitted substantive comments on the draft environmental impact statement have been notified of the availability of this document from either the Brush Creek/Hayden District Office, or from the Forest website.

INDIVIDUALS AND ORGANIZATIONS

Wendell Funk	Teresa Kurtzhall
James Willms	F. W. Cooper
Robert Van Risseghem	Marion County Water Watch
Bighorn Lumber Company	Ron Harden
Barry Bruns	Patrick Whelan
James Rittmueller	Paul Richards
Rodney Parlee	Bobbie D. Flowers
Josh Thompson	Storm Waters
Bart Geerts	Betty Jean Herner
Ken Bauer	Kerry Brinkerhoff
Dana Eberhard	Marc Madow
American Lands Alliance	Steve & Eddie Hoadley
Jonathan B. Ratner	Billy & Stephanie Wagoner
J. P. Cavigelli	Jim Stone
Birgit F. Burke	Dave & Diane Pauli
Kate Inman	Kristin Belko
David Willms	Sierra Club, Medicine Bow Group
Ted Zukoski	Tom Hoadley
Jack Clinton	J. M. Rudder
Center for Native Ecosystems	Kathy Moriarty
American Lands Alliance, Southern Rockies	Lisa Archer
Richard Perue	Holly Stadtler
Randy Bruns	Christopher Hiemstra
Gail Harmon	Madeline Dalrymple
Cindy Bonds	Kelly Lotts
Sigrid Mayer	Charles and Kaye Barrett
Denis O'Mahoney	Chuck Pezeshki
Eric Dalton	Shane Smith
Abigail B. Wiebenson	Bryan Wyberg
Rock Schuler	Marian Paxton
Dean Roddick	Red Desert Audubon
George Van Sickle & Stephanie White	Biodiversity Conservation Alliance
Mimi McMillen	Mary McCombs
Kim Peterson	Patricia Dowd

Jim Maucker	American Lands/Upper Midwest
Joyce Harkness	Dana Dreinhofer
Mark Jenkins	Greg Sauer
Leila Bruno	Ann Hicks
	Dennis Lenz

FEDERAL, STATE, AND LOCAL AGENCIES

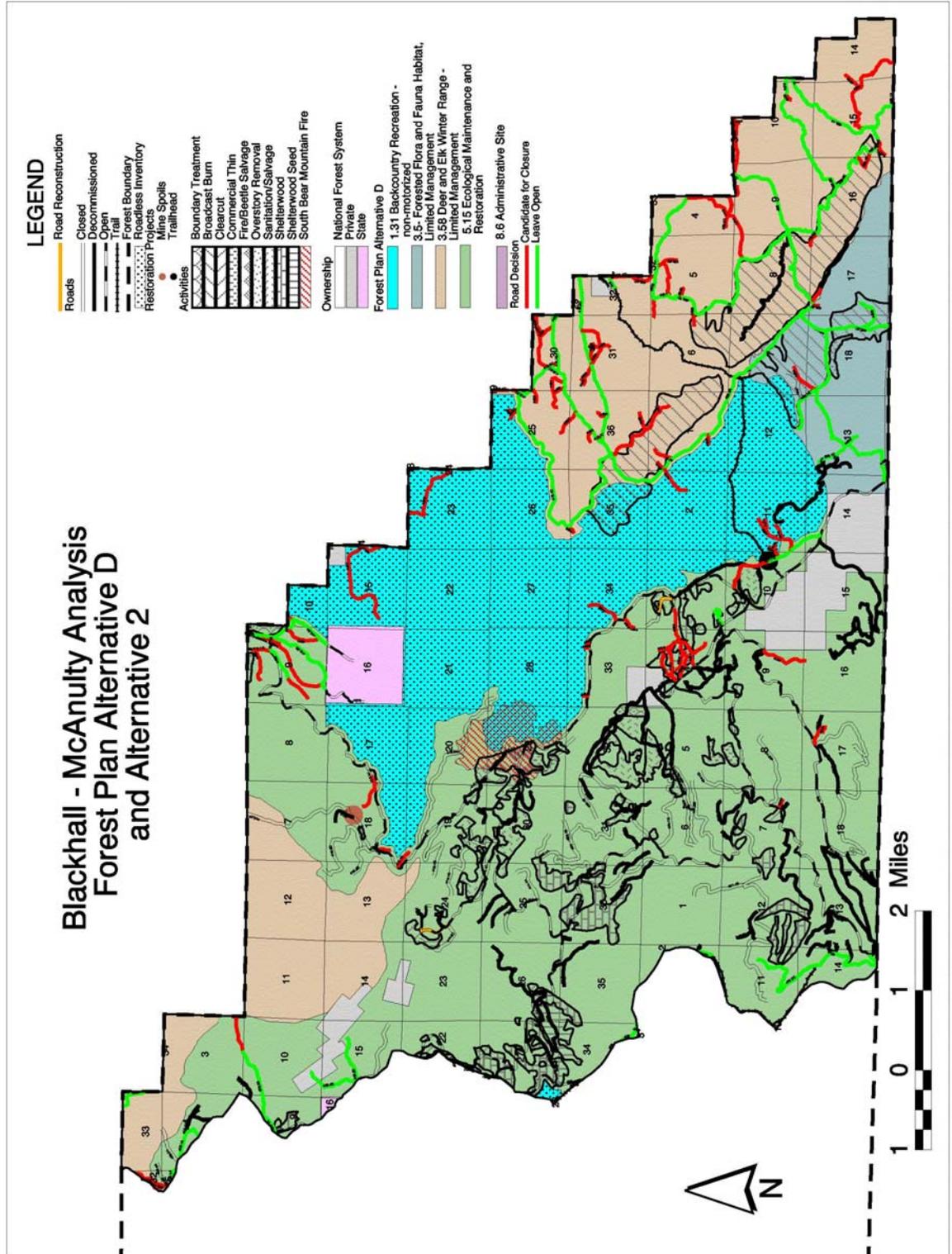
USDA APHIS	Natural Resources Conservation Service
USDA National Agricultural Library	BLM Wyoming State Office
US Army Corps of Engineers	US Department of Energy
US Environmental Protection Agency	Region VIII Environmental Protection Agency
US Department of Housing & Urban Development	CO Department of Housing and Urban Development
National Park Service	Federal Aviation Administration
Federal Highway Administration	Advisory Council on Historic Preservation
US Department of the Interior	WY Game & Fish Dept
Dave Freudenthal, Governor	

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APPENDIX A

Draft Forest Plan Alternative D



APPENDIX B

Response to Public Comment

During the initial scoping period, 85 comments were received from individuals and organizations, Federal, State and local agencies (*see DEIS, Chapter 4*). The Interdisciplinary Team reviewed the comments and identified significant issues to be analyzed in depth in the EIS. Significant issues were defined as those directly or indirectly caused by implementing or not implementing the Proposed Action. The issues that were not significant or which had been covered by prior environmental review were identified and eliminated from detailed study, narrowing the discussion to be analyzed in depth in the EIS (*see DEIS, Chapter 2*). Additional alternatives or mitigation measures to address these significant issues were developed.

The following section responds to ***substantive** comments received during the 45-day Draft EIS review period. Ninety-three comment letters were received. ***Definition of substantive comments – Comments that are within the scope of the proposed action, are specific to the proposed action, have a direct relationship to the proposed action and include supporting reasons for the Responsible Official to consider. Comments not meeting this definition were not addressed in this section.**

Comments pertinent to the same subject have been grouped into categories. Many of the comments received were previously identified during the scoping period and addressed in the Draft EIS; therefore, the response to these comments will be brief and will reference the chapter or section of the Draft EIS that supports the agency's position. As previously documented in the Draft EIS on page 45, excerpts of specialist reports were used to compile the Draft EIS. Specialist reports in their entirety are part of the official Project Record. Where noted, the response to comments refers to the full, unabbreviated specialist reports on file at the District office.

Comments received from Federal, State, and local agencies are included in their entirety in this appendix.

Letter #	Commenter	Letter #	Commenter
1	Wendell Funk	39	George Van Sickle & Stephanie White
2	James Willms	40	Mimi McMillen
3	Robert Van Risseghem	41	Chad Doverspike
4	Bighorn Lumber Company	42	Kim Peterson
5	Barry Bruns	43	Teresa Kurtzhall
6	James Rittmueller	44	F. W. Cooper
7	US Dept of the Interior	45	Evelyn Dye-Garcia
8	Rodney Parlee	46	Marion County Water Watch
9	Jane Warren, Rep District 13	47	Ron Harden
10	Josh Thompson	48	Patrick Whelan
11	Bart Geerts	49	Paul Richards
12	Ken Bauer	50	Bobbie D. Flowers
13	Dana Eberhard	51	Storm Waters
14	American Lands Alliance	52	Betty Jean Herner
15	Jonathan B. Ratner	53	Kerry Brinkerhoff
16	J. P. Cavigelli	54	Libby Langston
17	Birgit F. Burke	55	Marc Madow
18	Kate Inman	56	Steve & Eddie Hoadley
19	WY Game & Fish Dept	57	Billy & Stephanie Wagoner
20	David Willms	58	Jim Stone
21	Angel & Ruth Muzzin	59	Dave & Diane Pauli
22	Ted Zukoski	60	Kristin Belko
23	Jack Clinton	61	Sierra Club, Medicine Bow Group
24	Center for Native Ecosystems	62	Tom Hoadley
25	American Lands Alliance, Southern Rockies	63	J. M. Rudder
26	Natural Resources Conservation Service	64	Kathy Moriarty
27	Richard Perue	65	Lisa Archer
28	Randy Bruns	66	Conservancy of the Phoenix
29	Thomas Walker	67	Holly Stadler
30	Gail Harmon	68	Christopher Hiemstra
31	Cindy Bonds	69	Madeline Dalrymple
32	Sigrid Mayer	70	Kelly Lotts
33	Denis O'Mahoney	71	Charles and Kaye Barrett
34	Robert Handelsman	72	Chuck Pezeshki
35	Eric Dalton	73	Shane Smith
36	Abigail B. Wiebenson	74	Bryan Wyberg
37	Rock Schuler	75	Marian Paxton
38	Dean Roddick	76	Red Desert Audubon

Letter #	Commenter	Letter #	Commenter
77	Biodiversity Conservation Alliance	86	Damon Montano
78	Mary McCombs	87	Dana Dreinhofer
79	Patricia Dowd	88	Greg Sauer
80	Jim Maucker	89	Mark Johnson
81	Joyce Harkness	90	Environmental Protection Agency
82	Mark Jenkins	91	Ann Hicks
83	Nancy Brown	92	Dennis Lenz
84	Leila Bruno	93	Dave Freudenthal, Governor
85	American Lands/Upper Midwest		

Vegetation Treatments

<p>Comment #1</p>	<p>“In general I support the portions of the proposed action that involve treatments of the forest for the purpose of beetle control, vegetation improvements for wildlife through broadcast burning, hazardous fuels reduction for fire protection for private in holdings, and thinning to improve tree diversity based on the discussion in the DEIS. The proposed commercial harvest, as part of this activity seems reasonable and appropriate consistent with the multiuse objectives for the forest.” (Letter #2)</p>
	<p>“I support the basic concept of this analysis. I strongly believe that efforts must be made to reduce the fire danger and improve the overall health of the forest. Going forward with the proposals in the analysis are essential to attaining these goals.” (Letter #6)</p>
	<p>“I would like to give support for portions of the proposed action that involve forest treatment. Controlling the spread of mountain pine beetle is essential to protect the forest from certain cataclysmic effects on lodgepole stands. Additionally, the prescribed burning and selective thinning projects as discussed in the DEIS are reasonable and I fully support them.” (Letter #20)</p>
	<p>“I applaud...the intent of the FS to undertake <u>forestry</u> activities to keep the forest healthy and available for many uses instead of leaving it the mercies of mistletoe, beetles and wildfires.” (Letter #80)</p>
	<p>“I support the purpose and need identified. Specifically, I believe it is ecologically correct to manage for a mosaic of larger patches of forested vegetation to better emulate natural wildfire patterns. The historic research done as part of the forest plan revision shows that natural patch size was typically in the range of several hundred acres up to several thousand acres.” (Letter #4)</p>

Response: Thank you for your comment. As stated in the DEIS *Abstract* p. i, since it best meets the purpose and need for action in the vicinity, the Forest Service has chosen Alternative 2 as the preferred alternative to be implemented in the Blackhall-McAnulty area.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Vegetation* pp.84-102. *Project Record-Silviculture Report*.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #2	<p>“The proposed action’s prescriptions are very heavy to fire/beetle salvage, sanitation/salvage and shelterwood – prep cut with an emphasis on harvesting dead, beetle infested, or poor form timber... Forget about salvaging the dead, bug hit, stained timber and instead move quickly to thin the green stands that remain in the area to try to give them a chance to withstand the bugs... This will provide the best chance to maintain some green, healthy forest while providing a marketable product.” (Letter #4)</p>
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Response: As stated and displayed on pp.6-7 of the DEIS, the current mountain pine beetle activity is situated primarily within the Bear Mountain Inventoried Roadless Area in the eastern portion of the area. It is also in this same area that the Bear Mountain South Fire occurred in 2002. It is anticipated that most of the beetle, dead, and fire salvage associated with the proposal will occur primarily in the fire salvage unit and the other easternmost harvest units along the western edge of the roadless area. The majority of the commercial treatments and harvest acreage covered under the proposal that are further to the west and north are currently unaffected by the beetles. As long as the proposal is implemented in a timely fashion to stay ahead of the current beetle epidemic, it is anticipated that harvesting in these units will be primarily green timber.

As stated on p.17 of the DEIS, it is envisioned that the commercial treatments covered under the proposal will be implemented through a combination of timber sales. This will allow the flexibility to divide the proposal up into more feasible timber sale packages for potential purchasers during project implementation.

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-25, and Chapter 3 Environmental Consequences Vegetation pp.84-102. **Project Record-Silviculture Report.**

Changes to FEIS/Project Record: It is recognized that some of the proposed sanitation/salvage units that were heavily logged prior to 1950 have marginal commercial value due to low amounts of timber volume per acre. Based on this comment, additional language has been added to the sanitation/salvage treatment description in the FEIS (p.20) allowing the option to treat these stands non-commercially.

Comment #3	<p>“The Forest Service should assume the responsibility to perform all burning associated with this project. The liability that comes with burning slash piles can no longer be assumed by industry – we cannot afford it.” (Letter #4)</p>
	<p>“In the mitigation section, no explanation is given about who will be responsible to perform some of the activities such as mine spoil removal or cheatgrass herbicide application or reconstructing roads when funds become available, etc. Please show in the final decision if such mitigation measures will be part of a timber sale or handled by the Forest Service.” (Letter #4)</p>

Response: It is anticipated that all of the prescribed burning will be done by qualified Forest Service and BLM fire and fuels personnel, with a possibility of assistance from (qualified) Carbon County and local volunteer fire department firefighters. The cheatgrass treatments and the mine spoil removal also covered by the proposal are unassociated with the commercial timber sale(s) and will be implemented by either the Forest Service or through a service contract overseen by the Forest Service.

As for the slash pile burning associated with the commercial timber sale(s), most past sales include a combination of pile burning by both the sale purchaser and the Forest Service. The purchaser's estimated costs associated with this work is credited in the sale appraisal. The purchaser always has the option under the timber sale contract to request that this work be given back to the Forest Service to complete. Based on this comment, consideration will be given to the Forest Service conducting all slash pile burning under the timber sale contract(s) during implementation.

DEIS/Project Record: DEIS-Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #4	“...it concerns me that the forest service allows so much logging in an area where trees take so long to grow back. There are clearcuts in the MedBow that are decades old and show little sign of recovery. This concerns me very much for the sake of the forest, but equally for the sake of a sustainable logging industry.” (Letter #16)
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Response: As pointed out on p.17 of the *Alternatives, Including the Proposed Action* section of the DEIS, almost all the commercial vegetation treatments under the proposal are situated within the 7E management area which emphasizes wood fiber production and utilization. As displayed on p.44 of the DEIS, there is an estimated 35,185 acres that are forested within the analysis area. Of this amount (p. 88 DEIS, *Environmental Consequences, Vegetation*) approximately 22,162 acres are classified as meeting the National standard for being capable and suitable for timber management.

Clearcutting is identified on p.14 of the DEIS as a significant issue. Alternative 3, which has no clearcut treatments, is designed to address this concern. It is unclear what area of the Forest the commenter is referring to, where there are clearcuts that show little sign of recovery. There are areas on the Snowy Range portion of the Forest predominantly at higher elevations (i.e., >10,000' Upper French Creek/Libby Flats) where clearcuts done as recently as the 1970's in stands dominated by spruce-fir have been slow to recover. Displayed on pp.18, 25, 40, and 43 of the DEIS, only 234 acres or approximately 11% of the entire harvest proposed is clearcut under the Proposed Action and Alternative 2. As stated on p.18-19 of the DEIS, all clearcutting under the proposal is within stands dominated by lodgepole pine and/or aspen all well below 10,000 feet in elevation. All stands dominated by spruce-fir will be treated under partial cut methods such as shelterwood.

Forest logging sustainability is based on the entire Forest and not at the project level such as this analysis. Though this is the case, as stated on p.88 within the *Vegetation* portion of the *Environmental Consequences* section of the DEIS, since 1950 approximately 8,571 acres or 39% of what is classified as being suitable for timber management and production has had some form of harvest. As implemented the Proposed Action and Alternative 2 would increase this amount cumulatively to 10,754 acres or 49%. Although 4,880 acres of this amount is clearcut, there is still an estimated 17,282 acres of suitable forest with commercial volume that will still be present in the Blackhall-McAnulty Analysis Area following the completion of this proposal. Current management is based on a 120-year rotation. If 1950 is viewed as the beginning of the rotation, then there will still be approximately 78% of the suitable timber base available for future timber sales during the remaining 60-70 years of the 120-year rotation following the completion of this proposal.

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences* Vegetation pp.84-102. Project Record-Silviculture Report.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #5	“It is accepted by virtue of the DEIS that the Blackhall-McAnulty Analysis Area receives little recreational use, except during hunting season...In order to assist hunters and the Game and Fish Department in reaching herd objectives for elk, the timber harvest should take place during months of least use.” (Letter #20)
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Response: There are no current Forest Plan standards and guidelines for restricting or prohibiting logging operations or any other multiple use activities due to big game hunting seasons. As displayed by Figure 3 on p.24 of the FEIS the timber sale proposal is concentrated in the western portion of the area where the existing road system was constructed for and by past timber sales in the area. The eastern portion of the analysis area will be unaffected by this proposal during hunting season. Based on past experience it would be anticipated that any logging activity would be very localized and short-term. Appropriate signing warning of logging activity and traffic would be placed along the haul route to make Forest users aware of the activity during the life of the proposal.

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences* Recreation pp.113-117. Project Record-Recreation Report.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #6	“Fire, beetles and undesirable vegetation is doing considerable more damage to the forest than all the roads, campgrounds and vehicles ever could...None of the alternatives seem to address the problems. What I would like to see done is: Allow a reasonable timber harvest throughout the area—including the Bear Mountain IRA. Go back to sheep and cattle grazing to control cheatgrass and weeds. Do not <u>open</u> or <u>close</u> any more roads in the area...Actually those little “pull outs” off the roads contribute to less use of major roads since many older hunters park and watch from there instead of running up and down “road hunting.” Also a lot of game is retrieved from these short roads. Other than about a month of hunting season these roads go unused...Leave the area open to snowmobiling and winter use.” (Letter #27)
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Response: See responses to **Vegetation Treatments Comments #1, #2, and #4, Travel Management Comments #1, #2, #3, #4, and #6, Social/Economics Comment #1, Wildlife Comments #2, #3, and #17.** Discussed on p.12 of the DEIS, the Forest Service has responsibility for implementing the Forest Plan. The Forest Plan guides natural resource management activities and provides the Forest Service, Forest users, and the public with an overall strategy for managing the Forest. As pointed out on p.38 of the DEIS under the *Alternatives Considered but Eliminated from Detailed Study* section, a number of harvest units were dropped from the original proposal in order to comply with Forest Plan standards and guidelines for thermal cover, old growth, northern goshawk nest, etc.

