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Owl Mountain North Analysis Environmental Assessment

Parks Ranger District

MEDICINE BOW-ROUTT NATIONAL FORESTS &
THUNDER BASIN NATIONAL GRASSLAND

Jackson County, Colorado

Township 5 North, Range 76 West
Township 6 North, Ranges 76, 77, & 78 West

Responsible Official: **Michael A. Wright**
District Ranger

For Further Information: **Joanne M. Sanfilippo**
Interdisciplinary Team Leader
PO Box 249, Saratoga WY 82331
(307) 326-2518
email: jmsanfilippo@fs.fed.us

Cover Photo: Owl Mountain North Analysis Area, August 2007

INTRODUCTION AND BACKGROUND

The Owl Mountain North Analysis Area is located in the southeast part of Jackson County, approximately 22 miles southeast of Walden, Colorado, on the Parks Ranger District. The legal description is T.5 N., R.76W & T.6 N., R.76, 77, and 78W (see Figure 1). The analysis area contains approximately 27,779 acres, including about 150 acres of private land.

Recent years have seen a dramatic increase in bark beetle activity and conifer tree mortality on the Medicine Bow-Routt National Forests. Ground reconnaissance in 2006-2007 determined that the higher elevation spruce-fir stands on Owl Mountain were heavily infested with spruce beetles, along with the spruce located in the lower elevation drainages and north slopes. The lodgepole pine stands at both low and high elevations were also heavily infested with mountain pine beetle. The Parks Ranger District proposes to treat approximately 2,577 acres of mature and overmature forested stands in the analysis area where the emphasis is to reduce hazardous fuels, improve forest health conditions, regenerate dead and dying stands, and provide forest products.

The Forest Service has prepared this Environmental Assessment (EA) to disclose the environmental effects of implementing the proposed silvicultural treatments on National Forest System lands within the Owl Mountain North Analysis Area. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. Guidance for Environmental Assessments of Forest Health Projects (Council on Environmental Quality 2002) has been followed in preparing the EA. The proposed action is consistent with the management direction provided within the Routt National Forest Land and Resource Management Plan 1997 Revision.

NEED FOR THE PROPOSAL

Existing Condition

Bark beetles are always present in the forest in low endemic numbers. The mountain pine beetle is specific to the pine species such as lodgepole, ponderosa, and limber, while the spruce beetle is specific to the spruce species such as Engelmann and blue. 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. Endemic beetle populations are naturally regulated through cold winter temperatures and through predation by birds--such as woodpeckers, small mammals, and other insects.

When conditions are favorable, the beetle population increases to epidemic levels. 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 mature stands have little or no defense against these 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. Disturbances become problematic when they threaten the uses we manage the forest for.

Based on the Forest R2Veg Database information, approximately 74% of the analysis area (AA) is forested. Due to elevation and northerly aspects, 22% of the area is dominated by stands of Engelmann spruce and subalpine fir (spruce-fir). The lower elevations and southerly aspects are dominated by lodgepole pine (48%). Mixed in with the lodgepole are scattered pockets of aspen.

Recent years have seen a dramatic increase in bark beetle activity and conifer tree mortality across the Forest. The current beetle infestations and their impact on lodgepole pine and spruce forests have likely been influenced by a number of factors, including: 1) an abundance of older, dense, larger diameter stands; 2) prolonged drought; 3) earlier melting of the smaller, drought-influenced snowpacks, resulting in extended and more severe drought conditions; 4) higher temperatures, allowing for an expansion of the mountain pine beetle into areas of lodgepole pine at higher elevations (>9,500 feet elevation); and 5) greater survival of mountain pine beetle broods in the higher elevations.

Aerial surveys conducted annually for the Medicine Bow-Routt National Forests show that losses of lodgepole pine to mountain pine beetles have increased significantly in the extent and number over the past 11 years. For example, on the Routt National Forest, roughly 230 acres of lodgepole pine trees showed evidence of beetle-caused mortality in 1996. By 2006, that number has increased to 223,000 acres. On the Medicine Bow National Forest, aerial survey data from 1996 showed only 10 acres impacted by mountain pine beetles. By 2006, that number had increased to 75,000.

Data from ground surveys conducted between 2002 and 2006 also confirmed that mountain pine beetle populations exceeded endemic levels (<0.5 infested trees per acre), and ranged from 2.8 to 89.4 newly infested trees per acre, with an average of 24.5 newly infested trees per acre (Lakewood Service Center report, LSC-07-06). Data from both surveys clearly indicates that a mountain pine beetle epidemic is underway on the Medicine Bow-Routt National Forests.

Ground reconnaissance in 2006–2007 determined that the higher elevation spruce-fir stands on Owl Mountain were heavily infested with spruce beetles along with the spruce located in the lower elevation drainages and north slopes. The lodgepole pine stands at both low and high elevations were also heavily infested with mountain pine beetle. A tree count survey of two units in the Gould Stewardship Fuels Reduction project (immediately north of the AA) in February 2008 showed the units have gone from 0% infested to 89% and 87% infestation in the past two years. A change of this size clearly indicates that mountain pine beetle populations are rapidly increasing, indicating that the epidemic has moved into the area.

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. Hazard rating is done using specific plot data, which collects information on species composition, age, diameter, basal area, and other factors.