A comparison of all the action alternatives and no action is displayed on pp.40-43 of the DEIS. The cumulative effects of the alternatives on the area vegetation is covered on pp.100-102. As stated on p.100, the treatments under the proposal along with past treatments will cumulatively reduce mistletoe, beetle spread and hazard risk on an estimated 49% of what the forested stands considered suitable for timber management. A number of mitigation and monitoring items have been included on pp.32-38 of the DEIS addressing the control of noxious weeds in the vicinity. Pointed out on pp.44-45 of the DEIS, livestock grazing in the area will be analyzed under the upcoming Upper North Platte Allotment Management Plan analysis.

As discussed on p.25 of the DEIS, Alternative 2 (the preferred Alternative) was designed to address public concerns on the amount of proposed road decommissioning and maintaining recreational/hunter access to the area. Alternative 2 is a balanced approach to both maintaining public access to the area while also addressing concerns for road densities on wildlife habitat capability and soil erosion. There is no disclosure in the alternatives of closing the area to snowmobiling and winter use in the DEIS. The existing condition discusses that the remoteness of the area restricts the winter use to motorized use, primarily snowmobile use.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, *Chapter 1 Purpose and Need for Action* pp.1-15, *Chapter 2 Alternatives, Including the Proposed Action* pp.16-43, *Chapter 3 Environmental Consequences* Vegetation pp.84-102 and Recreation p.113-117. *Project Record-Silviculture, Transportation, Roads Analysis, Wildlife/Ecology, Wildlife BA/BE, and Recreation Reports.*

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

<p>Comment #7</p>	<p>“By suppressing and/or controlling dwarf mistletoe, the MBNF is impacting the ecosystem of the MBNF, including the components, structures, and function of the MBNF...Given that the DEIS seems to only disclose positive or neutral impacts associated with dwarf mistletoe suppression and/or control, it appears that the MBNF failed to analyze the impacts of the timber sale in accordance with 40 CFR §§ 1502.16(a) and (b) and 1508.8.” (Letter #77)</p>
	<p>“What will be the role of disease, insects and fire in maintaining natural disturbance? Is the current drought a factor in the intensity of beetle and dwarf mistletoe outbreaks?” (Letter #19)</p>
	<p>“We continue to have concerns regarding potential impacts to ecosystem processes...The proposed management activities cannot, however, replicate the natural landscape or ecological effects of a pine beetle outbreak...” (Letter #90)</p>

Response: See response to **Vegetation Treatments Comment #4**. As pointed out beginning on p.7 of the DEIS, dwarf mistletoe is a parasitic plant that infects a high percentage of the lodgepole pine stands which is the dominant forest type within the analysis area. Mistletoe deforms and weakens trees making them more susceptible to other diseases and insects—such as mountain pine beetle. All of the proposed silvicultural treatments under the action alternatives (pp.18-19 DEIS) are designed to reduce or minimize the presence of mistletoe to maintain improve tree growth and health in treated and adjacent stands.

As stated on p.90 of the Vegetation portion of the *Environmental Consequences* section of the DEIS, in discussing the implications of the No Action alternative, it is recognized there is no threat of ecological collapse or loss of ecological function from dwarf mistletoe and other disturbance agents. The forests of the Central Rocky Mountains and Blackhall-McAnulty vicinity have proven resilient if not dependent on these natural agents and associated disturbance cycles (Alexander 1981). Natural agents such as mistletoe only become problematic when they threaten the use we manage forests for. As previously stated almost all the commercial vegetation treatments under the proposal are situated within the 7E management area, which emphasizes timber management and production.

As displayed on p.44 of the DEIS, there is an estimated 35,185 acres that are forested within the analysis area. Of this amount (p. 88 DEIS, *Environmental Consequences, Vegetation*) approximately 22,162 acres are classified as being suitable for timber management. The remaining 23,153 forested acres that are classified as being unsuitable for timber management including much of the Bear Mountain IRA would be areas where dwarf mistletoe and other natural agents are currently allowed to progress unchecked. As discussed under the previous **Vegetation Treatments Comment #4**, there will still be an estimated 17,282 acres of suitable forest with commercial volume that will be present in the Blackhall-McAnulty Analysis Area following the completion of this proposal. As pointed out on p.95 of the DEIS, dominated by mostly lodgepole pine, much of this acreage currently has and will continue to have dwarf mistletoe after proposed treatments.

The Medicine Bow National Forest currently has no “let burn” or natural fire policy. The Forest is currently looking at the feasibility adopting such a policy for some of the wilderness areas. Alluded to on p.6 of the DEIS, beetle outbreaks are cyclic like drought. The lack of water brought about by drought conditions puts trees under more stress, reducing their production of sap. As discussed in the DEIS, sap is the tree’s main defense against beetle attack. Due to this, it can be reasonably assumed that drought does make trees more susceptible to beetle attack and that it can lead to an increase in beetle intensity and subsequent tree mortality.

Dwarf mistletoe on the other hand being a parasitic plant that feeds off the tree’s water and food tubes in the cambium would most likely be equally negatively affected by drought. In weakening the tree further to beetle attack, interesting enough the mistletoe sets up it own demise. Once the trees has been successfully attacked and killed by the beetles and associated blue stain fungus, the mistletoe also dies along with its host!

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.4, 7, 9, 12-13, & 15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-19, and Chapter 3 *Environmental Consequences, Vegetation* pp.86, 88-102. *Project Record-Silviculture Report.*

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #8	“It is unclear how the FS assessed the cumulative impacts of past timber harvesting and road construction in the timber sale area.” (Letter #77)
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Response: The cumulative effects of the current proposal and past impacts to the area’s various resources is discussed in the *Environmental Consequences* section of the DEIS. All resource areas determined that the action alternatives were consistent with direction in the 1985 Medicine Bow Land and Resource management Plan (Forest Plan) as long as listed mitigation and monitoring on pp.32-38 of the DEIS were effectively implemented.

Unfortunately, not all analysis information can be displayed within the DEIS or subsequent FEIS. As stated on p.45 of the DEIS, “The information displayed in the remainder of this section (*Environmental Consequences* section) includes pertinent unedited excerpts from various resource specialist reports that were completed for the Blackhall-McAnulty analysis.” Copies of these reports in their entirety are available for public review within the project record.

DEIS/Project Record: DEIS-Chapter 3 *Environmental Consequences* pp.44-195.
Project Record-All Resource Specialist Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #9	“It appears some of the created openings would exceed current forest standards. The Preliminary Proposed Action acknowledged some regeneration problems and that some of the proposed overstory removals would resemble clearcuts. We are unable to determine if these are the units that have been dropped.” (Letter #19)
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Response: See response to **Vegetation Treatments Comment #4**. The proposal is in compliance with all standards for created openings. All of the proposed clearcut units are less than 40 acres in size. Although some units are directly adjacent to stands that were clearcut in the past, regeneration in the old clearcut units has grown to the point that these stands are no longer considered created openings. All units that have been proposed for partial harvest treatments will remain forested and again will not fit the definition of a created opening.

The only proposed treatment that may exceed the standard or fit the definition of an opening greater than 40 acres is the Bear Mountain South Fire salvage unit. As stated on p.12 of the DEIS, the lightning-caused wildfire burned approximately 500 acres during the summer of 2002. Though there are areas within the interior of the burn greater than 40 acres in size in which all the trees were killed, much of the burn especially along the edges is a patchwork of live unburned and dead burned trees. Displayed on Table 3 on p.18 and on Figure 3 map on p.23 of the DEIS, it is estimated that the fire salvage unit will treat an estimated 144 acres along the western edge of the burn. Discussed on p. 19 of the DEIS, this treatment would concentrate on treating pockets of green trees with beetles to reduce their spread out of the burn area into adjacent stands. Most trees killed by the fire outright would be left as wildlife snags. Though it is not envisioned that the fire salvage treatments will expand or create an opening greater than 40 acres, the Forest Plan provides direction on p. III-46 (5b.) allowing for silvicultural treatments to exceed the 40 acre opening standard in openings created by natural catastrophic conditions such as fire.

There is no “acknowledgement” of regeneration problems in the DEIS Proposed Action discussion. On the contrary, there are a number of places throughout the DEIS where the success of past regeneration harvests is acknowledged. As discussed on pp.4-5 and 88 of the DEIS, in the case of the Blackhall-McAnulty Analysis Area past clearcutting since 1950 has successfully regenerated to lodgepole pine and aspen stands. Many of these regenerated stands have already been thinned to reduce density and improve growth. As displayed on pp.21 and 40 of the DEIS, an additional 1,000 acres of these regenerated clearcut stands are proposed to be precommercially thinned under all the action alternatives with commercial treatments. Part of the project record, the Region 2 Certified Silviculturist assigned to the analysis determined that based on past experience and on site conditions all regeneration harvest including clearcutting proposed will have no problem successfully regenerating and meeting the 5 year NFMA regeneration standard.

Covering an estimated 35 acres or less than 2% of the entire proposal, the overstory removal units are still included as part of the proposal. Contained in the Silviculture Report in its entirety, the project’s Region 2 Certified Silviculturist has determined that all proposed regeneration harvest under the proposal, including clearcutting and overstory removal, are the optimum silvicultural methods for these stands and the treatments will meet the 5 year NFMA standard for regeneration.

DEIS/Project Record: *DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences Vegetation pp.84-102. Project Record-Silviculture Report.*

Changes to FEIS/Project Record: Due to this comment, additional information has been included in the Vegetation portion of the *Environmental Consequences* section of the FEIS (p.94) clarifying the project’s Certified Silviculturist determinations for NFMA.

Restoration Only

<p>Comment #1</p>	<p>Clear-cutting, road construction and toxic chemicals are inimical to a natural forest expected to serve generations... Alternative 4 best serves the national public, present <u>and</u> future. (Letter #1, 38, 61)</p>
	<p>Select Alternative 4:</p> <ul style="list-style-type: none"> ▪ The Blackhall-McAnulty area has been heavily logged and extensive road building has already occurred. ▪ Alternative 4 best addresses the need to restore the environment and protect rare and imperiled wildlife species and their habitat. ▪ Alternative 4 best addresses the need to protect the natural resources of the Medicine Bow National Forest for today’s and future generations. ▪ Alternative 4 protects the Colorado-Wyoming border region from increased fragmentation. ▪ Alternative 4 does the most to ensure the lynx, which is a threatened species, is restored on the Medicine Bow. ▪ Alternative 4 does the most to protect wildlife that need old growth habitat and burned habitat. ▪ Streams in the timber sale area have also suffered; watershed restoration must be a priority. (Letter #8, 10, 11, 13, 14, 15, 16, 17, 18, 22, 23, 24, 25, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 42, 43, 44, 46, 47, 48, 49, 50, 51, 52, 53, 55, 58, 59, 60, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 76, 77, 78, 79, 81, 82, 84, 85, 87, 88, 91, 92)

Response: See responses to **Vegetation Treatments #4, #7, #8, and #9**. As discussed on p.30 of the DEIS, Alternative 4 was designed to directly address the significant issues of cumulative effects and watershed restoration. A comparison between Alternative 4 and the other Alternatives can be found on pp.40-43 of the DEIS. The implications of Alternative 4 and the other Alternatives to the area’s various resources is located in the *Environmental Consequences* section of the DEIS on pp.44-195. As discussed under the Vegetation portion of this section in the DEIS on pp.102, in dropping all proposed vegetation treatments (other than prescribed burning) Alternative 4 is similar to the No Action alternative in that it does not meet the purpose and need for the proposal and is inconsistent with the standards and guidelines for the timber resource and 7E management areas under the current Forest Plan.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, *Chapter 1 Purpose and Need for Action* pp.1-15, *Chapter 2 Alternatives, Including the Proposed Action* pp.16-43, and *Chapter 3 Environmental Consequences* pp.44-195. *Project Record-All Specialist Reports*.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Travel Management

Comment #1	“The FS should be commended for proposing to decommission several miles of roads.” (Letter #76)
	“I will agree that many of the spurs in the area to the southeast of the Bear Mountain IRA and on the east facing drainages adjacent to the Big Creek Ranch should be eliminated to protect elk security as addressed in the DEIS.” (Letter # 20)

Response: See response to **Social/Economics Comment #1**. As pointed out on p.21 of the DEIS, the road decommissioning proposed under the Blackhall-McAnulty action alternatives is part of the Phase 2 implementation of the 2000 Forest-Wide Travel Management decision. Under the Phase 2 analysis, a determination is made on whether or not unplanned and unmanaged user-created roads and trails will be added to the Forest Transportation System, whether or not additional motorized opportunities should be developed, or if existing routes should be opened, closed, or decommissioned.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences* pp.44-195. *Project Record-Transportation and Roads Analysis Reports*.

Changes to FEIS/Project Record: The 2000 Forest-Wide Travel Management decision notice has been added to the project record.

Comment #2	“The Forest Service Alternative 2, with minor modifications, keeps public access to the Bear Mountain IRA reasonable.” (Letter #28)
	“I am pleased that the FS has selected Alternative 2 as the preferred alternative thereby supporting the (?) of motorized uses for less road closure.” (Letter #80)
	“I would ask that the ID Team consider the Alternative 2 road decommissioning proposal as part of the selected alternative, and consider the modifications to this proposal provided by several sportsmen who use this area. This area is difficult to access by foot for many sportsmen. This has been an important hunting area for many in the state.” (Letter #93)
	“Alternative 2 looks to us like it would return the available open roads to a state similar to what the area was like when we started using it 30 years ago... We believe that road closures should be made with thought given to the needs of all the users. These users should include the elderly, disabled, and the handicapped citizens as well as the able bodied.” (Letter #71)

	<p>“I strongly oppose the extent of road decommissioning in the Proposed Action. For the most part I support the preferred Alternative 2 because the specific road decommissioning will allow reasonable public access to the east facing drainages...and to the southwest portion of the Bear Mountain IRA while improving big game security by eliminating many miles of unnecessary spurs.</p> <p>There are, however, three specific proposed road closures with which I disagree. Specifically, I recommend keeping open three spurs, two emanating from 498.1C and one from 498.2A, and closing one emanating from 498.5C (which exists but is not shown on your map) as marked on the attached map.” (Letter #2)</p>
	<p>“I am writing in support of the DEIS Alternative 2, with minor modification. I suggest that a few additional roads, over and above the roads identified in Alternative 2, remain open...Road 4492 should remain open. This road is not located in the Bear Mountain IRA. Road 418.4C should remain open. These two roads provide public hunter access to the edge of the IRA and provides reasonable access to sections 22, 23, 25, and 26 located within the lower and mid elevations of the Bear Mountain IRA. Road 4422 should remain open. The portion of road 418.5C between the beginning and ending of 4422 has not been open or accessible for years. If I recall correctly, it has not been used since the fire in the area. 4422 provides the route around the closed or inaccessible portion of 418.5C.</p> <p>I support Alternative 2, with minor modifications, because the road closings as proposed in the Proposed Action would make public access to a portion of Bear Mountain so burdensome for the public hunter that it will effectively create an area that is only easily accessible by private landowners and outfitters that have access across private land. I believe the road closures should not be so excessive as to make access by the public hunter more difficult than it would be for the hunter with access through the private land. These primitive roads have been in public use for over 50 years. I personally have used them for 28 years.” (Letter #6)</p>
	<p>“I do stand in opposition to the extent of road decommissioning that would take place under the Proposed Action, and support Alternative 2 with minor changes for the following reasons:</p> <p>Road decommissioning under Proposed Action will create a private hunting reserve for adjacent ranches.</p> <p>The edge effect formula is applied too broadly.</p> <p>A high scenic integrity and semi-primitive experience cannot be achieved in the area.</p> <p>Soil types have low to moderate erosion qualities.</p> <p>Road decommissioning in Proposed Alternative will have nominal impact on elk winter range and the other seasonal elk numbers.</p> <p>It will congest other areas that remain open, and impact hunter success.”</p>

	<p>I support the preferred Alternative 2 with a few modifications stated below: The two spurs from 498.1C into the IRA should remain open. Spur 498.2A should remain open.” (Letter #20)</p>
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Response: See response to **Travel Management Comment #1 and Social/Economics Comment #1**. NFSR 498.1C, which is referred to as the trunk road (Letter #2), is actually 418.1C (typo). Although the beginning of 4492 (Spur A) is outside of the roadless area, it is very steep, eroding, and there are no flat areas along it for parking or turning around. 4438 and 4492 are recommended to be closed because they enter the Bear Mountain Roadless Area. The end of 498.2A (Spur C) past the junction with 418.3C is proposed to be closed under Alternative 2 to provide wildlife security area, walk-in hunting, and because sufficient access is being maintained. Non-system roads and ATV trails (Spur D) not shown on the Alternative 2 map will be closed under the proposal.

While soil types in the area primarily have moderate erosion rates, the amount of road erosion is also related to the sufficiency of the road’s drainage structures. Field surveys of the roads in the project area, during the summer of 2002, found that many of the roads have active erosion and are currently contributing sediment to streams.

Based on these comments, consideration will be given to making modifications to the road decommissioning proposal under the project’s final Record of Decision (ROD).

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences* pp.44-195. Project Record-Transportation, Roads Analysis, Soils, and Fisheries/Aquatics/Watershed Reports; Field Survey Data from 2002 Road Inventories.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

<p>Comment #3</p>	<p>“Closing the following roads would limit access and use of this area: Road 498 from Highway 230 through Holroyd Park and Big Creek Park. BLM Road 419 which links 498 and 498-1D, Roads 498-2A, 1B, 5B, 6B, 1C, 2C, 5C, 2D, 3D, 8D, 9D, 2E, 7E, 8E, 2F which complete loops in the parks and Bear Mountain, should remain open. By keeping a loop off the main 498 Road on both north and south sides, it allows use of the area and also keeps parts of the area free from traffic, where wildlife will not be disturbed. If these closures were done in the way proposed way, only the able bodied individual would be able to enjoy the majority of this area. The loops that are now open, allow handicapped individuals to enjoy the area without having to walk, which is often impossible for them.” (Letter #56, 57, 62)</p>
	<p>The proposed closures would severely limit use by the public in the area. By restricting travel, individuals would be required to cross, or gain access, through private land. (Letter #28, 56, 62)</p>

Response: See response to **Travel Management Comments #1 and #2 and Social/Economics Comment #1**. NFSR 498 is the main collector road through this area and will remain open in all alternatives. We will not close another agency’s road, so BLM 419 will remain open. 498.1D, 498.2A up to junction with 418.3C, 498.1B, 418.1C, 418.2C, 418.3C, and 418.5C will remain open in Alternative 2. 498.5B and 498.6B (assumed these are 4467 and 4405) are parallel roads going to the same area and will not be left open in Alternative 2. 498.9D will remain closed in this alternative since this area can be accessed across BLM land and by 498.1D. 498.3D and 498.8D are short roads not needed for access and will remain closed in the alternative. 498.2D (assume this is 4414 and 4415) will be closed in this alternative since there is access open to the area. 498.1D and 498.2E will remain open in this alternative. 498.7E and 498.8E are short parallel roads and would be closed in this alternative. 498.2F is a short road going to dispersed camping. Since the camping area is within 300 feet of the main 498, this camping spot could still legally be accessed.

Based on these comments, consideration will be given to making modifications to the road decommissioning proposal under the project’s final Record of Decision (ROD).