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. Phloem thickness is of primary importance, but it is generally related to diameter, which is a readily available attribute, whereas phloem thickness is normally not collected. Stand hazard rating for Engelmann spruce cover types incorporates information on site index, basal area, average diameter of live spruce above 10" DBH, and percent of spruce in canopy.

Based on inventory data for the area, the lodgepole pine stands are evenly rated between moderate and high risk for mountain pine beetle, while most of the spruce stands are in the moderate risk category for spruce beetle (Tables 1 & 2). Lodgepole pine stands that have a moderate risk are typically greater than 60 years old, contain trees with diameters that average 7" or greater, and are located below 9,800' in elevation. Lodgepole pine stands that have a high risk are typically greater than 80 years old, contain trees with diameters that average 8" or greater, and are located below 8,800' in elevation (Amman et al. 1977). Spruce-fir stands that have a moderate risk typically contain trees with average diameter of 12"-16", 100-150 square feet of basal area per acre, 50–65% spruce in the canopy, and site indexes of 80–120 (Schmid and Frye 1976).

Table 1. Existing Beetle Hazard Rating: Lodgepole Pine Type

Beetle Hazard Rating*	**Acres**
Low	513
Moderate	8,514
High	4,566

** Based on inventory data*

Based on assumptions used in the Routt Bark Beetle Analysis EIS, where mountain pine beetle outbreaks occur, mortality of pines greater than 6 inches in diameter will be as follows:

- High hazard stands will experience 90% mortality.
- Moderate hazard stands will experience 50% mortality.
- Low hazard stands will experience 25% mortality.

Table 2. Existing Beetle Hazard Rating: Spruce-fir Type

Beetle Hazard Rating*	Acres
Low	18
Moderate	1,354
High	4,828

** Based on inventory data*

Based on assumptions used in the Routt Bark Beetle Analysis EIS, where spruce beetle outbreaks occur, mortality in the spruce-fir type will be as follows:

- All of the spruce over nine inches DBH will be killed.
- Half of the trees 5" to 8.9" DBH will be killed.
- High hazard stands will lose 70% of their basal area.
- Moderate hazard stands will lose 25% of the stand basal area on average. Stand composition, or the kinds of trees present in a stand, varies widely in the moderate hazard class.
- Low hazard stands will lose 10% of the stand basal area on average. Low hazard stands will still lose most of their mature spruce basal area, but other factors such as non-host trees and smaller diameter spruce generally associated with these stands will lessen effects associated with the loss of the mature spruce component.

The situation now in the analysis area is such that conditions are right for both spruce beetle and mountain pine beetle to attack and kill standing trees. The dramatic increase in beetle populations and subsequent tree mortality, along with the current weather conditions and abundant lodgepole pine and spruce food source, indicate that epidemic levels will continue to spread in the Owl Mountain area.

On June 25, 2007, a Mountain Pine Beetle Epidemic Declaration for Northern Colorado and Southern Wyoming was signed by the Deputy Regional Forester. On November 9, 2007, the Forest Supervisor of the Medicine Bow-Routt National Forests (MBR) issued a determination that the Owl Mountain North project is an "authorized project" under the Healthy Forests Restoration Act (HFRA), Title I, Section 102(a)(4).

Title I provides authorities for expedited vegetation treatments on certain types of National Forest System (NFS) lands that are at risk of wildland fire; have experienced wind throw, blowdown, or ice-storm damage; are currently experiencing disease or insect epidemics; or are at imminent risk of such epidemics because of conditions on adjacent land (USDA Forest Service and DOI Bureau of Land Management 2004). Expedited procedures will be used to complete project planning and decision-making.

Desired Future Condition

The following objectives were described for this project and outline how the desired future conditions resulting from this action would be met:

- Reduce threats to public safety, infrastructure, and resources, by reducing fuel hazards associated with large-scale, beetle-caused tree mortality.
- Work with state and private partners that have developed Community Wildfire Protection Plans (CWPP) to reduce current and future fuel hazards in the general area.
- Provide merchantable timber products for sale, and salvage and remove dead trees, from forested lands classified as being suitable, to keep them in production and positively contributing to the Forest's future Allowable Sale Quantity (ASQ).
- Promote natural reforestation, and artificial reforestation when necessary, to regenerate dead and dying stands.

The Routt National Forest Revised Land and Resource Management Plan (Forest Plan) guides natural resource management activities and provides an overall strategy for managing the Routt National Forest. Management emphasis within the analysis area and larger geographic areas is distributed among several Forest Plan management area (MA) prescriptions. The proposed actions are located within **MA 5.11 General Forest and Rangelands - Forest Vegetation Emphasis, MA 5.13 Forest Products, and MA 7.1 Residential/Forest Interface.**

The current spruce and pine beetle infestations are negatively impacting suitable timber stands in the 5.11 and 5.13 MAs. *Suitable* is defined as areas where the land has been deemed capable and suitable for timber management and production. These are the only MAs under the Revised Forest Plan that contain suitable timberlands that contribute towards the Forest's Allowable Sale Quantity (ASQ).