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences* pp.44-195. *Project Record-Transportation and Roads Analysis Report*.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

<p>Comment #4</p>	<p>“The following comments are intended to draw your attention to a few oversights within the DEIS regarding road identifications. These comments refer to the Alternative 2 map.</p> <ul style="list-style-type: none"> ▪ The portion of road 418.5C between the beginning & ending of 4422 has not been open or accessible for years. 4422 provides the route around the closed or inaccessible portion of 418.5C. ▪ Road 418.4C is marked on the map to be closed but is not on the road closure list provided to me. Having said that, I maintain that 418.4C should remain open. ▪ Roads 4492 and 4438 are not located within the Bear Mountain IRA and the maps should reflect this fact. ▪ There is a road down the fence line between roads 4426 and 418.3C. ▪ A road extends generally from the eastern point of road 4422 to the section corner of 29, 30, 31 and 32. This road then continues through a gate onto BLM land. ▪ The road (the number I could not determine) that extends south from the junction of roads 498.3D, 4414, and 4415 does not exist. ▪ Road 4502 does not exist between 498.9D and 4501. The road marked in red directly west of green 4502 does not exist. ▪ The road marked in red directly south of 4502 is a user created road, created about 15-17 years ago, which may make it a candidate for closure. ▪ I am fairly certain that road 4501 does not exist. ▪ A road exists from the western edge of road 4503, north to the approximate corner of the Forest Service land and then this road exits through a gate onto the Merrill property.” (Letter #6)
	<p>“Many of the (road) numbers cited in the report do not coincide with the actual road markings, and in one case the road cited has not existed as depicted on the EIS maps for many years.” (Letter #5)</p>

Response: See response to **Travel Management Comments #1, #2 and #3 and Social/Economics Comment #1**. The 2-track down the fence line between 4426 and 418.3C is not identified in this alternative and therefore will be closed. The road from 4422 to gate on BLM has been identified to remain open in this alternative to provide a loop road and access to BLM. The roads you say do not exist show on aerial photos, but are not included in any alternatives to be left open. They will be considered closed. The road you mention that goes from 4503 to the gate on Merrill property will be closed under this alternative.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences* pp.44-195. *Project Record-Transportation and Roads Analysis Report*.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #5	“When addressing road erosion, it would be my suggestion that road layout, design and location as well as the full implementation of best management practices be addressed when implementing the vegetation management project. Water quality is of great importance to the people of Wyoming and eliminating non-point pollution requires vigilance by all agencies.” (Letter #93)
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Response: Displayed on Table 4 on p.18 of the DEIS, there is an estimated 12.8 miles of specified road reconstruction and temporary road construction and reconstruction needed to implement the commercial timber sale portion of Alternative 2. It is envisioned the bulk of the estimated 6.2 miles of specified road reconstruction work will entail primarily clearing tree regeneration off the roads. Closing of these roads following the completion of sale will entail ripping and seeding the surface, retaining the template for future vegetation management entries. Minimal (ground disturbing) standards would be used in the reconstruction of these roads and the construction of any needed temporary roads (p.17 DEIS).

The area’s open road system will continue to be maintained to the Level 2 maintenance standards (primarily maintained for drainage, not user comfort). Additional measures will be taken at live stream crossings to minimize sedimentation to waterways. As shown on p.22 of the DEIS, three of the watershed restoration projects to be implemented under the proposal are designed to reduce erosion and sediment and maintain and improve area water quality. A number of the mitigation and monitoring measures, listed on pp32-38 of the DEIS, are designed to address maintaining water quality during implementation of the proposal.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, *Chapter 1 Purpose and Need for Action* pp.1-15, *Chapter 2 Alternatives, Including the Proposed Action* pp.16-43, and *Chapter 3 Environmental Consequences* pp.44-195. **Project Record-Transportation, Fisheries/Aquatics/Watershed, Soils, and Roads Analysis Reports.**

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #6	“We encourage the Forest to minimize roads and traffic needed for conducting projects as part of this analysis. The analysis still does not evaluate “effective” open road (i.e., open roads and closed roads with a history of violation) and motorized trail densities. Roads and permitted uses on them should be designed to minimize stress on wildlife in sensitive areas during primary use seasons. Road closures need to be effectively barricaded. Under mitigation for roads (p. 35) the DEIS does not address effectiveness or enforcement of road decommissioning actions. How will these be achieved?” (Letter #19)
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Response: See the response to **Wildlife comments #2, #3, #6 and #7 and Social/Economics Comment #1**. Several dozen roads will be decommissioned within this analysis area, thereby reducing the open road density. This effort, along with the Forest-wide Travel Management Order signed in 2000 (no motorized off road travel), greatly minimizes stress on wildlife. This is the greatest effort ever made within this area to reduce stress on wildlife. Road closure methods will vary from physical closure (this includes tank traps, boulders, stumps, trees, or a combination) to signing, depending on location and amount of use. This document does not address or make any law enforcement decisions.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences* pp.44-195. **Project Record-Transportation and Roads Analysis Report.**

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Social/Economics

Comment #1	“I hunt and prospect in your proposed areas. I also take disabled veterans hunting, as part of our hunting party. Your proposals discriminate against people with disabilities. I would like you to comply with this (www.usdoj.gov/crt/ada/pubs/ada.txt) or at least address it in your analysis.” (Letter #3)
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Response: There is a perception that the Proposed Action and other action alternatives would not be consistent with the Americans with Disabilities Act of 1990 (ADA). ADA applies specifically to providing access to Forest Service facilities rather than to all areas of National Forest System lands.

The Blackhall-McAnulty analysis tiers to the 2000 Forest-Wide Travel Management Analysis. In October 2000 the Medicine Bow National Forest finished a Forest-Wide Travel Management Analysis and the Forest Supervisor signed a decision notice requiring motorized users to travel only on open designated routes. This decision created the current travel management regulations that are found in the Blackhall-McAnulty Analysis Area.

The closure of a particular segment of road to motorized use restricts all motorized users similarly. Included in the ADA is a section that discusses tracts of federal land that are closed to motorized use. This is found under *Section 507. Federal Wilderness Areas*. This section discloses that wilderness areas are not off limits to individuals using wheelchairs. Closing a road to motorized use would not restrict individuals from using wheelchairs. Lastly, the analysis area is open for motorized game retrieval by individuals who possess a valid Permit for Hunters with Qualifying Disabilities, as issued by the Wyoming Game and Fish Department. Therefore, a decision to restrict motorized use to designated routes will not violate the ADA. This analysis does comply with the *Americans with Disabilities Act of 1990 (ADA)*.

DEIS: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences pp.44-195. Project Record-Transportation, Recreation, and Roads Analysis Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #2	<p>“You state that over 38 miles of roads will be closed...you state that there will be about 13 miles of road construction, 7 miles of temporary road construction and 6 miles of road reconstruction. There is no way that a 6 to 7 million board foot timber sale that is primarily salvage will be able to support all of that road work...I understand that most of the road closure work will not be part of a timber sale...In the final decision, please display what part of this proposed project will be completed as part of a timber sale contract...You need to make sure that the road work included in the timber sale contract is what is needed to perform the on the ground work. All extraneous road construction and closure work should be performed by some means other than the timber sale contract.” (Letter #4)</p>
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Response: See response to **Travel Management Comment #5**. As discussed on p.17 of the DEIS, the proposal would use the existing road system to access much of the proposal. Displayed on Table 4 on p.18 of the DEIS, there is an estimated 12.8 miles of specified road reconstruction and temporary road construction and reconstruction needed to implement the commercial timber sale portion of the proposal. It is envisioned the bulk of the estimated 6.2 miles of specified road reconstruction work will entail primarily clearing tree regeneration off the roads. Closing of these roads following the completion of sale will entail ripping and seeding the surface, retaining the template for future vegetation management entries. To reduce costs and environmental disturbance, minimal (ground disturbing) standards would be used in the reconstruction of these roads and the construction of any needed temporary roads. It is anticipated that much of the temporary road would be used to access landings out of sight off open roads. All purchaser costs associated with roads needed for the proposal will be accounted for under the timber sale contract appraisal.

Displayed on Figures 4 and 5, pp.24 and 26 of the DEIS, most of the proposed road decommissioning is in the eastern portion of the analysis area where no there are no commercial treatments proposed. It is currently envisioned that almost all the proposed road decommissioning would be implemented by either Forest Service crews or by service contracts overseen by the Forest Service. The only current anticipated exception to this is the road system directly to southeast of Jerry Park that has been identified for closure under the all the action alternatives. This same road system accesses a number of proposed treatment units in this same area. In the case of this road system and depending on how the proposal is implemented consideration would be given to closing all or portions of these roads under the timber sale contract. As with the other road costs, these costs would need to be accounted for in the contract appraisal.

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences pp.44-195 Project Record-Transportation and Roads Analysis Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Wildlife

Comment #1	“Table 43 (p. 135) does show cover and old growth inadequacies in contrast to other claims (e.g., p. 138).” (Letter #19)
	“In the wildlife mitigation section, the discussion about old growth stands is not easily understood. Maps that display the proposed old growth areas would help.” (Letter #4)

Response: Table 43 (DEIS p.135) does not show old growth inadequacies. Vertical diversity is below requirements and is discussed in the Specialist’s Report for MIS (p. 4, 21, and 38). Mitigation measures 3, 4, 6, 7, 8, and 9 will improve some characteristics of vertical diversity.

The reasons for designating stands as old growth are described in the DEIS (p. 145) and follow 1985 Forest Plan standards and guidelines for amounts of designated old growth for specific management areas (III-125, III-209). Standards and guidelines in the 1985 Forest Plan for Management Area 9A state that management will attain 20% old growth. Currently, no acres of management area 9A in the analysis area are designated as old growth. Stands identified in mitigation have appropriate vegetation characteristics for old growth and would meet the acreage standard and guideline.

Standards and guidelines in the 1985 Forest Plan for Management Area 4B state to “maintain habitat for old-growth dependent species.” Boundary harvest unit #3 at T 13N, R 82W n 09 would eliminate 14 acres of designated old growth in Management Area 4B. The mitigation identifies a replacement stand, located at T 13N, R 82W n 15.

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences Wildlife pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

<p>Comment #2</p>	<p>“I disagree with several of the “issues” identified as significant. Thermal cover for big game has not been shown to be an issue for the Medicine Bow. Game populations are at or above targeted levels by Wyoming Game and Fish. Most of the recent research that I have seen recently downplays the importance of thermal cover in maintaining big game populations.” (Letter #4)</p>
	<p>“The user created roads cited for closure do not seem to bother the elk, and especially not the deer, other than during hunting season. In fact, the deer seem to prefer to use the unimproved two track roads to move from feeding to resting areas. These roads will all be grown over with grass by next spring, that is how we find them each fall. According to the dept of Fish and Game, there are still too many elk in this area. Closing the area to hunting, or to any hunting except that of well-equipped horse-packing groups, certainly will not be beneficial in maintaining a healthy elk and deer herd... It seems the closings will only concentrate hunters into increasingly small numbers of hunt areas. This will not be healthy for the game populations in either category of area, open or closed, nor ultimately to the economy of the state. I offer the Trent Creek and Deer Creek watersheds as two examples of areas that the proposed action would degrade. Both of these areas are currently accessible to serious hunters who can drive within reasonable walking distance...they get limited but steady pressure during hunting season. Without road access to striking distance of these areas, I doubt they will be hunted much at all. The elk population could rapidly increase to numbers far exceeding the carrying capacity of the ecosystem. Closing the roads to these areas would accomplish exactly the opposite of the stated purpose of the EIS.” (Letter #5)</p>

Response: Identified on p.15 of the DEIS. Thermal cover was identified as a possible concern under the significant issue of *Cumulative Effects/Habitat and Wildlife Diversity/Fragmentation*. Maintaining thermal cover is required in the standards and guidelines of the 1985 Forest Plan (p. III-34). Maintenance of thermal is discussed in the DEIS (pp.138-139, & 151-152). Maintenance of thermal cover is discussed in more detail in the Specialist’s Report for MIS (pp.4, 6-7, 9, 21, 29, 30, & 38).

Research on elk and mule deer, including research on this Forest, indicates that these wildlife attempt to avoid roads, especially during increased traffic such as hunting season. Second, there is a direct loss of habitat caused by roads. Statements in the last 2 paragraphs of the comment (Letter #5) have contradictions. The comments indicate that more roads are needed to access elk but that these elk are using areas away from roads to avoid hunters. Security habitat is habitat used by elk during the hunting season to avoid hunters. One characteristic of security habitat is that this habitat is $\geq \frac{1}{2}$ miles from a road. More roads decrease the amount of security habitat and fewer roads increase the amount of security habitat but the elk typically remain $\geq \frac{1}{2}$ mile from the roads. So, hunters will usually have to travel without a vehicle $\geq \frac{1}{2}$ mile to harvest elk.

Security areas currently comprise only 11% of the analysis area, due to road density but also lack of cover on some winter range. Hillis et al. (1991) presented criteria for elk security areas. They should be at least 250 acres in size. Security areas should account for a minimum of 30% of the analysis area if it is to be managed for effective elk habitat. If existing security areas are smaller than 250 acres, management activities should be directed to achieve larger blocks. Effectiveness declines if security areas are within one-half mile of open roads or if closed roads bisect the area (Hillis, J. M., M. J. Thompson, J. E. Canfield, L. J. Lyon, C. L. Marcum, P. M. Dolan, and D. W. McCleerey 1991.) A brief discussion defining elk security is included in the DEIS (p. 147) and a comprehensive discussion is included in the Specialist’s Report for Wildlife (pp.7, 22-25).

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences, Wildlife pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #3	<p>“Based on my experience, even during the hunting season this area does not receive excessive use. In the DEIS, the Forest Service suggests that these road closures will serve to add additional secure areas for elk using the area as winter-feed grounds. The facts are that this area is not accessible after the snows fall and thus the road closures are not necessary for this purpose. Mother nature sees to it that the area is secure for the elk. The roads are just not passable after snow. I refer to the DEIS, page 2, in which it states in part, “...the winter use in the analysis area is very low...” and page 65, “...the roads are mostly on ridge tops that are seasonally closed by snow during the winter and spring months, and used mainly during the big game season...”</p> <p>“In the DEIS, page 121, it is noted that in certain areas the elk appear to have adversely impacted some winter feed areas. In the DEIS, page 141, it is noted that the elk population is 5,500 over the objective of 4,200 by 1,300. I believe it is obvious that when pressured the elk generally retreat into the 9,426 acre Bear Mountain IRA. It would seem reasonable that the Forest Service would maintain adequate and reasonable public access to the borders of the Bear Mountain IRA in order to encourage hunting as a means of managing elk population within the area.” (Letter #6, 62, 56)</p>
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“In the DEIS, the Forest Service further suggests that the road closures will provide more feed and grasses for the elk. It is noted that the closed roads will grow over with grass. Quite frankly, over the years, the most significant positive impact on the grasses available for the elk has come from reduced cattle grazing activity. The positive impact from reduced cattle grazing activity is very evident this year in the area east and south of the Bear Mountain IRA. On page 119 of the DEIS it is noted that over grazing and poor range management in the early to mid 20th century created poor rangeland conditions. I would suggest that if the Forest Service believes additional grazing opportunities are necessary for elk that this could be accomplished by reducing the number of cattle allowed on the various allotments. Road closures will have no noticeable impact on improving grazing and winter feed for the elk.”
(Letter #6)

Response: See response to **Wildlife Comment #2**. A definition and comprehensive discussion of security areas was included in the Specialist’s Report for Wildlife (pp. 7, 23-24). Security is defined as the protection inherent in any situation that allows elk to remain in a defined area despite an increase in stress or disturbance associated with the hunting season or other human activities (Lyon and Christensen 1990). Road closures are necessary since security areas provide protection **during hunting season**.

The Wyoming Game and Fish Department is addressing elk populations with hunting seasons. Prescribed burn projects and road closures described in this analysis are designed to increase the quantity and quality of habitat, which would help alleviate “adversely impacted...winter feed areas.”

Roads are rock and dirt surfaces that provide no forage to elk. Closure of these roads will add 55 acres of foraging habitat. This topic is discussed in the Specialist’s Report for Wildlife (p. 25).

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences* Wildlife pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #4	“...Greater sage grouse are dependent on sagebrush habitats, and may occur in sagebrush areas about 8000 feet in Wyoming... We recommend that the historical presence or absence of sage grouse, as well as any recent sage grouse survey efforts, in the sagebrush areas proposed to be burned in the Blackhall-McAnulty Analysis, be documented in the EIS. Burning sagebrush may cause long-term negative effects on sage grouse nesting habitat (Nelle et al., 2000). We recommend that any activities that result in loss of sagebrush, or degrade important sage grouse habitats, be closely evaluated for impacts to sage grouse.” (Letter #6, 61)
	“The Service should also thoroughly survey the Holroyd Park area for sage grouse and other sage dependent species. Recent sightings of sage grouse in Holroyd Park need to be verified.” (Letter #76, 77)

Response: Elk was chosen over sage grouse as a Management Indicator Species (MIS). Elk was chosen as an MIS for this analysis due to its importance to Wyoming as a game species, the analysis area contains elk winter range, the possibility that timber harvest could reduce hiding or thermal cover, changes in road density could affect habitat capability, and potential treatment of shrub stands could affect habitat capability. Selection of elk as MIS is included in the DEIS (p. 140) and the Specialist’s Report for Wildlife (p. 9). Wildlife surveys were described in the Specialist’s Report for Wildlife (pp. 9-10).

Sage grouse was not chosen as an MIS because most of the analysis area does not contain suitable sagebrush grassland habitat, the nearest known lek is more than 8 miles away and at a lower elevation, and sage grouse use of the area would be infrequent at best and has too much snow cover to be nesting habitat. Second, this bird was not part of the 1993 Region 2 List of Sensitive Species, so Biological Assessment analysis was not conducted for sage grouse. Importantly, sage grouse were not observed during any previous wildlife surveys, wildlife surveys for this project, or in 2003 during wildlife surveys for other projects.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Wildlife* pp.134-190. **Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.**

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #5	“The DEIS states: “The chance for any intentional or unintentional take of any migratory bird is extremely minimal.” ... We recommend that the Forest Service address how vegetation treatments, that result in the removal of vegetation during the neotropical migratory bird nesting season, will be planned to minimize unintentional take.” (Letter #7)
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Response: As stated on p.190 of the DEIS, the analysis and project are consistent with current USFS and USFWS criteria for the protection of migratory birds. Many of the migratory birds likely to occur in the area have been considered under the project’s MIS and Biological Evaluation reports.

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences Wildlife pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #6	“Of additional note is the DEIS contention that the HABCAP analysis relied upon (p.148) indicated “essentially no difference in elk habitat capability (.01) from 9 miles less road decommissioning in Alternative 2 for the analysis area. This alone should be enough to adopt Alternative 2.” (Letter #20, 28)
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Response: The HABCAP model addresses the effect of roads outside the hunting season. As stated on p.148 of the DEIS, “However, these numbers describe only a small portion of the effects identified by Ward, Hillis et al., and Leptich and Zager described earlier.” Other effects are described in the Specialist’s Report for Wildlife in security cover, hiding and thermal cover, winter range, roads, and habitat regained from road closure.

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences Wildlife pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #7	“While habitat capability is useful in comparing alternatives, we cannot understand how the FS can possibly use habitat capability values to determine whether or not impacts will be significant or native species will be adequately protected in accordance with NFMA and its implementing regulations. We request the FS better explain how habitat capability was used to analyze and assess impacts to MIS...” (Letter #77)
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Response: Changes in thermal and hiding cover, security habitat, foraging habitat, and road density were described in relation to elk populations. Nests, nest territories, nesting habitat, foraging habitat, and habitat for prey species were described in relation to goshawk populations. Cavity nests, nesting habitat, foraging habitat, and prey habitat were described in relation to hairy woodpecker populations. These described changes corresponded to habitat capability changes (DEIS pp.149-153, 153-156, and 156-159).

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences Wildlife pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #8	“The FS is required under 36 CFR § 219.19(a)(6) to monitor population trends of MIS and determine relationships to habitat changes. It is difficult to see how the FS has complied with its obligations to gather the requisite population trend data to ensure an accurate analysis and decisions that maintain viable populations of native vertebrate species.” (Letter #77)
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Response: Population data for elk, goshawk, and hairy woodpecker were described in the DEIS (pp.152, 155, & 158) and Specialist’s Report for MIS (pp.30, 34, & 37). Cited on p.9 of the DEIS, the 1985 Medicine Bow National Forest Plan (Forest Plan) goal for wildlife is “manage fish and wildlife habitats, including plant diversity, to maintain viable populations of all known native vertebrate species and meet population objectives of management indicator species.” Forest Plan includes objectives for elk and deer winter range carrying capacity but does not describe other population or habitat objectives (Amendment 6, p. II-11, 12). Forest Plan direction to meet the Forest Plan goal includes “4. Maintain habitat for viable populations of all existing vertebrate wildlife species” (p. III-30). The Standard and Guideline for this is “a. Habitat for each species on the forest will be maintained at least at 40 percent or more of potential.”

Forest Plan direction to meet the Forest Plan goal also includes “7. Provide habitat for management indicator species at a level no lower than 40 percent of potential...”(III-31). Standards and guidelines relevant to this response include “d. No activities shall be allowed within ¼ mile of an active...goshawk nest... from March 1 to July 31 if they would cause nesting failure or abandonment.”

The Forest Plan defines monitoring for MIS (Amendment 4, p. IV-6) and describes the required monitoring in detail (Amendment 9, p. IV-40). The description includes the use of the R2 HABCAP model for computer model analysis of habitat capability trend such that “all Management Indicator Species will be provided habitat capability at a level no lower than 40 percent of potential.”

Analysis for the Blackhall-McAnulty project follows described forest-wide goals, objectives, direction, and monitoring scheme to maintain required Forest Plan habitat for MIS (goshawk or hairy woodpecker) as follows:

- Goshawk nests were excluded from treatment units (Specialist’s Report for MIS p. 32).
- Mitigation measure (DEIS p. 36) “Include appropriate contract provisions to ensure protection of threatened, endangered, proposed, and Forest Service sensitive species as per Forest Supervisor Jerry Schmidt’s letter (file code 2600, dated 8/31/1995).”
- Mitigation measure (DEIS p. 36) “Monitor proposed treatment areas that occur in the vegetation/elevation range preferred by nesting goshawks during sale layout, marking, and implementation for nesting activity to facilitate #1 above.”

Lastly, northern goshawks are relatively abundant on the Forest. There are more than 300 nests on the Forest. These include 290 known inactive or active nests on the Brush Creek-Hayden District [including 39 active and 74 inactive nests found by Squires (1996)], 17 known nests on the Laramie District, 25 on the Laramie Peak unit, records in the Wyoming Natural Diversity Database, and District survey records. From 15 to 60 nests are surveyed each year with known nest occupancy ranging from 15% to 34% annually.

Hairy woodpeckers are also abundant on the Forest. Fifty-one were located within 7 watersheds across the Forest during field surveys in summer 2003.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences* Wildlife pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: Based on this comment, an additional mitigation measure for goshawks stating “Goshawk nests found to be within a ¼ mile buffer of treatment units will be excluded from treatment from March 1 through July 31 (Forest Plan p. III-31)” will be added to the *Mitigation* section of the FEIS (p.37).

Comment #9	“We request the FS better analyze and assess impacts to goshawk nesting habitat utilizing the findings of Squires and Ruggiero. We also ask that the FS clarify its claim that harvest will only temporarily eliminate goshawk nesting areas (DEIS p. 154).” (Letter #77)
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Response: See response to **Wildlife Comment #8**. Squires and Ruggiero research was used to identify nesting habitat as described in the Specialist’s Report for Wildlife: “The northern goshawk is a Sensitive Species in Region 2. Goshawk was selected as an MIS for this analysis because it is highly associated with mature lodgepole pine and aspen forest and it may respond to potential effects from no action or proposed management actions. The goshawk is primarily a summer resident; however, some birds may be present in winter. Studies conducted at the Forest Service Research Laboratory in Laramie indicated that this species showed tendencies for both elevation and latitudinal migrations (Squires and Ruggiero 1995). The goshawk uses all forest types for both foraging and cover. Most stands selected for nesting are older lodgepole and lodgepole/aspen stands at lower elevations (District records, Squires and Ruggiero 1996). Goshawk nesting habitat will be temporarily eliminated until regeneration to mature aspen or lodgepole as discussed in the DEIS p.154.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences* Wildlife pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

<p>Comment #10</p>	<p>“The DEIS analysis and assessment of impacts to pine marten is further lacking...” (Letter #77)</p>
	<p>“Although the analysis area may not provide habitat as good for pine marten as others (see p. 140-141), impacts within this and adjacent watersheds with better marten habitat warrant further consideration in the decision. Pages 186-187 acknowledge these concerns are valid.” (Letter #19)</p>

Response: Marten was considered a poor choice as a MIS for this project (Specialist’s Report for MIS, p. 9). However, the American marten was evaluated as a sensitive species (Biological Assessment, pp. 42-44), including cumulative effects. Impacts to marten discussed in the DEIS included changes in mature forest, canopy cover changes, den and rest sites, prey habitat, snags, coarse woody debris, riparian habitat, regeneration time for suitable habitat to return, and fragmentation. Fragmentation was discussed in greater detail in the Biological Assessment, including references to marten (pp. 47-58), and in a map of fragmentation and mature forest (p. 58).

The Biological Assessment for Sensitive Species (pp. 42-44) discusses existing habitat, impacts due to the proposed action, and cumulative effects. The cumulative effects analysis explains how the 22% figure for unsuitable habitat was calculated and how that relates to existing habitat.

The DEIS (pp.186-187) indicates that sufficient old growth exists in the analysis area to meet Forest Plan requirements. The DEIS states that there are currently 2,292 acres of spruce-fir in the analysis area and spruce-fir could possibly increase to approximately 5,800 acres over several centuries. Additionally, the Biological Assessment (pp. 42-44) indicates there are currently 6,210 acres of suitable forest habitat for martens in the analysis area with 559 of those acres being spruce-fir DEIS (pp. 186-188), BA (pp.42-44, 47-58).

Mean home ranges for American martens in the adjacent Encampment River watershed were found to be 1,652 acres in summer and 1,462 acres in winter for females and 4,494 acres in summer and 3,602 acres in winter for males (O’Doherty et al. 1997). Female home ranges did overlap with male home ranges. Therefore, there is sufficient habitat for 3 or 4 female and 1 or 2 male martens in the analysis area.

The Bear Mountain South fire and proposed actions will leave 5,726 acres of suitable habitat. There would be sufficient habitat remaining after the Bear Mountain South fire and proposed actions for 3 or 4 female and 1 or 2 male martens in the analysis area.

Part of the project record, two maps display potential marten habitat across the Forest. These maps are titled “Old Growth Data Sierra Madre Range” and “Old Growth Data Snowy Range.” There are 686,150 acres of potential marten habitat across these ranges. These maps indicate that potential marten habitat is well distributed across the Forest.

Based on these comments, an additional map (Map1A) has been added to the project record. Map 1A shows marten habitat (yellow stripe), Bear Mountain South fire (purple stripe), and clearcut or overstory removal harvest since 1973 that would discourage marten travel (red) imposed on an aerial photo of the analysis area. Map 1A demonstrates that much of the northern and eastern portion of the analysis area and many of the south facing slopes do not naturally contain spruce-fir or lodgepole pine that would provide marten habitat. Remaining forested habitat that is not marten habitat or was harvested prior to 1973 would have sufficient characteristics of tree establishment and canopy cover to allow marten movement. There is an area within T 13N, R 82W sections 31 and 32 and T12N, R 82W section 6 where little marten habitat exists and marten travel would be prohibitive due to lack of forest cover resulting from past harvest. However, martens would be able to move around this area as necessary, comparable to reaching existing marten habitat by traveling around the natural openings that exist in the analysis area.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Wildlife* pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: Based on these comments, an additional map (Map1A) displaying pine marten habitat in the analysis area has been added to the project record.

Comment #11	“The DEIS seems to present contradictory conclusions regarding impacts to the hairy woodpecker, a MIS.” (Letter #77)
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Response: See response to **Wildlife Comment #8**. Not all hairy woodpeckers are expected to be observed during wildlife surveys but hairy woodpeckers are assumed to use all suitable habitat. The Specialist’s Report for MIS (p. 21) states that there are 17,950 acres of suitable habitat for hairy woodpeckers. Population data discussed in the DEIS is consistent with HABCAP model results and with the assessment of hairy woodpecker habitat and effects of proposed action to hairy woodpecker habitat. The Specialist’s Report for MIS (pp. 21-23) analyzes foraging habitat, nesting habitat, prey availability, habitat/breeding pair, burned habitat, snags, coarse woody debris, and cumulative effects in relation to hairy woodpeckers. These analyses relate habitat changes to population trend. DEIS (pp. 158, 156-159).

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Wildlife* pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #12	“Fire salvage/impacts to woodpeckers: The DEIS discussion of the black-backed and three-toed woodpeckers is lacking.” (Letter #77)
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Response: Sensitive species do not have to be sighted in an analysis area as long as suitable habitat exists (DEIS pp. 170-171). Wildlife observed in the analysis area are stated in the DEIS (p.141). The DEIS indicates that 424 acres of the fire salvage would remain as foraging habitat with foraging quality reduced in the other 40 acres subjected to fire salvage (DEIS p.179). So, 91% of burned forest would remain. These acres would provide a new supply of recently dead snags. The DEIS (pp.179-180) also states that 6,595 acres of foraging habitat and 6,018 acres of nesting habitat would remain in the analysis area. Third, there are Forest Plan requirements for old growth and snags and additional old growth designated as mitigation that would retain aspects of habitat quality.

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences Wildlife pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #13	“Sensitive species: Without reliable population data for sensitive species and without reliable estimates of how many individuals might be impacted reviewers cannot understand the significance of the impacts posed by the alternatives considered in the DEIS.” (Letter #77)
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Response: This issue is initially addressed in the DEIS (p.172) concerning maintaining habitat for viable species. Vegetation changes within the analysis area were analyzed in the DEIS (pp.135-139), the Specialist’s Report for Wildlife (pp.2-7, & 20-28), and the Biological Assessment for Sensitive Species (pp.47-58). Additionally, the DEIS describes cumulative effects of changing vegetation conditions for each sensitive species individually, a corresponding determination for individuals and the species, and reasons for that determination (i.e., goshawk DEIS p.174, boreal owl DEIS p.178 etc...). This same information is discussed in greater detail in the Biological Assessment for Sensitive Species (pp.25-47). The DEIS (p.141) identifies the wildlife surveys that were conducted and other sources of data that were referenced. The Biological Assessment for Sensitive Species (pp.23-47) contains available population/occurrence information for each sensitive species analyzed such as “Goshawk/raptor surveys were conducted in 2001, 2002, and 2003. All suitable nesting habitat within the Blackhall-McAnulty Analysis Area was surveyed intensively following protocol established in Kennedy and Stahlecker (1993). One new inactive nest was located in 2001 and was not active in 2002. Six other previously known inactive nests were inactive in 2002. All known nests were inactive in 2003.”

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences Wildlife pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #14	“The DEIS seems to fail to adequately analyze and assess impacts to lynx in several regards and still fails to provide adequate information and analysis supporting the determination that the timber sale would not adversely impact lynx.” (Letter #77)
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Response: There is no Lynx Analysis Unit in the analysis area. There is a linkage corridor (travel corridor between Lynx Analysis Units) across part of the analysis area. Effects of the proposed action are described in the DEIS with the reason for the determination (pp.165-170). The analysis is provided in greater detail in the Biological Assessment (pp.15-22).

Habitat for lynx was identified in a collaborative effort between the Forest and the US Fish and Wildlife Service in 2000. Some lodgepole pine is a component of identified lynx habitat; however, some lodgepole pine habitat was not included as lynx habitat due to aspect, slope, and moisture conditions.

On January 23, 2004, the Forest received concurrence from the US Fish and Wildlife Service on the determination of “may affect, not likely to adversely affect” for Canada lynx by the Blackhall-McAnulty proposal.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Wildlife* pp.44-195. **Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.**

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #15	“While some of the proposed timber sales may seem expedient to address fragmentation from a silvicultural standpoint, they will actually increase fragmentation from an ecological perspective, especially for resident wildlife. We encourage a reevaluation of the timing of these treatments and planning for timber sales that will not compound fragmentation problems. Removing the remnant strips between cuts will eliminate important linkages and stepping stone habitats for some species of concern. The Draft EIS does not present a detailed analysis of habitat linkages.” (Letter #19)
	“We are very concerned that the logging and road building proposed will exacerbate the impacts of fragmentation and detrimentally impact many native species of wildlife.” (Letter #77)
	“Substantial timber harvest has occurred or is proposed immediately adjacent to the analysis area including Coon Creek, Tie Camp, Jerry Park 2 and Wood Mountain 2. These constrain dispersal for some wildlife species.” (Letter #19)

Response: See responses to **Wildlife Comments #1, #8, and #10**. Fragmentation was described briefly in the DEIS (p. 143) and analyzed extensively in the Biological Assessment (pp. 47-63). The Biological Assessment discussed logging, roads, and measures to correct fragmentation. Findings of Baker, Reed, and Honaker, among others, were used to analyze and address fragmentation. Also, the analysis for American marten in the Biological Assessment (pp. 42-44), in particular, addresses this issue.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences* Wildlife pp.134-190. *Project Record-Wildlife/Ecology and Wildlife BA/BE Reports*.

Changes to FEIS/Project Record: Based on these comments, additional discussion and analysis of Fragmentation has been added to the Wildlife portion of the *Environmental Consequences* section of the FEIS (pp.195-198).

Comment #16	“In terms of coarse woody debris requirements, we are concerned that the timber sale, especially the Bear Mountain South fire salvage, will not leave sufficient coarse woody debris.” (Letter #77)
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Response: Forest Plan requirements for coarse woody debris will be met (Forest Plan p. III-15). Also, Wildlife Mitigation items 6 and 7 will improve coarse woody debris utility for wildlife (DEIS p. 36).

Mitigation to provide additional coarse woody debris and additional snag retention and recruitment has been added to the FEIS. The coarse woody debris mitigation far exceeds the current Forest Plan (1985, p. III-15) requirements. This coarse woody debris mitigation was evaluated in the draft EIS (p. 3-244 to 3-247) for the current revising of the Medicine Bow Forest Plan. The mitigation recommendation approximates the simulated rate of natural production of coarse woody debris in fires (Tinker and Knight 2001). This mitigation will assure coarse woody debris amounts similar to that provided naturally to wildlife after fires.

The snag retention mitigation far exceeds the current Forest Plan (1985, p. III-15) requirements. This snag retention mitigation was evaluated in the final EIS (p. 3-147 to 3-151) for the current revising of the Medicine Bow Forest Plan. The mitigation recommendation “...would probably represent the low range of that which occurs under natural conditions” (FEIS p. 3-148) on land scheduled for timber harvest. This mitigation will assure snag amounts similar to that provided naturally to wildlife.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences* Wildlife pp.134-190. *Project Record-Wildlife/Ecology and Wildlife BA/BE Reports*.

Changes to FEIS/Project Record: Based on these comments, an additional mitigation measure for coarse woody debris and snag retention was added to the FEIS (p.38).

<p>Comment #17</p>	<p>It appears that the area is used primarily during the hunting season. However, if there are problems with disturbance especially on crucial winter range during the winter, during parturition or during migration, tools such as seasonal closures should be considered. (Letter #93, 19)</p>
	<p>“We find no mention of proposed measures to reduce disturbance to wintering wildlife and elk parturition under wildlife mitigation (p.36). This should be addressed.” (Letter #19)</p>

Response: Permanent closures are proposed to address wildlife and habitat values, in addition to elk or deer, as described in the Specialist’s Report for MIS (pp.8, & 22-27) and the Biological Assessment (pp.4, 7, 14, 17, 27, 48, 49, 53, & 56). See also the responses to **Wildlife Comments #1, #3, #4, & #5**. Winter range (Management Areas 5A and 5B) is closed to snowmobile use in the Forest Plan (p. III-146, III-153). These management areas also have direction to close roads permanently or seasonally (Forest Plan III-150, 143). Second, these management areas in the Forest Plan (pp.140-159) contain several recreation, wildlife, and transportation direction, standards and guidelines to protect big game during these periods.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Wildlife* pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

<p>Comment #18</p>	<p>“About 60% of the analysis area is currently under wildlife habitat emphases in the current Medicine Bow NF Land and Resource Management Plan...emphasizes wood fiber production in essentially the rest of the analysis area. These wildlife resources support a substantial amount of recreation on this portion of the Forest. We have encouraged the Forest to give special consideration to wildlife and habitat concerns given the emphasis placed on these resources in the Forest Plan.” (Letter #19)</p>
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Response: See response to **Vegetation Treatment Comment #4**. As pointed out on p.17 of the *Alternatives, Including the Proposed Action* section of the DEIS, almost all the commercial vegetation treatments under the proposal are situated within the 7E management area which emphasizes wood fiber production and utilization. Designed to benefit big game habitat, the entire prescribed burn proposal is within 4B, 5A, and 5B management areas that emphasize wildlife and winter range.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Wildlife* pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #19	“Cover adjacent to open roads and trails should be preserved where practical.” (Letter #19)
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Response: Forest Plan requirements will be met (Forest Plan p. III-35) and was evaluated in the Specialist’s Report for MIS (p.6).

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Wildlife* pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #20	“Potential alternate nest sites for goshawks, cavity nesting birds and other species should be provided by considering the requirements of structural diversity for nesting birds and other wildlife.” (Letter #19)
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Response: Requirements of structural diversity for nesting birds and other wildlife was addressed throughout the Specialist’s Report for MIS in discussion of horizontal and vertical diversity, grass/forb, old growth, and hiding and thermal cover. The Biological Assessment addresses habitat for a variety of threatened and sensitive species. Nesting habitat for goshawks and cavity nesting birds (hairy woodpecker) was addressed in the Specialist’s Report for MIS (pp.31-37). The Biological Assessment addressed goshawk habitat (pp.25-29) and cavity nesters (boreal owl, black-backed and three-toed woodpeckers) (pp.34-37). Mitigation in the DEIS (p.36) includes continued surveying for goshawk nests.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Wildlife* pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #21	“What will be the impact of insecticides and other chemical treatments on nontarget insects and on wildlife that forage on them?” (Letter #19)
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Response: The chemical treatment identified for beetles (DEIS pp.93-94) was only intended to describe one of the possible tools that are available to control beetles. There is no chemical treatment for beetles proposed for Blackhall-McAnulty.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Wildlife* pp.134-190. Project Record-Wildlife/Ecology and Wildlife BA/BE Reports.

Changes to FEIS/Project Record: Chemical treatment for beetles has been dropped from consideration under the FEIS.

Comment #22	“Why are there no road densities shown in Table 44 (p. 137)? This should be analyzed and disclosed. The discussion on roads (p. 139) seems to contradict the claims about cover and road density adequacy.” (Letter #19)
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Response: Table 43 indicates that hiding cover is adequate but thermal cover is lacking. This information is accurately expressed later in the DEIS (pp.138-139). No proposed harvest units are identified as thermal cover (DEIS p.38).