Approximately 776 acres of National Forest System (NFS) lands southwest of the Town of Gould and surrounding about 150 acres of contiguous private land are designated as MA 7.1. This is an area where developed residential use blends into relatively undeveloped natural environments. Management actions are to influence the vegetation composition and structure to minimize risks of catastrophic fires and insect epidemics. Cooperative relationships with other agencies and adjacent private landowners are emphasized. Unlike the 5.11 and 5.13 MAs, vegetation management practices are done to protect the values of the management area and do not contribute to ASQ.

Though part of the greater analysis area, there are no beetle treatments proposed for 1.11, 1.12, 1.32, 3.31, 4.3, and 5.41 management areas, where ecological processes such as beetles are allowed to operate relatively free from the influence of humans.

This project is not designed to stop or control the current bark beetle epidemic. History has shown that this is not possible once an epidemic has started. The purpose of the proposal is to manage the forest vegetation affected by the mountain pine beetle and spruce beetle epidemics.

An analysis of the existing condition has determined the following:

- Aerial and ground surveys show significant increase in beetle infestations. Indications are that epidemic levels will continue to spread in the Owl Mountain area. Conditions are right for both spruce beetle and mountain pine beetle to attack and kill standing trees.
- The current spruce and pine beetle infestations are negatively impacting suitable timber stands in the 5.11 and 5.13 MAs.
- Lodgepole pine stands in the area have serotinous cones. The relatively pure stands with large size trees will probably experience high mortality and lose most of their seed source in the next few years. If natural processes are allowed to proceed in these stands, regeneration of the stands could take many years, delaying the production of wood products for the future. The same can be said for spruce.
- Management actions in the Residential/Forest Interface 7.1 Management Area are to influence the vegetation composition and structure to minimize risks of catastrophic fires and insect epidemics.

There is a need for silvicultural treatments to reduce fuel hazards, salvage and remove dead trees, reduce threats to public safety, and regenerate dead and dying stands.

PROPOSED ACTION AND ALTERNATIVES

No Action

The dramatic increase in beetle populations and subsequent tree mortality, along with the current weather conditions and abundant lodgepole pine and spruce food source, indicate that epidemic levels will continue to spread in the Owl Mountain area. In severe outbreaks, over 90% of the lodgepole pine or spruce in a stand can be killed.

Under the No Action Alternative, no silvicultural treatments would take place. Without treatment, the large amounts of hazardous fuels, along with fuel continuity, would continue to increase. Threats to public safety would continue or increase. In addition, existing timber products would not be salvaged and the regeneration of a future healthy forest would be hampered by the amount of dead trees and loss of a natural seed source.

Proposed Action

Under the proposed action, approximately 2,577 acres of mature and overmature forested stands in the analysis area would be treated, where the emphasis is to reduce hazardous fuels, improve forest health conditions, regenerate dead and dying stands, and provide forest products (See Figure 3). This would include numerous silvicultural treatments specifically designed to address fuel hazards adjacent to or near private and federal infrastructure, including the community of Gould, the municipal watershed of Walden, and developed recreational sites. Additionally all treatments, whether near infrastructure or in the greater analysis area, contribute towards the salvage and regeneration of dead and dying stands.

Silvicultural treatments of clearcut, overstory removal, and a combination of salvage/clearcut would be used for the Owl Mountain North project (See Table 3).

General Description of Proposed Silvicultural Prescriptions

CLEARCUT - Clearcutting would be applied to stands having a large number of dead and dying trees due to mountain pine beetle. The objective is to salvage the trees and regenerate the stand. Slash treatments to reduce the fuel loadings would be necessary in units 22, 24, 30, 32, and 40. Slash would initially be lopped and scattered and left on site for a minimum summer time period of 90 days to allow the slash to dry and the cones to open. Once this period is over the slash would be disposed of by machine piling and burning. Units which do not need slash treatment for fuels reduction would have the slash lopped and scattered. These units would be evaluated to determine if adequate scarification was received during logging. If so, then no treatment would be needed. If not, then scarification needs would be met by either machine trampling or roller chopping. Should natural seeding result in inadequate stocking, artificial regeneration would be done to bring the sites to minimum stocking standards.

OVERSTORY REMOVAL CUT – The final step of what is typically a two or three-step shelterwood. A removal step would be applied to stands having a uniformly established understory of conifer. The understory averages 200 to 1,000 stems per acre and 2' to 30' in height. Removing the overstory has the advantages of improving the growth of the residual stand, removing dead, dying or susceptible trees to mountain pine beetle or spruce beetle, and reducing the spread of dwarf mistletoe. The residual stand would be protected to the best extent possible. Some damage would occur as a result of the logging operations. Slash is typically lopped and scattered although whole tree skidding with piling of un-merchantable material at the landing would be necessary for fuels reduction in units 29, 33, and 37.

SALVAGE/CLEARCUT – This treatment would be applied to stands with a variable composition of species and size classes. Portions of these stands are mixed species, mixed sizes classes, or both, and would be best treated by a salvage removing the dead and dying trees. The residual stand would be protected to the best extent possible. Some damage would occur as a result of the logging operations. Slash is typically lopped and scattered although whole tree skidding with piling of un-merchantable material at the landing would be necessary for fuels reduction in units 23, 34, 35, 36, and 38.

Other portions of these stands are more uniform in species and size class and are experiencing heavy mortality due to beetles. These areas would be best treated with a clearcut. Slash treatments to reduce the fuel loadings would be necessary in units 23, 34, 35, 36, and 38. Slash would initially be lopped and scattered and left on site for a minimum summer time period of 90 days to allow the slash to dry and the cones to open. Once this period is over the slash would be disposed of by machine piling and burning. Units which do not need slash treatment for fuels reduction would have the slash lopped and scattered. These units would be evaluated to determine if adequate scarification was received during logging. If so, then no treatment would be needed. If not, then scarification needs would be met by either machine trampling or roller chopping. Should natural seeding result in inadequate stocking, artificial regeneration would be done to bring the sites to minimum stocking standards.

Table 3. Proposed Action: Silvicultural Treatments

Treatment	Estimated Acres
Clearcut	842
Overstory Removal	575
Salvage/Clearcut	1,160
TOTAL	**2,577**

Site preparation or slash treatments may be necessary to prepare the seedbed for natural regeneration, reduce fuel loading, or both. Slash treatments may include machine pile and burn, machine trampling, lop and scatter, or whole tree skidding. Treatment is dependent on the amount of slash on site, or location of the site to infrastructure or Forest Service boundary. Areas near infrastructure or Forest Service boundary usually dictates a higher degree of slash removal. Whole tree skidding may work for entire units, because when the dead trees hit the ground the limbs and cones break off. Should natural seeding result in inadequate stocking, artificial regeneration would be done to bring the sites to minimum stocking standards.

Site preparation and planting, native grass seeding, regeneration surveys, and release and weed thinning (removing small trees and weed trees to allow healthy trees to grow) would occur in harvest units after harvest. Noxious weed control is among the ongoing activities in the project areas. It is anticipated that a combination of commercial timber sale(s), service contracts, and Forest Service crews would be used to implement the project. The proposal could be implemented as early as the fall of 2008.

Roads Management

The proposed action would construct 9.3 miles of new road, including 1.0 mile of the new construction which would replace access currently provided by 0.7 miles of existing road that would be decommissioned (Table 4). The remainder of the new construction is required to access units without previous road access. Newly constructed permanent roads would be closed to vehicle travel and put in storage status (maintenance level 1) until the next entry. Only one new road (C24) is proposed to remain open as a maintenance level 2 road (for high clearance vehicles) after the project (1.1 miles). All roads that are currently closed to motorized travel will be closed again after the project (maintenance level 1).

Table 4. Proposed Action: Roads Management

Action	Estimated Miles
Reconstruction	14.9
New Construction	9.3
New Temporary Road Construction	0.7*
TOTAL	**24.9**
Decommission	0.7
TOTAL	**0.7**

*An additional one mile of new temporary road construction is anticipated, but cannot yet be identified on a map because the temporary road locations depend on the type of logging used by the purchaser. Existing temporary roads would also be used.

Note: The amounts (acres, miles, etc.) described in the previous tables and elsewhere in this document are based on the best information currently available. It is likely some of these described amounts will change slightly during implementation, due to adjustments made necessary as a result of field conditions not identified during reconnaissance and/or the implementation of mitigation measures.

Closed roads (Forest System maintenance level 1 roads) are classified as intermittent service roads that receive basic maintenance to perpetuate the road to facilitate future management activities. 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.

Temporary roads would need to be constructed in coordination with the timber purchaser during the sale. The exact location of these roads is not known at this time, but estimates made during the planning process identified approximately 0.7 miles of temporary roads may need to be constructed for timber access, depending somewhat on the logging system and equipment available. An additional 1-2 miles of temporary roads will utilize existing user-created routes, including old temporary roads. All temporary roads will be decommissioned after sale activities and motorized use prohibited. Closure methods are similar to level 1 roads.

The ground-based logging system would also use skid trails (temporary pathways used to shuttle logs and trees to a landing for loading onto trucks) to move timber to the roads within treatment units.

Reconstruction of 14.9 miles existing roads is needed to accommodate truck haul and provide for resource protection. Some of these roads have not been used in more than 30 years and need design improvements in order to meet current standards. Road widening and adding new drainage structures including rolling dips and culverts are the primary road reconstruction needs on the existing roads.

Road maintenance would need to be accomplished on many of the existing roads that will be used for timber access this entry. Pre-use maintenance is needed on 35 miles of existing road, some of which is located outside the planning area. Maintenance can include reshaping the roadway, reshaping and cleaning of drainage structures, roadside brushing, minor slump and slide cleanup, and maintenance of structures such as cattleguards and gates.

Reconstruction and maintenance of the system roads through sale activities helps address deferred maintenance needs and reduce required annual maintenance.

Alternative 2

Alternative 2 was designed to address wildlife habitat concerns identified by the wildlife biologist, additional wet areas identified by the botanist, and roads affecting hydrology identified by the hydrologist. This alternative also directly addresses some of the concerns identified during scoping, including: close new road construction C24; reduce road mileage; obliterate, reseed, or decommission more roads; reduce the size of the project; maintain diversity of forest species and age class; provide shade for spruce regeneration; reduce harvesting of dead spruce; and reduce impacts to wildlife species.

Alternative 2 would reduce harvesting in the spruce-fir type by 213 acres; leave 40% of the overstory in the spruce-fir overstory removal and salvage units; reduce new road construction by 6.8 miles; increase temporary road construction by 4.5 miles (3.5 miles would be designed); reduce road reconstruction by 0.8 miles; increase road decommissioning by 4.5 miles; increase hydrological self-maintenance on closed roads by 13.4 miles; realign four roads out of existing sapling stands; and close new road C24 to public use.