Table 44 was intended to indicate only vegetation characteristics. Table 3 of the Specialist’s Report for MIS includes road density. Road density is discussed in detail in the Specialist’s Report for MIS (pp.8, 10, 12, & 22-31). Also, road density is a factor used in calculating habitat capability for elk. Habitat capability (HABCAP), including elk, was discussed throughout the Specialist’s Report for MIS. The contradiction is evaluated throughout the Specialist’s Report for MIS. The road closure portion of the proposed actions is a response to address road density.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Wildlife* pp.134-190. *Project Record-Wildlife/Ecology and Wildlife BA/BE Reports*.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #23	“The Department (WY G&F) supports Alternative 3 or 4 because these negatively impact wildlife habitat less than the Proposed Action.” (Letter #19)
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Response: See responses to **Vegetation Treatments Comments #1, #2, #4, #5, #6, #8, & #10, Restoration Comment #1, and Wildlife Comments #1, #7, #8, #9, #10, #11, #12, #13, #14, #15, & #18**. As pointed out on p.12 of the DEIS under the *Purpose and Need for Action*, the intent of the Forest Plan, that guides natural resource management activity, is to manage National Forest system lands for multiple-use and not for any single purpose such as wildlife habitat. As stated previously, an analysis of the proposal found that the Proposed Action and Alternative 2 are in compliance with all resource area Forest Plan standards and guidelines (including wildlife) as long as the recommended mitigation and monitoring measures are effectively implemented.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Wildlife* pp.134-190. *Project Record-Wildlife/Ecology and Wildlife BA/BE Reports*.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Watershed/Aquatics

Comment #1	In the DEIS, the Forest Service also claims that the road closures will serve to protect the streambeds from soil erosion and also eliminate sediment entering the creeks. The stream crossings east and south of the Bear Mountain IRA (Henry Creek area) that would be affected by the road closings are all very stable, generally with gravel bottoms. These crossings are so minor that an individual can step across every crossing. Furthermore, the area gets very little use, (and only during the hunting season), thus the road closings only incidentally impact the area, if at all, in terms of preventing soil erosion and sediment from entering the creeks. I refer to the DEIS, page 56, in which it states in part, “Most of the soils in the project area have an erosion hazard that is slight or moderate.” (Letter #6)
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Response: While soil types in the area primarily have moderate erosion rates, the amount of road erosion is also related to the sufficiency of the road’s drainage structures. Field surveys of the roads in the project area, during the summer of 2002, found that many of the roads have active erosion and are currently contributing sediment to streams. Several of the roads in the Henry Creek area were observed to be rutted at stream crossings and had other signs of erosion.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences* pp.44-195. *Project Record-Transportation, Roads Analysis, Soils, and Fisheries/Aquatics/Watershed Reports*; Field Survey Data from 2002 Road Inventories.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #2	“The DEIS makes no mention of the ground water and streamflow characteristics in the study area. We recommend that the Final EIS include a description of baseline conditions relative to the streamflow regime (low flow and high flow), the relationship between ground water and surface water, and the physical characteristics of water quality (dissolved oxygen, nutrients, inorganic and organic chemistry, pH, and so forth). At a minimum, quantitative measures of Wyoming water quality standards should be provided and compared to existing baseline water quality conditions in the major streams and tributaries in the study area. The impacts of mining on water quality of selected streams should be described. Additionally, an estimate of the impacts of the alternatives (clearcutting and other timber harvest activities) on snowpack retention, and the anticipated changes in the magnitude and timing of streamflow quantity and peak flows need to be provided in the document.” Letter #7)
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Response: The analysis for the DEIS focused on those watershed and water quality characteristic with the potential to be affected by the projects activities. The Watershed and Aquatics Specialist Report determined that riparian forest buffers and other BMPs incorporated into project design would prevent effects on water quality from this project, other than effects on fine sediment levels, which were analyzed in the report.

Effect on streamflow from the proposed timber harvest was analyzed in the discussion of ‘Flow Regime’ in the DEIS p.63. More detail on the effects of timber harvest on snowpack retention, streamflow magnitude and timing, and peak flows can be found in the Watershed and Aquatics Specialist Report and in the literature cited in that report.

No recent water quality data has been collected within the project area, however no streams are listed as Impaired by the State of Wyoming and all streams appear to support beneficial uses.

Although the analysis area contains signs of historic mineral exploration and mining, currently there are no active mining claims located within the analysis area. There may be some recreational rock hounding or gold panning occurring in the area during the summer and fall seasons. These activities would have negligible effects on water resources. There are no abandoned mines known to be leaching groundwater or otherwise causing water quality degradation. The abandoned mine in Turnbull Gulch is the only known mine in the area that is affecting water resources, and is primarily affecting stream channel morphology and sediment rather than affecting water quality.

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences pp.44-195. Project Record-Roads Analysis, Soils, Fisheries/Aquatics/Watershed, and Lands & Minerals Reports; Field Survey Data from 2002 Road Inventories.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #3	“In the proposed action, sagebrush and bitterbrush communities may be broadcast burned, slash piles from timber harvests and hazardous fuels reduction efforts may be burned, and prescribed fire may be used to broadcast burn after clearcutting. Please clarify if any water from tributaries to the Platte River will be used for fire suppression or any other activities identified in the DEIS. If so, please describe the amount and timing of the water depletion....” (Letter #7)
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	<p>“The DEIS states: “The proposed action would have no effect on downstream listed species or their habitats, because all above-listed species (except bald eagles) are not known or suspected to occur in the Blackhall-McAnulty Timber Sale analysis area.” Downstream species may be affected by upstream water depletions to a river system... Therefore, although none of the species listed above, except the bald eagle, may occur on the Blackhall-McAnulty Analysis Area, project actions may still affect the species if project activities involve water depletions to the Platte River system. Therefore, please identify whether water depletions will occur on the Platte River system, as a result of the project actions, to determine if project actions will affect Platte River species.” (Letter #7)</p>
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Response: There should be no depletion of any water from tributaries to the Platte River. Bitterbrush and sagebrush community prescribed burns are designed to be low intensity ground cover burns. All scheduled broadcast burns for these two communities would be accomplished during the early spring months when suitable snow cover can be used as fire breaks. Burning of slash piles is normally scheduled during the winter months during, which there is adequate snow cover to prevent the fire from spreading. Access to these piles is usually via snowmobiles to minimize collateral resource damage.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Fisheries & Aquatics* pp.60-78. Project Record-Fisheries/Aquatics/Watershed Report.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

<p>Comment #4</p>	<p>“The DEIS, p. 71, states: “Listed T and E (sic) species or their habitats are not known or suspected to occur in the project area.” Since there are threatened and endangered species and habitats that are known or suspected to occur in the analysis area, such as the bald eagle and lynx, we recommend that this statement either be removed or corrected accordingly.” (Letter #7)</p>
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Response: This statement relates to and identifies aquatic and/or aquatic dependent species as presented in Table 24 of the DEIS, p.70. Paragraph one; p.71 specifically states that local populations of bald eagles will be addressed in the terrestrial Wildlife section of the DEIS, and what is referred to in the above comment addresses only downstream aquatic or aquatic dependent species and their habitats.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, Chapter 1 *Purpose and Need for Action* pp.1-15, Chapter 2 *Alternatives, Including the Proposed Action* pp.16-43, and Chapter 3 *Environmental Consequences Fisheries & Aquatics* pp.60-78. Project Record-Fisheries/Aquatics/Watershed Report.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #5	“The DEIS states that “Western boreal toad...have not been documented to inhabit, but do have suitable habitat within or adjacent to the Blackhall-McAnulty Timber Sale proposed project area.” The Wyoming Natural Diversity Database identifies a suspected breeding area and documents observation of boreal toads, in 1990...Most of this section is located within the project area and shelterwood cuts are currently proposed there. Please clarify if the boreal toad observation and suspected breeding area occurs within or outside the Blackhall-McAnulty Analysis Area, and if this area could be impacted by shelterwood cuts or other project actions.” (Letter #7)
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Response: The 1990 boreal toad observation was overlooked during the literature review of the WNDD-2002 data. However, Forest Service personnel accomplished four (4) different area surveys during August 2002 for amphibians (3 in section 27 and 1 in sec 26, T.13N., R.83W.), and none were documented to occur during that time period in the areas surveyed. This area will continue to be monitored periodically as a historical site and project compliance. Amphibians sometimes disperse great distances from aquatic systems; therefore there is the possibility of a fatal incidental take by personnel or equipment activity. It is unlikely that direct or indirect impacts to amphibians, specifically boreal toads should occur during the silvicultural treatments. Compliance with BMPs for forestry, WCPs, and specifically designed mitigation should provide the desired security for amphibians and their associated habitats. Proposed road closures and repairs should reduce cumulative impacts for amphibians and their habitats. There is the remote possibility of adverse impacts to individuals, but not the loss of viability for any population as any activity within this project has been designed to meet Forest Service standards and guidelines.

DEIS/Project Record: *DEIS-Abstract* p. i, *Summary* pp. ii-v, *Chapter 1 Purpose and Need for Action* pp.1-15, *Chapter 2 Alternatives, Including the Proposed Action* pp.16-43, and *Chapter 3 Environmental Consequences Fisheries & Aquatics* pp.60-78. **Project Record-Fisheries/Aquatics/Watershed Report.**

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #6	“...the protection of the North Platte River watershed from deleterious forest project is of utmost importance to users of the North Platte, especially during our current drought. This proposed sale, which will add almost 13 miles of roads and add to stream sedimentation, only adversely impacts the watershed. As a result, I strongly recommend Alternative 4 in the Draft EIS which will, if anything, improve water quality of the watershed.” (Letter #12)
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Response: While Alternative 4 would have the most immediate beneficial effect on streams in the area, all the action alternatives would result in a short-term increase and long-term decrease in stream sedimentation, resulting in long-term beneficial effects to watershed conditions.

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences pp.44-195. Project Record-Roads Analysis, Soils, and Fisheries/Aquatics/Watershed Report;. Field Survey Data from 2002 Road Inventories.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #7	“The DEIS analysis of impacts to watersheds and soils is incredibly lacking and consequently, FS assumptions regarding impacts to fish and amphibian species seems to be flawed.” (Letter #77)
	“While the MBNF claims that BMPs will effectively protect watersheds and soils, there is no information or analysis presented that supports the effectiveness of these mitigation measures in protecting watersheds and soils.” (Letter #77)

Response: Direct, indirect, and cumulative effects to watershed and soils are described in the DEIS, with more detail available in the specialists reports in the project record.

The Watershed Conservation Practices (WCP) Handbook contains proven practices to protect soil, aquatic and riparian systems. If used properly, they meet or exceed State Best Management Practices (FSH 2509.25). The WCP as well as site-specific mitigations have been incorporated into project design. In 2000, a review of Best Management Practices was conducted on the nearby Routt National Forest on a timber salvage operation by the State of Colorado. This review found that the planning as well as implementation of BMPs and mitigation measures were effectively implemented and consistent with the Clean Water Act. The summary letter from the Colorado Water Quality Division is in the project file.

The DEIS states that BMPs will be monitored to ensure effectiveness, and if not effective the operation will be halted until sufficient BMPs are designed and implemented.

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences pp.44-195. Project Record-Roads Analysis Soils, and Fisheries/Aquatics/Watershed Reports; Field Survey Data from 2002 Road Inventories.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Comment #8	“The Department (WY G&F) would like clarification of the following statement on page 37 “Should monitoring reflect an abnormal downturn in relative abundance, additional monitoring would be performed three years following harvest completion.” What is considered “abnormal”? Is it a 25% reduction or a 50% reduction? The DEIS should clarify at what level additional monitoring will be performed.” (Letter #19)
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Response: The current Forest Plan includes direction to improve fish habitats by managing grazing systems, minimizing sediment deposits from construction and other activities, and maintaining water in the stream to support the riparian ecosystem and aquatic species. The current management direction is to “manage fish and wildlife habitats, including plant diversity, to maintain viable populations of all known native vertebrate species and meet population objectives of management indicator species.” Monitoring requirements of the Forest Plan specifically looking at population and habitat trends of MIS species allow for a 20% reduction or change in species habitat distribution, and for “Common Trout” species a 10% reduction in relative abundance based on pre-project surveys and sampling. These percentages would and should be tempered with the professional judgment of the Forest Service Biologist who would also have to account for or take into consideration natural biotic fluctuations for the species in question, and habitat changes due to extreme high stream flows or drought conditions.

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences pp.44-195. Project Record-Fisheries/Aquatics/Watershed Report.

Changes to FEIS/Project Record: No changes were made to the FEIS based on these comments.

Rare Plants

<p>Comment #1</p>	<p>“The DEIS states that “...the project would not have any net effect on habitats in the main stem Platte River. Thus, the project is determined to have No Effect on Ute ladies’ tresses...” Although the USFWS agrees that hydrological effects upstream may affect downstream species, Ute ladies’ tresses also may be affected with the proposed project site. The DEIS does not clearly indicate whether Ute ladies’ tresses or its habitat is present in the Blackhall-McAnulty Analysis Area. If surveys have been conducted to specifically search for Ute ladies’ tresses, please document when and where these surveys were conducted and what the results were.” (Letter #7)</p>
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Response: There are no populations of Ute Ladies tresses known to exist within the Snowy Range or Sierra Madre portions of the Forest. As displayed on p.79 of the DEIS, Ute Ladies tresses were one of the six rare plant species determined not likely to occur within or near the project area and was dropped from further consideration. Although other rare plants were found, extensive field botany surveys of the project area during 2002 and 2003 did not detect any populations of Ute Ladies tresses.

DEIS/Project Record: DEIS-Abstract p. i, Summary pp. ii-v, Chapter 1 Purpose and Need for Action pp.1-15, Chapter 2 Alternatives, Including the Proposed Action pp.16-43, and Chapter 3 Environmental Consequences 60-83. Project Record-BA/BE Plants and Fisheries/Aquatics/Watershed Reports.

Changes to FEIS/Project Record: The Rare Plants portion of the *Environmental Consequences* section of the FEIS (pp.80-85) has been revised to include additional survey information collected during the 2003 field season within the Blackhall-McAnulty project area. Additional more specific mitigation measures for rare plants have also been added to the FEIS (pp.36-37). Finally, the revised Rare Plant Report in its entirety has been added to the project record.

Comments from Federal, State, and Local Agencies**United States Department of the Interior**

OFFICE OF THE SECRETARY
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November 10, 2003

ER 03/840

Terry De Lay, ID Team Leader
Brush Creek/Hayden Ranger District
Medicine Bow-Routt National Forest
P.O. Box 249, South Highway 130
Saratoga, Wyoming 82331

Dear Mr. DeLay:

The Department of the Interior (Department) has reviewed the Draft Environmental Impact Statement (DEIS) for the proposed Blackhall-McAnulty Analysis, in the Brush Creek/Hayden Ranger District, Medicine Bow-Routt National Forest, Carbon County, Wyoming, and provides the following comments.

General Comments

The Medicine Bow National Forest submitted a Biological Assessment (BA) of the Blackhall-McAnulty Analysis to the U.S. Fish and Wildlife Service (USFWS) on August 26, 2003. The BA provides an analysis of the effects of the Forest Service's proposed actions on Canada lynx (*Lynx canadensis*) and bald eagle (*Haliaeetus leucocephalus*). The letter accompanying that BA requests the USFWS's concurrence for the determinations of effects to bald eagle and Canada lynx for the preferred Alternative, Alternative 2. The USFWS will respond to that request in a subsequent letter; therefore, our comments in this letter do not address effects of the Blackhall-McAnulty Analysis on Canada lynx or bald eagle.

The DEIS makes no mention of the ground water and streamflow characteristics in the study area. We recommend that the Final EIS include a description of baseline conditions relative to the streamflow regime (low flow and high flow), the relationship between ground water and surface water, and the physical characteristics of water quality (dissolved oxygen, nutrients, inorganic and organic chemistry, pH, and so forth). At a minimum, quantitative measures of Wyoming water quality standards should be provided and compared to existing baseline water quality conditions in the major streams and tributaries in the study area. The impacts of mining on water quality of selected streams should be described. Additionally, an estimate of the impacts of the alternatives (clearcutting and other timber harvest activities) on snowpack

retention, and the anticipated changes in the magnitude and timing of streamflow quantity and peak flows need to be provided in the document.

Specific Comments

Pages 17-20, Proposed Actions: Commercial Timber Sales, Clearcuts, Prescribed Fire, and Reduced Hazardous Fuels Adjacent to Private Lands: In the proposed actions, sagebrush and bitterbrush communities may be broadcast burned, slash piles from timber harvests and hazardous fuels reduction efforts may be burned, and prescribed fire may be used to broadcast burn after clearcutting. Please clarify if *any* water from tributaries to the Platte River will be used for fire suppression or any other activities identified in the DEIS. If so, please describe the amount and timing of the water depletion, the methods used to arrive at such estimates, the location of where the depletion will occur, and if and when the water will be returned to the system. This information is necessary to adequately assess water depletion effects. Please be advised that the Forest Service will need to consult with the USFWS office in Cheyenne if a water depletion to the Platte River system is anticipated.

Page 20, Prescribed Fire: In the proposed action, areas dominated by sagebrush and bitterbrush in the vicinity of Cunningham and Holroyd Parks would be broadcast burned during spring. Greater sage grouse (*Centrocercus urophasianus*) are dependent on sagebrush habitats, and may occur in sagebrush areas above 8000 feet in Wyoming. The USFWS has received several petitions to list sage grouse under the Endangered Species Act. Habitat loss and degradation, as well as loss of population connectivity are important factors affecting sage grouse populations (Braun 1998, Wisdom et al., 2002). We recommend that the historical presence or absence of sage grouse, as well as any recent sage grouse survey efforts, in the sagebrush areas proposed to be burned in the Blackhall-McAnulty Analysis, be documented in the Environmental Impact Statement. Burning sagebrush may cause long-term negative effects on sage grouse nesting habitat (Nelle et al., 2000). We recommend that any activities that result in loss of sagebrush, or degrade important sage grouse habitats, be closely evaluated for impacts to sage grouse.

Page 71, Federally Listed Species with Habitat Within the Blackhall-McAnulty Timber Sale Project Area: The DEIS states: "Listed T and E (*sic*) species or their habitats are not known or suspected to occur in the project area." Since there are threatened and endangered species and habitats that are known or suspected to occur in the analysis area, such as the bald eagle and lynx, we recommend that this statement either be removed or corrected accordingly.

Page 71, Platte River Mainstem Ecosystem Species: The DEIS states: "The proposed action would have no effect on downstream listed species or their habitats, because all above-listed species (except bald eagles) are not known or suspected to occur in the Blackhall-McAnulty Timber Sale analysis area." Downstream species may be affected by upstream water depletions to a river system. Water depletions to the Platte River system may affect the federally listed whooping crane (*Grus americana*), interior least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), pallid sturgeon (*Scaphirhynchus albus*), bald eagle, Eskimo curlew (*Numenius borealis*), and western prairie fringed orchid (*Platanthera praeclara*). In addition, depletions may contribute to the destruction or adverse modification of designated critical habitat for the whooping crane, and proposed critical habitat for the northern Great Plains breeding

population of the piping plover. Therefore, although none of the species listed above, except the bald eagle, may occur on the Blackhall-McAnulty Analysis Area, project actions may still affect the species if project activities involve water depletions to the Platte River system. Therefore, please identify whether water depletions will occur on the Platte River system, as a result of the project actions, to determine if project actions will affect Platte River species.