Alternative 2 proposes to treat approximately 2,364 acres of mature and overmature forested stands in the analysis area. Silvicultural treatments of clearcut, overstory removal, and a combination of salvage/clearcut would be used (See Table 5 & Figure 4). (See the *Proposed Action* for a discussion of silvicultural treatments and post treatment reforestation.)

Table 5. Alternative 2: Silvicultural Treatments

Treatment	Estimated Acres
Clearcut	842
Overstory Removal	454
Salvage/Clearcut	1,068
TOTAL	**2,364**

Roads Management

The primary access to treatment units would be the existing transportation system. Some new permanent and temporary road construction would be needed to access units without previous road access, and one mile of new permanent construction would replace access currently provided by 0.7 miles of existing road now proposed for decommissioning (Table 6).

Table 6. Alternative 2: Roads Management

Action	Estimated Miles
Reconstruction	14.1
New Permanent Construction	2.5
New Designed Temporary Construction	3.5**
New Temporary Construction	1.7*
TOTAL	**21.8**
Close	2.5
Decommission	5.2
Remove Culverts/Reestablish Drainage	13.4

* An additional one mile of new temporary road construction is anticipated, but cannot yet be identified on a map because the temporary road locations depend on the type of logging used by the purchaser. Existing temporary roads would also be used.

**Built sufficient to protect environmental resources.

All newly constructed permanent roads would be closed to vehicle travel and put in storage status (maintenance level 1) after the project is complete. All existing closed roads reopened for this project would remain closed after the project is complete, and some will be decommissioned.

Temporary roads are not added to the National Forest System Roads (36 CFR 212.1) and are decommissioned after the project is complete. Temporary roads are usually built to the minimum standard needed for the planned use. Designed temporary roads are built to a higher standard to reduce impacts to resources during use.

Extensive tree mortality from the bark beetle epidemic has reduced the need for future entry into the area for timber management. Roads in the area may not be needed for, perhaps, 80 years or more.

When roads are not planned for use over decades, decommissioning removes a road from the National Forest System of roads and helps reduce road maintenance costs, restore the natural drainage patterns, and reduce the risk of road failures that can damage a variety of resources. Methods used to decommission roads consist of blocking or signing the entrance, building earth berms, and scattering limbs and boulders on the roadbed to discourage unauthorized motorized vehicle use; removing culverts, reestablishing drainage ways, and installing waterbars to ensure proper drainage over time; removing road fills, pulling back unstable shoulders, ripping and seeding, and revegetation to stabilize soils; and/or full obliteration by recontouring slopes.

Closed roads that also serve other access needs on an intermittent basis such as fire suppression, fuels treatment, or range permittee access, would remain part of the road system. However, these roads could still have drainage structures removed to reduce the risk of failure as well as reducing road maintenance needs. Restoring vegetation is also a high priority for all closed roads. Specific closure techniques would be identified on the ground for each road.

Design Features

In addition to Forest Plan standards designed to mitigate adverse impacts, the Interdisciplinary Team identified design features that would be applied to reduce or prevent undesirable effects resulting from management activities. These design features would be incorporated into the implementation plan and timber contract.

Design features are located at the end of the document, in Appendix A.

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

This section provides a summary of the environmental impacts of the Proposed Action. This assessment is consistent with the National Forest Management Act, 16 U.S.C. 1604(g)(1) and with the management direction described in the Routt National Forest Land and Resource Management Plan 1997 Revision. The following analysis was compared against this management direction for consistency purposes.

Effects Summary

This section describes the environmental impacts of the proposal. It provides the necessary information to determine whether or not to prepare an Environmental Impact Statement. The associated Finding of No Significant Impact discusses whether this project has significant effects. Additional documentation, including more detailed analyses of project-area resources, may be found in the project administrative record located at the Brush Creek/Hayden Ranger District Office in Saratoga, Wyoming.

Social and Economic

The cost/benefit ratio for the Forest Service is not a realistic measure of the success of this project. Forest fuel reduction treatments are needed to protect the community of Gould, the municipal watershed for Walden, and the forest resources and ecosystem from large, high intensity fires fueled by the dead trees of the beetle epidemic. In addition, the proposal includes closing and decommissioning roads which reduces long-term maintenance costs.

This project would salvage some valuable trees in commercial timber sales to help offset the cost of removing dead and dying small diameter trees and other fuels from the forest. The market value for the smaller logs may be less than the harvest and hauling charges, resulting in a net cost for operations. However, failure to remove these small logs results in the retention of ladder fuels that support crown fires with destructive impacts to the forest landscape (Mason et al. 2006). The extensive beetle epidemic has dramatically increased the supply of trees on the market in Colorado and Wyoming. In addition, beetle hit trees may have blue staining or other characteristics that reduce their value. If the timber is purchased the receipts may be well below the cost of preparing the sale, and there is no guarantee the commercial timber sales would even sell.

Ordinarily an economic efficiency analysis shows the difference in cost between alternatives and is used in the decision making process to gain full information about a project. When evaluating trade-offs, the use of economic efficiency measures is one tool used by the decision maker. Many things cannot be quantified, such as effects to wildlife and forest health, and private citizens and firefighter safety. The decision maker takes many factors into account in making the decision.

National Forest System (NFS) lands immediately adjacent to private lands are managed to build and maintain cooperative relationships between the landowners and other governments with jurisdiction. NFS lands adjacent to these residential interfaces will be managed to minimize risks of catastrophic fires and insect and disease epidemics (Forest Plan, pp. 2-50 through 2-52).

The community of Gould, Colorado, listed in the *Federal Register* in 2001 as a wildland-urban interface area, developed a Community Wildfire Protection Plan (CWPP) in October 2006. In that plan, fuel treatment projects identified as high priority included planning and implementation of Owl Mountain projects to reduce fuel hazards. This project would compliment the efforts being made by the ongoing Gould Stewardship Fuels Reduction Project located immediately north of the analysis area. It is the objective of the Medicine Bow-Routt National Forests to carry out the National Fire Plan goals to complete fuels reduction treatments in interface areas (USDA 2003).

Forested Vegetation

Under the proposed action forest products would be made available for public consumption. The chances for natural regeneration in the proposed clearcut stands would be increased and regeneration would be assured if necessary through reforestation treatments, thus decreasing the time it takes to move these stands back into timber production. Stand stocking would be reduced in the salvage and overstory removal units, potentially increasing the growth of the residual stand. Damage to advanced regeneration and residual trees may occur during logging. The risk of wind throw may increase. These areas are not particularly hazardous for wind throw, but a small amount of blowdown should be expected. Current and future fuel accumulations would be reduced, lessening the chances of a fire having detrimental impacts to the sites, destroying existing regeneration and reducing the chances for future regeneration and timber production. The spread of dwarf mistletoe would be reduced particularly when infested trees are removed from advanced lodgepole pine regeneration. Mistletoe spread may also be increased in the lodgepole pine salvage units due to opening the stands up and possibly leaving infected trees.

Past timber management practices on the Forest and surrounding lands has 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 1940 in the form of clearcutting, shelterwood removal or overstory removal has effectively reduced stand beetle susceptibility on National Forest System lands in the Owl Mountain North area by roughly 6,922 acres. These stands are now characterized as early to mid seral young forests between 12 and 66 years old. The estimated 734 acres of clearcut treatments on adjacent lands since 1984 have further reduced stand beetle susceptibility.

Given the worst-case scenario, 2,577 acres would move into an early seral stage three to four years sooner than through natural processes. These acres would be assured to regenerate in five years, either through natural regeneration or reforestation treatments. If left to natural processes, some of these stands may not regenerate to full stocking for many years, or may not fully restock at all.

Approximately 15% of what is classified as suitable for timber production in the area would be treated under this proposal. Past timber harvest since 1940 in combination with the proposed action treatments would cumulatively create early to mid seral timber stands on 63% of the total forested area in the analysis area, leaving 37% to change to an early seral stage through natural process.

No action would have major implications to the timber resource in the area. In all management areas, the bark beetle epidemic would create considerably different stand conditions from what exists today. In spruce-fir cover types, stands would be dominated by younger age-classes. These stands would be dominated by subalpine fir of all ages and to a lesser extent by medium to small spruce trees. All spruce trees over nine inches DBH would be dead and half of the spruce trees between five and nine inches would be dead. Seed sources for establishment of new spruce seedlings would be seriously reduced until the remaining spruce trees in the understory advance through the subalpine fir canopy and become mature co-dominant trees.

In lodgepole pine cover types, the stands would be even more dramatically changed. Since moderate and higher hazard lodgepole pine stands are relatively pure and even-aged, when mountain pine beetle outbreaks occur, the entire stand is affected. All but the smaller individuals within a stand are killed, leaving no dominant and co-dominant trees in the overstory. A few intermediate and suppressed trees may also survive. During this time, should a fire occur it would probably move through the crowns releasing the stored seed from serotinous cones to regenerate the stand with a new even-age stand of lodgepole pine seedlings. Should a fire not occur, mortality would continue, needles would fall, and the canopy would open up, allowing more sunlight to the ground. Existing small understory trees increase in growth along with the ground vegetation. Limbs and cones would begin to fall off and should the cones fall on a favorable site and release seed, regeneration of the stand may occur. In some stands the increased ground vegetation may inhabit regeneration, changing the site to more of a grass/forb type. As the time after stand mortality increases the seed source is lost and trees begin to fall increasing the fuel loading. Fires in these stands may kill any remaining seed source trees and established regeneration, thus changing the site to more of a grass/forb type. In some cases, a lack of fire and subsequent deadfall would impede new tree regeneration and result in a slow re-establishment of a mix of subalpine fir and lodgepole pine. A small component of spruce may be established over time. In still other cases, aspen may recapture the sites.

Cumulative Effects

In the spruce-fir type, future management practices will be greatly affected by bark beetle mortality. Loss of spruce reduces options for how a stand may be managed in the future. These stands will probably become dominated by subalpine fir, which persist for long periods and is a less desirable timber species. Rotation ages may need to be lengthened because of the relatively slow growth of fir, compared to spruce. Increased dead fuel loads increase the fire hazard in these stands. If these stands were to burn, recovery after fire would be slow.