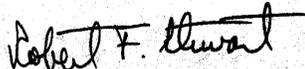
Page 73. Species with Habitat within the Blackhall-McAnulty Timber Sale Project Area: The DEIS states that "Western boreal toad . . . have not been documented to inhabit, but do have suitable habitat within or adjacent to the Blackhall-McAnulty Timber Sale proposed project area." The Wyoming Natural Diversity Database identifies a suspected breeding area and documents observation of boreal toads, in 1990, in Section 27, T 13N, R 83W (WYNDD, 2003). Most of this section is located within the project area and shelterwood cuts are currently proposed there. Please clarify if the boreal toad observation and suspected breeding area occurs within or outside the Blackhall-McAnulty Analysis Area, and if this area could be impacted by shelterwood cuts or other project actions.

Page 82. All Action Alternatives: The DEIS states that ". . . the project would not have any net effect on habitats in the main stem Platte River. Thus, the project is determined to have No Effect on Ute ladies' tresses . . ." Although the USFWS agrees that hydrological effects upstream may affect downstream species, Ute ladies'-tresses also may be affected *within* the proposed project site. The DEIS does not clearly indicate whether Ute ladies'-tresses or its habitat is present in the Blackhall-McAnulty Analysis Area. If surveys have been conducted to specifically search for Ute ladies'-tresses, please document when and where these surveys were conducted and what the results were.

Page 190. Neotropical Migratory Birds: The DEIS states: "The chance for any intentional or unintentional take of any migratory bird is extremely minimal." We commend the Forest Service for reviewing this project as it pertains to strategies outlined within the Memorandum of Understanding, directed by the President of the United States under the Executive Order 13186. We recommend that the Forest Service address how vegetation treatments, that result in the removal of vegetation during the neotropical migratory bird nesting season, will be planned to minimize unintentional take.

The Department appreciates the opportunity to comment on the Blackhall-McAnulty DEIS. If you have any questions regarding comments related to the Endangered Species Act or migratory birds, please contact Trish Swenor in the USFWS Wyoming Field Office at (307) 772-2374, extension 39. Please address any questions regarding ground water and streamflow characteristics to Trish Riley with USGS at (703) 648-6822.

Sincerely,


Robert F. Stewart
Regional Environmental Officer

Literature Cited

- Braun, C.E. 1998. Sage grouse declines in western North America: What are the problems? Proceedings of the Western Association of Fish and Wildlife Agencies 78:139-156
- Nelle, P.J., Reese, K.P, and J.W. Connelly. 2000. Long-term effects of fire on sage grouse habitat. Journal of Range Management. 53:586-591.
- Wisdom, M.J., B.C. Wales, M.M. Rowland, M.G. Raphael, R.S. Holthausen, T.D. Rich, and V.A. Saab. 2002. Performance of Greater Sage grouse models for conservation assessment in the Interior Columbia Basin, USA. Conservation Biology. 16: 1232-1242.
- WYNDD, 2003. Wyoming Natural Diversity Database. Univ. of Wyoming, Laramie.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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NOV 17 2003

Ref: 8EPR-N

Terry DeLay
Brush Creek/ Hayden Ranger District
Medicine Bow – Routt National Forest
P.O. Box 249
Saratoga, Wyoming 82331

Re: Blackhall – McAnulty Analysis Draft
Environmental Impact Statement, CEQ# 030439

Dear Mr. DeLay:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency Region 8 (EPA) has reviewed the *Blackhall – McAnulty Analysis Environmental Impact Statement* (Project) for the Brush Creek/ Hayden Ranger District of the Medicine Bow – Routt National Forest, dated September 2003.

The USFS proposes five resource management purposes within the 47,000 acre Blackhall-McAnulty analysis area. ~~The proposed actions include:~~ 1) reducing the spread of dwarf mistletoe and mountain pine beetle (MPB) in lodgepole pine stands; 2) increasing patch size of previously harvested areas; 3) improving resiliency and reducing susceptibility to future disease and insect attack; 4) salvaging fire-damaged trees; and 5) promoting and retaining aspen and ponderosa pine stands (DEIS p. 13). All five purposes have similar management actions including clearcutting, partial harvest and prescribed fire which will effect approximately 5,900 to 2,600 total acres (DEIS p. 40). Five to 12.8 miles of roads will be constructed or reconstructed. Additional actions associated with this Project include forage improvement, boundary treatments for fuels reduction at public/private interfaces, watershed projects, and trailhead improvement. Travel management actions include decommissioning 29.3 to 38.6 miles of existing roads.

We appreciate that four, previously proposed, individual vegetation management projects in the area have been combined for a larger analysis (Blackhall Timber Sale, McAnulty/ Beaver



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Creek Timber Sale, McAnulty 2 Fuels Management Project and Sierra Mare Travel Management Analysis). Through approaching this analysis at a larger, landscape level and prioritizing treatment in appropriate management areas, broader ecosystem attributes such as forest mosaics, diversity and contiguous habitat integrity are better protected. Combining these projects streamlines the NEPA process by eliminating redundancies across what would have been four separate NEPA documents. To this end, when analysis for the Colorado portion of the McAnulty/Beaver Creek Timber Sale is initiated, we advise that much of the relevant cumulative impacts information is already presented within this DEIS. This information should be used in the Colorado treatments to thoroughly describe the potential cumulative landscape effects.

EPA acknowledges that the USFS has addressed our initial concerns as discussed in our scoping letter (7/11/03). These concerns included: the project's complexity, description of baseline conditions and the presentation of scientific literature, impacts to ecosystem processes, and monitoring. We appreciate the careful attention that was given to the project's complexity and the presentation of what could have been contradictory and confusing information. The DEIS lists and summarizes the scientific references that support the proposed action and clearly identifies how each proposed purpose/action will meet, or not meet, Forest Goals and objectives. We commend the USFS for the detailed descriptions of each of the project purposes as well as the clear discussion of the specific management actions that are proposed to meet that purpose (in both text and map format). The DEIS adequately discusses the historical range of vegetation variability (HRV) and the expected effectiveness of proposed treatments based on existing science and past experience.

We continue to have concerns regarding potential impacts to ecosystem processes. We understand and appreciate that the Project treatment areas are generally focused on specific management area prescriptions. The treatments appear to be located predominantly adjacent to private land boundaries or in wood-fiber production and utilization designated areas, and the values associated with the interfaces and forest product activities were primary considerations in proposing Alternative 2 as the course of action. We also commend the USFS for planning the pest, fuel, and aspen treatments with respect to HRV and desirable ecosystem function. The vegetation management actions would, to some extent, mimic the effects that the on-going pine beetle epidemic will produce with no-action (*e.g.* reducing stand age, basal area, trees per acre, and the arrangement of host trees; DEIS p. 90). The proposed management activities cannot, however, replicate the natural landscape or ecological effects of a pine beetle outbreak because tree harvest reduces forage for some insect-dependent birds, reduces nesting cavities for birds, and changes nutrient cycling and other energy dynamics by substantially reducing standing and downed woody material. In addition, mechanical vegetation treatment increases soil disturbance, soil compaction, habitat fragmentation and homogeneity, and impacts to aquatic systems as compared to no action.

We recognize and appreciate that the USFS has worked to balance the necessity of protecting human values and retaining ecological processes within a forest system by restricting management to specific areas on the landscape. In order to prevent the need to continually mimic

forest disturbance through vegetation treatments, we recommend that the USFS consider halting the practice of suppressing beetle epidemics and fires throughout portions of the Forest (DEIS p. 102). This change would allow natural forest regeneration dynamics to exist on portions of the landscape (where possible) and prevent the need to continually, artificially induce disturbance to promote forest health.

Based on the procedures EPA uses to evaluate the potential effects of proposed actions and the adequacy of the information in the DEIS, the Proposed Actions identified by the DEIS for the *Blackhall - McAnulty Analysis* will be listed in the Federal Register in the category EC-1, "Environmental Concerns- Adequate Information." The EC rating is given because mechanical disturbances to terrestrial habitat and watersheds will have impacts within the Project area. The DEIS adequately discloses these potential impacts, as some of these impacts are the desired outcomes of the Project. The proposal minimizes impacts on the landscape while meeting project goals, as well as proposes to decommission 38.6 to 29.3 miles of existing redundant and watershed-damaging roads. We have enclosed a summary of EPA's rating criteria and definitions.

Thank you again for your willingness to consider our comments at this stage of the process. If you have any questions or would like to discuss our comments, please feel free to contact Amy Bergstedt of my staff at (303) 312-6647.

Sincerely,



Larry Svoboda
Director, NEPA Program
Office of Ecosystems Protection
and Remediation

**Environmental Protection Agency Rating System for Draft Environmental Impact Statements
Definitions and Follow-Up Action***

Environmental Impact of the Action

LO -- Lack of Objections

The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC -- Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO -- Environmental Objections

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU -- Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 -- Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 -- Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 -- Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

DAVE FREUDENTHAL
GOVERNOR



STATE CAPITOL
CHEYENNE, WY 82002

Office of the Governor

November 21, 2003

Terry DeLay, ID Team Leader
Brush Creek/Hayden Ranger District
PO Box 249
Saratoga, WY 82331

Dear Terry,

Thank you for the opportunity to comment on the Blackhall-McAnulty Analysis.

I have received numerous comments about the proposed action including 38.6 miles of road decommissioning. I have read the letters and their comments make great sense. I would ask that the ID Team consider the Alternative 2 road decommissioning proposal (29.3 miles) as part of the selected alternative, and consider the modifications to this proposal provided by several sportsmen who use this area. This area is difficult to access by foot for many sportsmen. This has been an important hunting area for many in the state.

It appears that the area is used primarily during the hunting season. However, if there are problems with disturbance especially on crucial winter range during the winter, during parturition or during migration, tools such as seasonal closures should be considered.

When addressing road erosion, it would be my suggestion that road layout, design and location as well as the full implementation of best management practices be addressed when implementing the vegetation management project. Water quality is of great importance to the people of Wyoming and eliminating non-point pollution requires vigilance by all agencies.

Also attached are comments from the Wyoming Game and Fish Department which I ask that you consider in your final decision.

Best Regards,

A handwritten signature in cursive script, appearing to read "Dave Freudenthal".

Dave Freudenthal
Governor

DF:MF

TTY: 777-7860

PHONE: (307) 777-7434

FAX: (307) 632-3909



Natural Resources Conservation Service
Federal Building
100 East B Street, Room 3124
Casper, WY 82601

Date: November 12, 2003

Terry DeLay, ID Team Leader
Brush Creek/Hayden Ranger District
P.O. Box 249
South Hwy 130
Saratoga, Wyoming 82331

Dear Terry DeLay,

RE: NRCS Environmental Document Number 2787

The Natural Resources Conservation Service has reviewed the Draft Environmental Impact Statement for the Blackhall-McAnulty Analysis. We do not have any comments on the DEIS.

If you have any questions, or need to discuss this comment with us, please contact Doug Gasseling, Conservation Agronomist, Cheyenne, Wyoming, at 307-772-2015, ext. 116.

Sincerely,

A handwritten signature in black ink, appearing to read "Lincoln 'Ed' Burton", is written over the word "Sincerely".

LINCOLN "ED" BURTON
State Conservationist

Cc:

Diane Gelburd, Director, Ecological Sciences Division, NRCS, Washington, DC

The Natural Resources Conservation Service works hand-in-hand with the American people to conserve natural resources on private lands.

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November 7, 2003

WER 9491.01
Medicine Bow-Routt National Forest
Brush Creek/Hayden Ranger District
Draft Environmental Impact Statement
Blackhall-McAnulty Analysis
PROJECT ID#: 1999-116
Carbon County

Scott Armentrout, District Ranger
Brush Creek/Hayden District
South Hwy 130
P.O. Box 249
Saratoga, WY 82331-0249

Dear Mr. Armentrout:

The staff of the Wyoming Game and Fish Department has reviewed the Draft Environmental Impact Statement for the Blackhall-McAnulty Analysis on the Brush Creek/Hayden Ranger District of the Medicine Bow-Routt National Forest. We offer the following comments

Terrestrial Considerations:

Proposed activities in the Blackhall-McAnulty Analysis Area include timber harvest, prescribed burning, fuels reduction, road decommissioning, watershed restoration and related actions.

We previously identified our concerns through several scoping requests. Some of the proposed projects would be beneficial to wildlife while others would have negative impacts to local populations. Some of the major wildlife and habitat resources of the area include the following:

- Crucial winter/yearlong and parturition (calving) areas for elk
- Migration corridors, and spring/summer/fall and winter/yearlong ranges for mule deer
- Spring/summer/fall range for pronghorn

Headquarters: 5400 Bishop Boulevard, Cheyenne, WY 82006-0001
Fax: (307) 777-4610 Web Site: <http://gf.state.wy.us>

- Winter/yearlong range for moose
- Actual and potential nesting habitat for northern goshawks, boreal owls and other raptors
- Coarse woody debris, old-growth, structurally diverse forested stands, suitable corridors and other important habitats for pine marten and other forest interior species.

About 60% of the analysis area is currently under wildlife habitat emphases in the current Medicine Bow National Forest Land and Resource Management Plan. These include habitat for management indicator species (4B), aspen (4D), non-forested big game winter range (5A), forested big game winter range (5B), and riparian areas (9A). The Forest Plan emphasizes wood fiber production (7E and 7C) in essentially the rest of the analysis area. We expect that the analysis area will retain similar management area prescriptions under the revised forest plan when it is finalized. These wildlife resources support a substantial amount of recreation on this portion of the Forest. We have encouraged the Forest to give special consideration to wildlife and habitat concerns given the emphasis placed on these resources in the Forest Plan.

The Draft EIS on this analysis identified a number of issues, including cumulative effects, fragmentation, wildlife habitat diversity, clearcutting, forest disturbance agents, and watershed impacts. We share those concerns and have raised them in the past.

We remain concerned about the effects of the Proposed Action and Alternative 2 that further timber harvests in many of the proposed timber sale units will further fragment habitat conditions for a number of forest-dependent species. A substantial number of the proposed commercial timber sale units are within or immediately adjacent to previously harvested units, especially in the vicinity of Blackhall Mountain. We reiterate some of our earlier stated concerns:

- a. Removing the remnant strips between cuts will eliminate important linkages and stepping stone habitats for some species of concern. The Draft EIS does not present a detailed analysis of habitat linkages.
- b. Substantial timber harvest has occurred or is proposed immediately adjacent to the analysis area including Coon Creek, Tie Camp, Jerry Park 2 and Wood Mountain 2. These constrain dispersal for some wildlife species.
- c. We previously recommended that the Draft EIS present a GIS-based evaluation of past, present and projected future stand sizes and conditions. That still is lacking from the disclosures.
- d. While some of the proposed timber sales may seem expedient to address fragmentation from a silvicultural standpoint, they will actually increase fragmentation from an ecological perspective, especially for resident wildlife. We encourage a reevaluation of the timing of these treatments and planning for timber sales that will not compound fragmentation problems.

- e. It appears some of the created openings would exceed current forest standards. The Preliminary Proposed Action acknowledged some regeneration problems and that some of the proposed overstory removals would resemble clearcuts. We are unable to determine if these are the units that have been dropped.
- f. We encourage the Forest to minimize roads and traffic needed for conducting projects as part of this analysis.
- g. The analysis still does not evaluate "effective" open road (i.e., open roads and closed roads with a history of violation) and motorized trail densities.
- h. Roads and permitted uses on them should be designed to minimize stress on wildlife in sensitive areas during primary use seasons.
- i. We encourage the Forest to expand area closures, especially on winter/yearlong and parturition ranges.
- j. Road closures need to be effectively barricaded
- k. Additional staff are needed to help enforcement of road closures in the analysis area.
- l. Cover adjacent to open roads and trails should be preserved where practical.
- m. Potential alternate nest sites for goshawks, cavity nesting birds and other species should be provided by considering the requirements of structural diversity for nesting birds and other wildlife.
- n. We inquired about opportunities to expand bighorn habitat to help alleviate conflicts with livestock, especially domestic sheep. The Draft EIS does not address this request.
- o. Human disturbance to wildlife during sensitive periods such as nesting, parturition, etc., should be minimized.
- p. What will be the role of disease, insects and fire in maintaining natural disturbance?
- q. What will be the impact of insecticides and other chemical treatments on nontarget insects and on wildlife that forage on them?
- r. Is the current drought a factor in the intensity of beetle and dwarf mistletoe outbreaks?
- s. How will treatments within winter range and other seasonal habitats be conducted to minimize impacts to wildlife?

We offer a few specific comments on the Draft EIS:

- a. In the discussion on Range (p. 34, also p. 119), where will livestock be pastured during the seasons of rest?
- b. Under mitigation for roads (p. 35), the DEIS does not address effectiveness or enforcement of road decommissioning actions. How will these be achieved?
- c. We find no mention of proposed measures to reduce disturbance to wintering wildlife and elk parturition under wildlife mitigation (p. 36). This should be addressed.
- d. The Draft EIS (e.g., p. 93) does not respond adequately to our requests for analyzing and presenting linkages for wildlife within and among watersheds.

- e. Table 43 (p. 135) does show cover and old growth inadequacies in contrast to other claims (e.g., p. 138). Why are there no road densities shown in Table 44 (p. 137)? This should be analyzed and disclosed. The discussion on roads (p. 139) seems to contradict the claims about cover and road density adequacy.
- f. Although the analysis area may not provide habitat as good for pine marten as others (see p. 140-141), impacts within this and adjacent watersheds with better marten habitat warrant further consideration in the decision. Pages 186-187 acknowledge these concerns are valid.

The Department supports Alternative 3 or Alternative 4 because these negatively impact wildlife habitat less than the Proposed Action. We have reservations about the Proposed Action, even with the changes the Forest incorporated as it is currently explained, given the cumulative effects on landscape function and habitat suitability. We could support a modification of the Proposed Action provided the Forest would demonstrate the modified timber harvests would maintain existing linkages, habitat effectiveness, and larger patches. The GIS analysis that we previously requested would be necessary for this demonstration.

Aquatic Considerations:

Soil Erosion/Sedimentation (pg 13) entering area streams from roads is identified as one of the reasons actions are needed and addressed by the Draft Environment Impact Statement (DEIS). If the proposed actions are carried out as listed, sedimentation should be reduced and this would benefit fisheries. Most streams within the project area are small but sustain wild trout populations, which provide fishing opportunity during the summer and fall.

The Department would like clarification of the following statement on page 37 (Fisheries and Aquatics), paragraph three, "Should monitoring reflect an abnormal downturn in relative abundance, additional monitoring would be performed three years following harvest completion." What is considered "abnormal"? Is it a 25% reduction or a 50% reduction? The DEIS should clarify at what level additional monitoring will be performed. Additionally, a statement should be added in the DEIS that any fish population monitoring data will continue to be forwarded to the Department for inclusion in our fish databases.

Overall, the end result of this project should result in conditions, which will benefit riparian areas and specifically fisheries.

Thank you for the opportunity to comment. We look forward to providing any clarification as the analysis proceeds.