In the lodgepole pine type, mountain pine beetle caused mortality could result in an almost complete loss of growing stock of timber. This loss could set the stands back to a very early successional status. Increased dead fuel loads increase the fire hazard in these stands. If these stands were to burn, recovery after fire would be slow.

Healthy stands provide several management options into the future, but dead stands offer fewer options. Virtually all of the suitable timber sites in 5.11 and 5.13 timber 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 of the suitable moderate and high hazard stands in the Owl Mountain North Analysis Area are attacked as assumed, then those acres would no longer meet quality and quantity objectives set out in the Forest Plan.

The No Action alternative is not consistent with standards and guidelines for the timber resource under the Routt Forest Plan (1997). This alternative may result in deviation from these important guidelines from the Forest Plan 5.11 and 5.13 areas:

- 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.
- The forest is not managed using treatments that maintain acceptable growth rates, nor do they favor commercially valuable tree species. Area spruce-fir and lodgepole pine stands will show a rapid deceleration in the rate of volume accumulation post-epidemic. Dead lodgepole pine and spruce are less valuable than green timber. The merchantable sized live trees in the affected stands and in the analysis area will be subalpine fir and aspen. These two species are the least valuable of commercial species in the area.

Alternative 2

The reduction in harvest acreage, along with leaving 40% of the overstory in the spruce-fir stands, still makes this an effective alternative to address the current bark beetle epidemic. Effects would be very similar to those disclosed under the Proposed Action. Under this alternative there would be 122 less acres of overstory removal and 91 less acres of salvage/clearcut in the spruce-fir type. In the spruce fir stands 40% of the overstory would be left to meet lynx habitat needs and maintain some diversity within the stands. This diversity may be in age class, size class, live and dead species, and would depend on stand conditions. This would also provide some shade for spruce seedling establishment.

The cumulative effect of this alternative is that given the worst-case scenario 2,364 acres would move into an early seral stage three to four years sooner than through natural processes. These acres would be assured to regenerate in five years either through natural regeneration or reforestation treatments. If left to natural processes, some of these stands may not regenerate to full stocking for many years or may not fully restock at all.

Approximately 13% of what is classified as suitable for timber production in the area would be treated under this proposal. Past timber harvest since 1940 in combination with the proposed action treatments would cumulatively create early to mid seral timber stands on 62% of the total suitable timber base in the analysis area leaving 38% to change to an early seral stage through natural process.

Heritage

No cultural resources within the proposed project areas are eligible for the National Register of Historic Places. The determination for the project is "no historic properties affected." A report documenting the determination has been forwarded to the State Historic Preservation Office for review.

Fire & Fuels

The proposed action and Alternative 2 would both provide benefits to the fuel profile, subsequent fire behavior, and firefighter capabilities. The difference between the two alternatives is negligible for the fire and fuels environment. Both are positive and would meet the purpose and need of the project as it relates to the fire and fuels resource. Removal in all cases would reduce the fuel accumulation that would occur through natural deterioration of the standing timber component, and especially as ongoing beetle infestations take hold of the mature stands. This project would directly affect 447 acres of treatment within one mile of the Community of Gould, Colorado, the Michigan River Guard Station, and the Aspen Campground.

The proposed action and Alternative 2 would help to maintain the treated stands in fuel models similar to Fire Behavior Prediction Systems (FBPS) 8 & 10, where fire behavior is somewhat moderated, as compared to the no treatment condition modeled under Standard Behavior (SB)4, where both rate of spread and flame length are much higher.

In the context of the larger landscape, the identified treatments would affect site-specific areas that would receive a benefit from both alternatives in terms of lessening future fuel loads. Units further away from the respective CWPP areas are still extremely important from a protection standpoint within a stand replacing fire regime. Stand replacement fire regimes lend themselves to spatially large fire occurrences, making larger landscape fuel or silvicultural treatments very effective. These treatments would only add value to the pre-existing fuels projects in the area. Individual stands may see an increase in surface fuel loading due to harvest activities in the short term (especially in areas where slash may be left and not removed from the site) but this would be significantly less than untreated stands through time.

Slash treatments would be mitigated through specific timber sale contract provisions such as site preparation, piling, lop and scatter, whole tree skidding or other similar slash treatment options, and would be designed to provide for future natural regeneration.

It is also important to note that not all coarse woody debris would be removed. As per Forest-wide silvicultural direction standard #10: "Leave large woody debris on harvested or thinned sites to help retain moisture, trap soil movement, provide microsites for establishment of forbs, grasses, shrubs and trees, and to provide habitat for wildlife," and Forest-wide biological diversity direction standard #2: "retain all soft (rotten) snags unless they are a safety hazard" (USDA 1997). Additionally, page 1-8 of the Routt National Forest Land and Resource Management Plan describes the minimum requirements for snag and woody debris retention and continuing recruitment of forested sites following timber harvests. The appropriate distribution of down wood and snags will be prescribed during project implementation.

The proposed action and Alternative 2 would provide a mosaic of fuel treatments across the landscape in concert with accessibility for implementation, conservation of other resource concerns, and potentially the least cost for implementation of fuels treatments by capturing timber values. In the overall fire/fuels environment these treatments would provide a positive influence and a benefit to fuel and fire scenarios. No significant negative effects are anticipated.