Sincerely,



GREGG ARTHUR
INTERIM DIRECTOR

BW:TC:as

cc: Kyndra Miller, State Planning Coordinator



LITERATURE CITED

- Albini, F.A. 1976. Computer-based models of wildland fire behavior: a user's manual. USDA, Forest Service, Intermountain Forest and Range Experiment Station, Ogden UT.
- Anderson, Hal E. 1982. Aids to Determining Fuel Models For Estimating Fire Behavior. USDA, Forest Service, General Technical Report INT-122.
- Andrews, Patricia L. 1986. Behave: Fire Behavior Prediction and Fuel Modeling System – Burn Subsystem, part 1. USDA, Forest Service, General Technical Report INT-194.
- Arno, S.F. 1980. Forest fire history in the Northern Rockies. *Journal of Forestry* 78(8):460-465.
- Askins, R.A. 1995. Hostile landscapes and the decline of migratory songbirds. *Science* 267:1956-1957.
- Baker, M.B. Jr. 1990. Hydrologic and water quality effects of fire. In: Krammes, J.S., technical coordinator. *Effects of Fire Management of Southwestern Natural Resources*. USDA, Forest Service, General Technical Report RM-191, pp.31-42.
- Baker, W.L. 1994. Landscape structure measurements for watersheds in the Medicine Bow National Forest using GIS analysis. Challenge cost-share agreement between Dept. of Geography and Recreation, University of Wyoming, and Medicine Bow-Routt National Forest.
- Banci, V. 1994. Wolverine. Chapter 5, pp. 99-127. In: L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Ziellinski, tech. eds. *The Scientific Basis for Conserving Forest Carnivores in the Western United States: American Marten, Fisher, Lynx, and Wolverine*. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-254.
- Beauvais, G.P. Ph.D. 1997. Mammals in fragmented forests in the Rocky Mountains: Community structure, habitat selection, and individual fitness. University of Wyoming, Laramie WY, 139 pp.
- Behnke, R.J. 1992. *Native Trout of Western North America*. Published by the American Fisheries Society, 5410 Grosvenor Lane, Suite 110, Bethesda MD, p. 88.
- Brittingham, M.C. 1989. Effects of timber management practices on forest interior birds. In: J. C. Finley and M. C. Brittingham, eds. *Timber Management and Its Effects on Wildlife*, pp. 163-170. Proceedings of the Penn State Forest Resources Issues Conference, Pennsylvania State University, University Park PA, 1989.
- Burroughs. 1998. Predicting Onsite Sediment Yield From Forest Roads. In: *Erosion Control: Technology in Transition*. Proceedings of Conference XXI, International Erosion Control Association, Washington DC, Feb. 1990.

- Camp, R.J. and R.L. Knight. 1998. Rock climbing and cliff bird communities at Joshua Tree National Park, California. *Wildl. Soc. Bull.* 26(4):892-898. As referenced in: Joslin, G. and H. Youmans, coord.. *Effects of Recreation on Rocky Mountain wildlife: A Review for Montana, 1999*. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society, 307 pp.
- Campbell, T.M. III, and T.W. Clark. 1980. Short-term effects of logging on red-backed voles and deer mice. *Great Basin Naturalist* 40(2):183-189.
- Canfield, J.E., L.J. Lyon, J.M. Hillis, and M.J. Thompson. 1999. Ungulates. Pp. 6.1-6.25 In: Joslin, G. and H. Youmans, coord. *Effects of Recreation on Rocky Mountain wildlife: A Review for Montana, 1999*. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society, 307 pp.
- Christensen, A.G., L.J. Lyon, and T.N. Lonner (comps.). 1991. *Proceedings of a Symposium on Elk Vulnerability*. Montana Chapter of The Wildlife Society, Montana State University, Bozeman MT, 330 pp.
- Clark, T.W., and M.R. Stromberg. 1987. *Mammals in Wyoming*. Museum of Natural History, Univ. of Kansas, Public Educ. Ser. No 10, 314 pp. Univ. Press of Kansas, Lawrence.
- Colorado Natural Heritage Project (CNHP) Database/GIS. 2002. Botanical GIS analysis specific to the Blackhall-McAnulty Analysis Area conducted by the Medicine Bow-Routt Forest Botanist (John Proctor), May 2002.
- Corn, J.G. and M.G. Raphael. 1992. Habitat characteristics at marten subnivian access sites. *J. Wildlife Management* 56(3):442-448.
- Cornell. 2003. Olive-sided flycatcher. <http://birds.cornell.edu/bfl/speciesaccts/olsfly.html>.
- Cowardin, L., V. Carter, F. Golet, and E. LaRoe. 1979. *Classification of wetlands and deepwater habitats of the United States*. U.S. Fish and Wildlife Service, FWS/OBS-79-31.
- Davis, P.R. 1976. Response of vertebrate fauna to forest fire and clearcutting in south central Wyoming. *Dissert. Abs., Int. Sci. Eng.* 37(8):3752B.
- DeBano, L.F., D.G. Neary, and P.F. Ffolliott. 1998. *Fire: Its effect on soil and other ecosystem resources*. John Wiley and Sons, Inc., 318p.
- DeBano, L.F., L.D. Mann, and D.A. Hamilton. 1970. Translocation of hydrophobic substances into soil by burning organic litter: *Soil Science Society of America Proceedings*, v. 34, pp.130-133.
- DeByle, N.V. and J.K. Brown. 1989. *Effects of Prescribed Fire on Biomass and Plant Succession in Western Aspen*. USDA, Forest Service, Intermountain Research Station, Ogden UT, Res. Pap. INT-412, 16pp.
- Deeming, J.E., R.E. Burgan and J.D. Cohen. 1977. *The National Fire-Danger Rating System – 1978*. USDA, Forest Service, General Technical Report INT_39.
- DeGraaf, R.M., V.E. Scott, R.H. Hamre, L. Ernst, and S.H. Anderson. 1991. *Forest and rangeland birds of the United States*. USDA, Forest Service, Agr. Handbook 688, 625 pp.

- Diaz, N., and D. Apostol. 1992. Forest landscape analysis and design. USDA, Forest Service, Pacific Northwest Region, Publication R6 ECO-TP-043-92.
- Dillon, G.K., D.H. Knight, and C.B. Meyer. 2003. Historic Variability for Upland Vegetation in the Medicine Bow National Forest, Wyoming. Report submitted to the Medicine Bow National Forest, Laramie WY, and the Division of Renewable Resources. USDA, Forest Service, Rocky Mountain Region, Lakewood CO, USFS Agreement 1102-0003-98-043.
- Dolbeer, R.A., and W.R. Clark. 1975. Population ecology of snowshoe hares in the central Rocky Mountains. *J. Wildlife Mgt.* 39:535-549.
- ESA. 1973. The Endangered Species Act of 1973, as Amended through the 100th Congress. Published by the USDI Fish and Wildlife Service, Washington DC, 1988.
- Ferguson, Carol Ph.D., Entomologist: Personal communication 9/26/02. Southern Oregon University, Ashland OR.
- Fertig, W., C. Refsdal, and J. Whipple. 1994. Wyoming Rare Plant Field Guide. Wyoming Rare Plant Technical Committee, Cheyenne WY.
- Finch, D.M. 1992. Threatened, endangered, and vulnerable species of terrestrial vertebrates in the Rocky Mountain Region. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins CO, Gen. Tech. Report. RM-215, 38 pp.
- Franklin, J.F., and R.T.T. Forman. 1987. Creating landscape patterns by forest cutting: ecological consequences and principles. *Landscape Ecology* 1:5-18.
- Garber, C.S., R.L. Wallen, and K.E. Duffy. 1991. Distribution of boreal owl observation records in Wyoming. *J. Raptor Res.* 25(4):120-122.
- Gashwiler, J.S. 1970. Plant and mammal changes on a clearcut in west-central Oregon. *Ecology* 51(6):1018-1026.
- Geist, V. 1971. Mountain sheep: a study in behavior and evolution. University of Chicago Press, Chicago, IL, 383 pp.
- Gloss, D. 2002a. Appendix B, Water Yield Analysis, Medicine Bow National Forest Proposed Revised Land and Resource Management Plan.
- Gloss, D. 2002b. Burned Area Emergency Rehabilitation Report, Bear Mountain South Fire. Brush Creek/Hayden Ranger District.
- Gloss, Dave. 2003. Personal communication, 5/1/2003. BAER (Burned Area Emergency Rehabilitation) Team Leader for the Bear Mountain South Fire and Zone Forest Hydrologist for the Medicine Bow National Forest.
- Graham, R.T., R.L. Rodriguez, K.M. Paulin, R.L. Player, A.P. Heap, and R. Williams. 1999. The northern goshawk in Utah: Habitat assessment and management recommendations. USDA, Forest Service, Rocky Mountain Research Station, RMRS-GTR-22, 48pp.

- Graham, R.T., T.B. Jain, R.T. Reynolds, and D.G. Boyce. 1997. The role of fire in sustaining northern goshawk habitat in Rocky Mountain Forests. Pp. 69-76 In: Proceedings – Fire effects on rare and endangered species and habitats conference, Coeur d' Alene ID, Nov. 13-16, 1995.
- Grant, V. and D.H. Wilken. 1986. Taxonomy of the *Ipomopsis aggregata* group (Polemoniaceae). *Botanical Gazette* 147: 359-371.
- Greater Yellowstone Bald Eagle Working Group. 1996. Greater Yellowstone bald eagle management plan: 1995 update. Greater Yellowstone Bald Eagle Working Group, Wyoming Game and Fish Department, Lander WY, 47 pp.
- Green A.E. 1997. Rare Plants of Colorado, 2nd Edition. The Colorado Native Plant Society and the Rocky Mountain Nature Associates. Falcon Press Publishing Company, Helena MT.
- Guenther-Gloss, P.M. 2001a. Field notes taken by North Zone Fisheries Biologist during monitoring of watershed conditions, stream habitat and Colorado River cutthroat trout populations following the Hell Canyon wildfire, May 31 and July 25, 2001.
- Guenther-Gloss, P.M. 2001b. Field notes taken by North Zone Fisheries biologist during reconnaissance of Cumberland Gulch, South Fork Goetze Creek, and portions of Lake Creek Allotment, conducted with W.Haas, September 25, 2001.
- Haas, W.L. 2001. Range Management Specialist. Biological Evaluation/Biological Assessment For Sensitive, Threatened and Endangered Plant Species within the Beaver Creek/McAnulty Project Area. Medicine Bow-Routt National Forests, Brush Creek/Hayden District, April 2.
- Hamann, B., H. Johnston, P. McClelland, S. Johnson, L. Kelly and J. Gobielle. 1999. Birds. Pp. 3.1-3.34 In: Joslin, G. and H. Youmans, coord. 1999. Effects of Recreation on Rocky Mountain wildlife: A Review for Montana. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society, 307 pp.
- Hann, W.J. 1990. Management for landscape and ecosystem biodiversity. In: Arlene Doyle and Angela Evenden, eds. Biodiversity Workshop Proceedings. USDA, Forest Service, Northern Region, Missoula MT.
- Harris, L.D. 1984. The fragmented forest. Univ. of Chicago Press, Chicago IL.
- Hartman, R.L, B.E. Nelson. 2001. Final report: General floristic/sensitive plant species survey of the Routt National Forest, Colorado. Department of Botany, University of Wyoming, Laramie WY.
- Hayward, G.D. and P.H. Hayward. 1993. Boreal Owl. No. 63 In: A. Poole and F. Gill (eds.). The Birds of North America. The American Ornithologists' Union, Philadelphia, 20 pp.

- Hayward, G.D., P.H. Hayward, and E.O. Garton. 1987. Movements and home range use by boreal owls in central Idaho. Pp. 175-184 In: R.W. Nero, R.J. Clark, R.J. Knapton, and R.H. Hamre, eds. *Biology and conservation of northern forest owls: Symposium proceedings Feb. 3-7, 1987, Winnipeg, Manitoba, Canada.* USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins CO, 309 pp.
- Herren, V., S.H. Anderson, and L.F. Ruggiero. 1996. Boreal owl mating habitat in the northwestern United States. *J. Raptor Res.* 30(3):123-129.
- Hickman, G.R., B.G. Dixon, and J. Corn. 1999. Small Mammals. Pp. 4.1-4.16 In: Joslin, G. and H. Youmans, coord. *Effects of Recreation on Rocky Mountain wildlife: A Review for Montana, 1999.* Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society, 307 pp.
- Hillis, J.M., M.J. Thompson, J.E. Canfield, L.J. Lyon, C.L. Marcum, P.M. Dolan, and D.W. McCleerey. 1991. Defining elk security: the Hillis paradigm. Pp. 38-43 In: A.G. Christensen, L.J. Lyon, and T.N. Lonner, compilers. *Proceedings of the Elk Vulnerability Symposium, Montana State University, Bozeman, 330 pp.*
- Honaker, J.J. 1995. Fire history in the Tie Camp area of the Sierra Madre Mountains, Wyoming. MS Thesis, University of Wyoming, Laramie WY, 55pp.
- Hoover, R.L., and D.L. Wills, eds. 1984. *Managing forested lands for wildlife.* Colorado Division of Wildlife, in cooperation with USDA Forest Service, Rocky Mountain Region, Eastwood Printing & Publishing, Denver, 459 pp.
- Hutto, R.L. 1995. Composition of bird communities following stand-replacement fires in northern Rocky Mountain conifer forests. *Conservation Biology* 9(5):1041-1-58.
- Hutto, R.L. 1996. An investigation of the potential threat of habitat fragmentation on some Northern Region bird species. Final report for contract #53-0343-2-00207, Northern Region, Missoula MT Institute for Wildlife Research, National Wildlife Federation Scientific Technical Service No. 11, as referenced In: Joslin, G. and H. Youmans, coord. 1999. *Effects of Recreation on Rocky Mountain wildlife: A Review for Montana.* Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society, 307 pp.
- IWWI. 1996-1999. Inland West Watershed Initiative database. Contained on computer network of Medicine Bow-Routt National Forests.
- Johnsgard, P.A. 1986. *Birds of the Rocky Mountains.* Colorado Associated University Press, Boulder, 504 pp.
- Johnston, B.C. 1987. *Plant associations of Region 2, 4th ed.* Pub. R2-ECOL-87-2, 429 pp. USDA, Forest Service, Rocky Mountain Region, Lakewood CO.
- Joslin, G., and H. Youmans, cords. 1999. *Effects of recreation on Rocky Mountain wildlife: a review for Montana.* Committee on effects of recreation on wildlife, Montana Chapter of The Wildlife Society.
- Karlen, D.L. et al. 1997. Soil Quality: A Concept, Definition and Framework for Evaluation. *Soil Science Society of America Journal* 61:4-10.

- Keller, M.E. and S.H. Anderson. 1992. Avian use of habitat configurations created by forest cutting in southeastern Wyoming. *Condor* 94:55-65.
- Kennedy, P.L. and D.W. Stahlecker. 1993. Responsiveness of nesting northern goshawks to taped broadcast of three conspecific calls. *J. Wildl. Manage.* 57:249-257.
- Knecht, Dorothy. 1996. The reproductive and population ecology of *Cypripedium fasciculatum* (Orchidaceae) throughout the Cascade Range. A thesis presented to Graduate Faculty of Central Washington University. Master of Science, Biology.
- Knight, R.L. and S.K. Skagen. 1988. Effects of recreational disturbance on birds of prey: a review. In: Proceedings of Southwest raptor management symposium and workshop, pp. 355-359. Institute of Wildlife Research, National Wildlife Federation Science Technical Service No. 11, as referenced In: Joslin, G. and H. Youmans, coord. Effects of Recreation on Rocky Mountain wildlife: A Review for Montana, 1999. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society, 307 pp.
- Koehler, G. M. 1990. Population and habitat characteristics of lynx and snowshoe hares in north central Washington. *Canadian J. of Zoology* 68:845-851.
- Koehler, G. M., and J. D. Brittell. 1990. Managing spruce-fir habitat for lynx and snowshoe hares. *J. of Forestry* 88:10-14.
- Koehler, G.M., and K.B. Aubry. 1994. Lynx. Chapter 4, pp. 74-98 In: L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski, tech. eds. American marten, fisher, lynx, and wolverine: The scientific basis for conserving forest Carnivores in the western United States. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO, General Technical Report RM-254.
- Kratz, Andy. 2003. Personal communication, January 2003. Region 2 Botanist, Lakewood CO.
- Leptich, D.J. and P. Zager. 1991. Road access management effects on elk mortality and population dynamics. Pp. 126-131 In: A.G. Christensen, L.J. Lyon, and T.N. Lonner, compilers. Proceedings of the Elk Vulnerability Symposium, Montana State Univ., Bozeman, 330 pp.
- Levenson, H. and J.R. Koplin. 1984. Effects of human activity on productivity of nesting ospreys. *J. Wildl. Manage.* 48(4):1374-1377.
- Livo, L.J. 1998. Identification guide to montane amphibians of the southern Rocky Mountains. Colorado Division of Wildlife, p. 25.
- Loose, S.S. 1993. Woodpecker habitat use in the forests of southeast Wyoming. Master's Thesis, University of Wyoming, Laramie, WY, 97 pp.
- Loose, S.S. and S.H. Anderson. 1995. Woodpecker Habitat Use in the Forests of Southeast Wyoming. *J. Field Ornithol.* 66(4):503-514.
- Luce, B., A. Cerovski, B. Oakleaf, J. Priday, and L. Van Fleet. 1999. Atlas of Birds, Mammals, Reptiles, and Amphibians in Wyoming.

- Lyon, L.J. and A.L. Ward. 1982. Elk and Land Management. In: Thomas, J.W. and D.E. Toweill (eds.). Elk of North America: Ecology and Management. Pp. 443-477, Stackpole Books.
- Lyon, L.J., and A.G. Christensen. 1990. Toward a working glossary of elk management terms. Paper presented at the Western States and Provinces Elk Workshop, Eureka CA, May 1990.
- Marston, R. and D. Clarendon. 1988. Land Systems Inventory of the Medicine Bow Mountains and Sierra Madre. Medicine Bow NF, Wyoming, MBNF 88-01.
- Medin, D.E. 1985. Breeding bird responses to diameter-cut logging in west-central Idaho. USDA, Forest Service, Intermountain Research Station, Ogden, UT, Research Paper INT-355, 12pp.
- Medin, D.E. 1986. Small mammal responses to diameter-cut logging in an Idaho Douglas-fir forest. USDA, Forest Service, Intermountain Research Station, Ogden UT, Research Paper INT-362, 6 pp.
- Mueggler, W.F. 1989. Age distribution and reproduction of Intermountain aspen stands. W. J. App. For. 4(2):41-45.
- Murphy, E.C. and W.A. Lehnhausen. 1998. Density and Foraging Ecology of Woodpeckers Following a Stand-Replacement Fire. J. Wildl. Manage. 62(4):1359-1372.
- Neighbours, M. L. 1996 (1997, 1998). Medicine Bow National Forest: known occurrences of animals and plants - threatened, endangered, Forest sensitive, and otherwise of concern - and occurrences of communities. Annual report prepared by Wyoming Natural Diversity Database, The Nature Conservancy, Laramie WY. Subsequent annual reports since then.
- NFMA 36 CFR. National Forest Management Act, 36 Code Federal Regulations.
- NOAA. Wind speed conversion charts, available from:
www.seawfo.noaa.gov/fire/olm/fire/10togust.htm.
- NWI. 1990. National Wetlands Inventory. U.S. Fish and Wildlife Service 1991, National Wetland Inventory maps of wetland occurrence on 7.5-minute quadrangle maps for Wyoming, including the Medicine Bow National Forest.
- O'Doherty, E.C., L.F. Ruggiero, and S.E. Henry. 1997. Martes: taxonomy, ecology, techniques, and management. Pp. 123-134 In: G. Proulx, H.N. Bryant, and P.M. Woodard, eds. Provincial Museum of Alberta. Edmonton, Alberta, Canada.
- Ortega, Y.K. and D.E. Capen. 2002. Roads as edges: effects on birds in forested landscapes. Forest Science 48(2):381-390.
- Page, L.M. and Burr, B.M. 1991. Freshwater Fishes. Petersen Field Guides, Published by Houghton Mifflin Company, 215 Park Avenue South, New York, NY 10003, pp. 53 and 104.
- Perala, D.A. 1990. Quaking aspen. Pp. 555-569 In: M. Burns and B.H. Honkala, tech. coords. Silvics of North America: Vol. 2, Hardwoods. USDA, Forest Service, Agric. Handbook 654, Washington DC, 877 pp.

- Pierson, E.D. and W.E. Rainey. 1994. The distribution, status and management of Townsend's big-eared bat (*P. townsendii*) in California. Report to California Department of Fish and Game, Sacramento CA, 48 pp. as referenced In: Joslin, G. and H. Youmans, coord. 1999. Effects of Recreation on Rocky Mountain wildlife: A Review for Montana. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society, 307 pp.
- Proctor, John and Matt Landis. 2002. Green Ridge Plant Survey Field Notes. Copy in Green Ridge Project File at Brush Creek/Hayden District, originals in Botany Files at Parks Ranger District.
- Purchase, C. 2003. Personal communication with a Brush Creek/Hayden District hydrologist.
- Purchase. 2002a. Field Survey Data from 2002 Road Inventories. Field Data summarized into a spreadsheet by C. Purchase, 12/02.
- Purchase. 2002b. Stream Surveys in the Big Creek and Beaver Creek Watersheds.
- Purchase. 2003. Equivalent Clearcut Calculations for Big Creek and Beaver Creek. May 2003.
- Raphael, M.G. 1988. Habitat associations of small mammals in a subalpine forest, southeastern Wyoming. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, Ft. Collins CO, GTR RM-166, pp. 359-367.
- Raphael, M.G., L.F. Ruggiero, and S.E. Henry. 1991. Habitat selection by marten in the Sierra Madre Range, Wyoming. Symposium on the biology and management of martens and fishers, May 29 – June 1, Laramie WY.
- Reed, R.A., J. Johnson-Barnard, and W.L. Baker. 1996. Fragmentation of a forested Rocky Mountain landscape, 1950-1993. *Biol. Conserv.* 75:267-277.
- Reed, R.A., J. Johnson-Barnard, and W.L. Baker. 1996a. Contribution of roads to forest fragmentation in the Rocky Mountains. *Conserv. Biol.* 10:1098-1106.
- Reinhardt, E.D., R.E. Keane, and J.K. Brown. 1997. First Order Fire Effects Model: FOFEM 4.0, User's guide. USDA, Forest Service, Intermountain Forest and Range Experiment Station, Ogden UT, Gen. Tech. Rep. INT-GTR-344.
- Reynolds, R. T. 1989. Accipiters. Pp. 92-101 In: Proceedings of the Western raptor management symposium and workshop. National Wildlife Federation, Washington, DC, Scientific and Technical Series No. 12, 317 pp.
- Reynolds, R.T. 1983. Management of western coniferous forest habitat for nesting Accipiter hawks. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins CO, Gen. Tech. Rept. RM-102, 7 pp.
- Reynolds, R.T., R.T. Graham, M.H. Reiser, and others. 1992. Management recommendations for the northern goshawk in the southwestern United States. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins CO, Gen. Tech. Rept. RM-217, 90 pp.
- Ripple, W.J., G.A. Bradshaw, and T.A. Spies. 1991. Measuring forest landscape patterns in the Cascade Range of Oregon, USA. *Biological Conservation* 57:73-88.

- Roche, Kathy. 2003. Personal communication, Medicine Bow-Routt National Forest Ecologist, January 30, 2003.
- Rogers, Brad. 2001. Informal Technical Support on listed species for the Medicine Bow National Forest. Personal communication, 5/25/2001 between Brad Rogers, Wildlife Biologist, USDI Fish and Wildlife Service, Ecological Services Office, Cheyenne, Wyoming, and David Austin, Wildlife Biologist, USDA Forest Service, Medicine Bow-Routt National Forests, Parks Ranger District, Walden, Colorado.
- Romme, W.H. and D.H. Knight. 1981. Fire frequency and subalpine forest succession along a topographic gradient in Wyoming. *Ecology* 62(2):319-326.
- Rosgen, D. 1996. *Applied River Morphology*. Wildland Hydrology, Pagosa Springs, CO.
- Rothermel, Richard C. 1983. How to predict the spread and intensity of forest and range fires. USDA, Forest Service, General Technical Report INT-122.
- Ruediger, B., J. Claar, S. Mighton, B. Naney, T. Rinaldi, F. Wahl, N. Warren, D. Wenger, A. Williamson, L. Lewis, B. Holt, G. Patton, J. Trick, A. Vandehey, and S. Gniadek. 2000. Canada lynx conservation assessment and strategy (dated January 2000). Cooperative effort between USDI Bureau of Land Management, USDA Forest Service, and USDI Fish and Wildlife Service.
- Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Ziellinski, tech. eds. 1994. *The Scientific Basis for Conserving Forest Carnivores in the Western United States: American Marten, Fisher, Lynx, and Wolverine*. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-254.
- Ruggiero, L.F., D.E. Pearson, and S.E. Henry. 1998. Characteristics of American marten den sites. In: Wyoming. *J. Wildl. Manage.* 62(2):663-673.
- Ryder, R.A., D.A. Palmer, and J.J. Rawinski. 1987. Distribution and status of the boreal owl in Colorado. Pp. 169-174 In: R.W. Nero, R.J. Clark, R.J. Knapton, and R.H. Hamre, eds. *Biology and conservation of northern forest owls: symposium proceedings*, Feb. 3-7, 1987, Winnipeg, Manitoba, Canada. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins CO, Gen. Tech. Rept. RM-142, 309 pp.
- Saab, V.A. and J.G. Dudley. 1998. Response of cavity nesting birds to stand-replacement fire and salvage logging in ponderosa pine/Douglas-fir forests of southwestern Idaho. Res. Paper. USDA, Forest Service, Rocky Mountain Research Station, RMRS-RP-11, Ogden UT, 17 pp.
- Salih, M.S.A., F.K. Taha, and G.F. Payne. 1973. Water repellency of soils under burned sagebrush. *Journal of Range Management*, V.26, No.5, pp. 300-331.
- Sauer, J.R., J.E. Hines, and J. Fallon. 2001. *The North American Breeding Bird Survey, Results, and Analysis 1966 – 2000, Version 2001.2*. USGS, Patuxent Wildlife Research Center, Laurel MD. <http://www.mbr-pwrc.usgs.gov/bbs/bbs2001.html>

- Schieck, J., K. Lertzman, B. Nyberg, and R. Page. 1995. Effects of patch size on birds in old-growth montane forests. *Conserv. Biol.* 9(5):1072-1084.
- Schnackenberg, Liz. 2002. Personal communication, Hydrologist, Medicine Bow-Routt NF, Hahns Peak-Bears Ears Ranger District, Steamboat Springs CO, Oct 30, 2002.
- Scholl, Summers and Rebekah Smith. 2000. Medicine Bow National Forest: known occurrences of animals and plants - threatened, endangered, forest sensitive, and otherwise of concern – and occurrences of communities. Report prepared by Wyoming Natural Diversity Database, The Nature Conservancy, Laramie WY.
- Scott, J.H. and E.D. Reinhardt. Linking models of surface and crown fire behavior: A method for assessing crown fire hazard.
- Scott, V.E., G.L. Crouch, and J.A. Whelan. 1982. Responses of birds and small mammals to clearcutting in a subalpine forest in central Colorado. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, Ft. Collins CO, Res. Note RN-422, 6pp.
- Shook, R.S. and P.H. Baldwin. 1970. Woodpecker predation on bark beetles in Engelmann spruce logs as related to stand density. *Canadian Entomo.*, Nov. Vol. 102, No. 11, pp. 1345-1354.
- Skorkowsky, Robert. 2002. Personal communication, Wildlife Biologist, Medicine Bow-Routt NF, Hahns Beak-Bears Ears Ranger District, Steamboat Springs CO, November 2002.
- Smith, F.W., and J.N. Long. 1987. Elk hiding and thermal cover guidelines in the context of lodgepole pine stand density. *Western Journal of Applied Forestry* 2(1):6-10.
- Snook, E. 1997. Field survey notes and channel stability field evaluation forms. On file: Water Resources, USDA, Forest Service, Brush Creek/Hayden Ranger District, Saratoga WY.
- Snook, E. 1999. Holroyd Analysis Area, Water Resources Existing Condition and Effects of Alternatives. Brush Creek Hayden District Files, 7-29-99.
- Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, and C. Spurrier. 1997. Colorado rare Plant Field Guide. Prepared for the Bureau of Land Management, the U.S. Forest Service and the U.S. Fish and Wildlife Service by the Colorado Natural Heritage Program.
- Spahr, R., L. Armstrong, D. Atwood, and M. Rath. 1991. Threatened, endangered, and sensitive species of the Intermountain Region. USDA, Forest Service, Intermountain Region, Ogden UT.
- Squires, J.R. 2000. Food Habits of Northern Goshawks Nesting in South Central Wyoming. *Wilson Bull.* 112(4), pp. 536-539.
- Squires, J.R. and L.F. Ruggiero. 1995. Winter movements of adult northern goshawks that nested in southcentral Wyoming. *J. Raptor Res.* 29(1):5-9.
- Squires, J.R., and L.F. Ruggiero. 1996. Nest site preference of northern goshawks in southcentral Wyoming. *Journal of Wildlife Management* 60(1):170-177.

- Stebbins, R.C. 1985. *Western Reptiles and Amphibians*. Petersen Field Guides. Published by Houghton Mifflin Company, 215 Park Avenue South, New York, NY, pp. 34, 70 and 83.
- Taylor, D.L., and W.J. Barmore, Jr. 1980. Post-fire succession of avifauna in coniferous forests of Yellowstone and Grand Teton National Parks, Wyoming. Pp. 130-145 In: R.M. DeGraff, tech. coord. *Management of western forests and grasslands for nongame birds: workshop proceedings*, Feb. 11-14, 1980, Salt Lake City, UT. USDA, Forest Service, Intermountain Forest and Range Experiment Station, Ogden UT, Gen. Tech. Rept. INT-86, 535 pp.
- Tinker, D.B., C.A. Resor, G.P. Beauvis, K.F. Kipfmueller, C.I. Fernandes, and W.L. Baker. 1998. Watershed analysis of forest fragmentation by clearcuts and roads in a Wyoming forest. *Land. Ecol.* (13) 149-165.
- Tinker, D.B. and D.H. Knight. 2001. Temporal and spatial dynamics of coarse woody debris in harvested and unharvested lodgepole pine forests. *Ecological Modeling* 141:1-3, 125-149.
- Troendle, C.A. and R.M. King. 1985. The Effects Of Timber Harvest On The Fool Creek Watershed, 30 Years Later. *Water Resources Research* 21(12):1915 - 1922.
- Troendle, C.A., M.S. Wilcox, G.S. Bevenger, and L.S. Porth. 1998. The Coon Creek Water Yield Augmentation Project: Implementation of Research Technology, Presented at The Science of Managing Forests to Sustain Water Resources, November 1998.
- U.S. Fish and Wildlife Service. 1996. Biological Opinion for Water Depletions in the Platte River (and amended on May 21, 1997). U.S. Fish and Wildlife Service.
- U.S. Fish and Wildlife Service. 1996. *Planthera praeclara* (western prairie fringed orchid) recovery plan. U.S. Fish and Wildlife Service, Ft. Snelling MN. VI + 100 pp. http://ecos.fws.gov/recovery_plan/pdf_files/1996/960930a.pdf
- U.S. Fish and Wildlife Service. 1998. Regional policy on the protection of fens. Unpublished memo from Gary Gessner, Region 6 Director, sent to project leaders for ecological services, refuges and wildlife, and fish and wild management assistance in Region 6.
- USDA Forest Service. 1979. Final Environmental Impact Statement, Roadless Area Review and Evaluation, RARE II. USDA, Forest Service, Washington DC, FS-325, pp. T3-T5, January.
- USDA Forest Service. 1985. Medicine Bow National Forest Land and Resource Management Plan. Laramie WY.
- USDA Forest Service. 1985a. Medicine Bow National Forest Land and Resource Management Plan-Final Environmental Impact Statement. Laramie WY.
- USDA Forest Service. 1986. 1986 ROS Book. US Government Printing Office, Washington DC, 1986-620-598:40706.
- USDA Forest Service. 1989. Soil Survey of the Medicine Bow National Forest, Wyoming (Draft). Medicine Bow Mountains and Sierra Madre Mountain Areas.

- USDA Forest Service. 1992. Soil Management Handbook, Chapter Two (FSH 2509.18, R-2 Suppl.).
- USDA Forest Service. 1994. Rocky Mountain Regional Endangered, Threatened, and Sensitive Species List. USDA Forest Service, Rocky Mountain Region 2, Lakewood CO, March 1994.
- USDA Forest Service. 1998. Recreation Visitor Map for the Medicine Bow National Forest. USDA, Forest Service, Medicine Bow National Forest, Laramie WY.
- USDA Forest Service. 1999. Forest Service Handbook 2509.25, Watershed Conservation Practices Handbook. Region 2 Amendment No. 2509.25-99-1, March 22, 1999.
- USDA Forest Service. 2000. Fire Family Plus User's Guide, Version 2.0. Rocky Mountain Research Station, Fire Sciences Lab, Systems for Environmental Management, Missoula, MT.
- USDA Forest Service. 2000. Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Volume 2. USDA, Forest Service, Washington DC.
- USDA Forest Service. 2001. Recreation Opportunity Spectrum Map for the Medicine Bow National Forest. USDA, Forest Service, Medicine Bow National Forest, Brush Creek/Hayden Ranger District, Saratoga WY.
- USDA Forest Service. 2002. Bear Mountain Burned Area Rehabilitation Report, 7/22/2002.
- USDA Forest Service. 2002. Draft Environmental Impact Statement for the Proposed Revised Medicine Bow National Forest Land and Resource Management Plan. Laramie WY.
- USDA Forest Service. 2002. Fire and Fuels Extension User's Guide.
- USDA Forest Service. 2002. Forest Vegetation Simulator. Essential FVS: A User's Guide to the Forest Vegetation Simulator. USDA, Forest Service, Forest Service Management Service Center, Fort Collins CO.
- USDA Forest Service. 2002. Holroyd Timber Sale and Prescribed Burning Final Environmental Assessment. Brush Creek/Hayden Ranger District.
- USDA Forest Service. 2003. ANRA Newsletter. Arapaho and Roosevelt National Forests and Pawnee National Grassland. Volume 3, Issue 1.
- USDA Forest Service. 2003. Fire Management Plan for the Medicine Bow National Forest. Document available from the Medicine Bow-Routt National Forests and Thunder Basin National Grassland Supervisors Office, Laramie WY.
- USDA Forest Service. 2003. Species Conservation Project Website. USDA, Forest Service, Region 2 - Rocky Mountain Region, Golden, CO.
[http://fsweb.r2.fs.fed.us/rr/scp/plants_html_files/Dicot/Rabbit%20Ears%20Gilia%20\(Weber%27s%20Scarlet-Gilia\).htm](http://fsweb.r2.fs.fed.us/rr/scp/plants_html_files/Dicot/Rabbit%20Ears%20Gilia%20(Weber%27s%20Scarlet-Gilia).htm)

- USDA Forest Service. 2003a. Index of Species Evaluated for Region 2 Sensitive Species List. Rocky Mountain Region.
http://fsweb.rs.fs.fed.us/tr/scp/spp_index.shtml.
- USDA Forest Service. Forest Service Manual 2670. Direction on federally listed Threatened and Endangered Species management. USDA Forest Service, Washington, DC. Also cited are Code of Federal Regulations 36, 40, 50.
- USDA FS 2001. Project Guidance for Management Indicator Species, Rocky Mountain Region (2). Directive letter, 2/2001, Region 2 Regional Office, Lakewood CO.
- USDI Fish and Wildlife Service and NMFS. 1998. Consultation Handbook, Procedures for Conducting Consultation and Conference Activities under Section 7 of the Endangered Species Act. USDI Fish and Wildlife Service, National Marine Fisheries Service, US Government Printing Office, Washington DC.
- USDI Fish and Wildlife Service. 2001. List of Threatened and Endangered Species for the Medicine Bow National Forest, Thunder Basin national Grassland. Developed by the Cheyenne Field Office, FWS, April 2001.
- Van Wagner, C.E. 1977. Conditions for the start and spread of crown fire. Canadian Journal of Forest Research 23.
- Villard, P. and C.W. Beninger. 1993. Foraging behavior of male black-backed and hairy woodpeckers in a forest burn. J. Field. Ornithol. 64(1):71-76.
- Ward, A.L. (undated). Multiple use of timbered areas: views of a wildlife manager specifically for elk and mule deer. USDA, Forest Service, Rocky Mountain Experiment Station, Laramie WY, 24 pp.
- Ward, A.L. 1984. The response of elk and mule deer to firewood gathering on the Medicine Bow Range. Pp. 28-40 In: Southcentral Wyoming in Proceedings of the 1984 Western states and Provinces elk workshop, Edmonton, Alberta.
- Ward, A.L. 1985. Little Snake River KRCRA elk study final report. USDA, Forest Service, Rocky Mountain Experiment Station, Laramie WY, 188 pp.
- Ward, A.L. 1985a. Elk movements on the north end of the Sierra Madre Mountains. Unpublished report, USDA, Forest Service, Rocky Mountain Experiment Station, Laramie, WY, 188 pp.
- Wemple, B.C., J.A. Jones, and G.E. Grant. 1996. Channel Network Extension by Logging Roads in Two Basins, Western Cascades, OR. Water Resources Bulletin, Vol. 32, No. 6.
- Wiedenmann, R.T. 1991. Effects of repeated human intrusion on singing behavior in subalpine breeding birds. M.S. Thesis, Baylor University, Waco TX, 59 pp.
- WNDD. 1999/2000. Wyoming Natural Heritage Program Database. Database query for species information in and surrounding the Project Area by David Austin and Steve Mottus (GIS) on 5/4/2001.
- WWA 1984. *Wyoming Wilderness Act of 1984*. USDA Forest Service, Medicine Bow National Forest, Wyoming, Rocky Mountain Region (R-2). Wyoming Wilderness Act of 1984, Public Law 98-550.

-
- Wyoming Department of Environmental Quality (WYDEQ). 1997. *Silviculture: Best Management Practices*. Nonpoint Source Management Plan, March 1997.
- Wyoming Department of Environmental Quality (WYDEQ). 2001. *Water Quality Rules and Regulations, Chapter 1. Wyoming Surface Water Standards*. Cheyenne WY.
- Wyoming Department of Environmental Quality (WYDEQ). 2002. *Wyoming's Draft 2002 305(b) State Water Quality Assessment Report and Draft 2002 303(d) List of Waters Requiring TMDLs*. Cheyenne WY.
- Wyoming Department of Environmental Quality (WYDEQ). 2003. *Wyoming Nonpoint Source Pollution Management Plan, Silviculture Best Management Practices*. Draft April 2003, Cheyenne WY.
- Wyoming Department of State Parks& Cultural Resources. 2002-2003. *Southeast Wyoming Snowmobile Trails Map*. State of Wyoming, Wyoming Department of State Parks& Cultural Resources-Division of State Parks & Historic Sites, Cheyenne WY.
- Wyoming Game and Fish Department. 1987. *A fisheries survey of the Little Snake River drainage, Carbon County, Wyoming*. WGFD Project Number 5086-01-8505. Written by Melvin Oberholtzer, Wyoming Game and Fish Department, 110 pp.
- Wyoming Game and Fish Department. 1990. *Current status of Colorado River cutthroat trout in the Little Snake River enclave*. WGFD Project Number 5090-28-8501. Written by Melvin Oberholtzer, Wyoming Game and Fish Department, 50 pp.
- Wyoming Game and Fish Department. 2000. *Annual Report of Upland Game and Furbearer Harvest*. 100 pp.
- Wyoming Game and Fish Department. 2002. *Annual Big Game Herd Unit Reports-Green River Region*. Cheyenne, WY, 479 pp.
- Wyoming Natural Diversity Database (WYNDD) Website 2003:
http://uwadmnweb.uwyo.edu/WYNDD/PDF_files/Plant_Summaries/C/Cypripedium%20fasciculatum.pdf
- Young, Michael K., tech. ed. 1995. *Conservation assessment for inland cutthroat trout*. General Technical Report RM-256. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. Pg: 61.