The proposal includes burning of slash piles. The smoke generated by burning is considered an indirect effect. The smoke emissions can be mitigated. Burning (as required by Forest Service policy) would only be completed on appropriate smoke dispersal days and after a smoke permit is received by the State of Colorado Department of Environmental Health outline appropriate meteorological conditions to reduce or eliminate smoke impacts.

Cumulative effects would occur where the cutting and/or removing of dead timber overlapped with some other vegetative treatment such as an ongoing timber sale or fuels project. In this case the Gould Fuel Reduction Project would see additional benefit from the proposed treatments. Cumulatively, the fuel load may have already experienced some reduction in the overlap and adjacent areas and additional fuel reduction would only fortify both efforts.

If no action is taken, the conditions related to fuels would increase and fire behavior would be similar to that modeled above using the SB4 fuel model. In addition, with all the standing dead along the road ways, access could be compromised during any wind event and/or over time as stand deterioration occurrs.

Range

The proposed harvest treatments would remove tree basal area and conifer canopy over a large area. The newly opened canopy would allow the herbaceous and woody understory to utilize the increased light and the available nutrients from reduced competition with the trees. This would expand/enhance wildlife habitat and, depending on proximity to water, access, and topography, create transitory rangeland for domestic livestock.

If the expected tree mortality from bark beetle activity continues from the no action alternative, some transitory range may still be created from the opened canopy. The death of the pine trees will open up the forest canopy and allow the vegetation on the forest floor to utilize the subsequent sunlight and available nutrients released from competition with the conifers. Depending on site conditions, other tree species, i.e., aspen may increase as well. The species composition and overall vigor of the herbaceous layer will improve forage conditions more under an aspen canopy than a conifer canopy.

The activities associated with the tree removal are not expected impact rangeland to the extent as to require a full season of rest from livestock grazing. Most of the treatments are located in areas not traditionally occupied by livestock, or at the west end of the allotment where livestock use occurs toward the end of the grazing season. Any livestock grazing that does occur on the treatment areas will take place after most of the vegetation has reached maturity, or later.

Project treatments would remove conifers in selected areas that have historically discouraged travel by livestock onto the adjacent Forest allotment, Bureau of Land Management (BLM), Colorado State Forest, or private land. If cattle follow the roads created by the proposed treatments up to the top of Owl Mountain and create/follow trails into the adjacent lands, fences would need to be constructed to prevent trespass problems. As long as there is ample forage in the traditional suitable rangeland on the allotment, it's not likely that cattle would explore much country the first few years; but, as time goes by, individual permitted cows would likely investigate new territory and eventually lead other cattle into areas not authorized for grazing.

Surface disturbing activities and associated traffic would create an environment for biennial thistles and other noxious weeds, including Canada thistle, leafy spurge, several knapweeds, Dalmation and yellow toadflax. While piling and burning of brush should not have any long-term effects, these disturbed areas may take a while to regenerate and would provide potential sites for noxious and undesirable weeds. The burned sites would be small and relatively isolated and should not have a significant impact on the size or condition of the range resource, as long as noxious and undesirable weeds are controlled. Elimination (burning) of slash would promote herbaceous undergrowth and allow greater mobility across the landscape for livestock and wild ungulates.

While all newly constructed roads, except for C24, would be managed as closed roads after project completion, they have the potential to be used by livestock to travel into previously inaccessible areas of the allotment. Utilization of newly created transitory range and naturally occurring rangeland previously inaccessible may offer more deferment, and possibly complete rest, on primary and secondary rangeland used annually.

Alternative 2

The changes in road construction and sale boundaries would not change the predicted effects to rangeland condition.

Recreation

Effects from this proposal include modification of the Pines Campground, and the potential to displace recreationists, in general, with log hauling, road closures, and noise and dust from operations.

Beetle-killed trees in the Pines Campground are an increasing threat to keeping it open for public use. Cutting inside its boundaries would result in an open canopy, providing less shade to campers, and a change in the character of the campground. This character change would last until new trees grow to a size to provide screening and cover for campers in a more forested atmosphere. However, the effects of not treating this area would be a near-permanent closure of the campground. There is a need to cut the dead and dying trees out of this site so that a new forest can be generated and so that the visitors to the site are safe from falling dead timber. In the meantime, the campground would be closed for safety reasons. Dispersed camping occurs on the side roads, so treatments won't have a direct impact on campers in the area, with the exception of added truck traffic on the main road.

Not cutting the trees along the roads in the Owl Mountain area would increase the likelihood that those roads will need to be closed, due to falling trees. This would limit hunting and OHV use of the area. Travel on foot would also become limited, and the eventual unsafe conditions would eliminate all recreation on the mountain.

Visitor traffic (mainly OHV, ATV, and 4-wheeled vehicles) may conflict with log truck traffic during the sale periods. Visitors would have to be more vigilant as they travel in areas with reduced sight distances. Overall, there may be some slight disruptions to people recreating in the area, but no significant long-term effects.

The proposed action would result in temporary disturbance to motorized users and hunters who depend on the roads inside the timber sale area. There would be higher safety risks to snowmobile users on NFSR 740, 791, and 792 if timber is hauled out on these roads during the winter.

New or improved roads would be used for motorized recreation, so proper signing and closing will prevent future resource damage. Treatment units 40 and 41 are inside a semi-primitive motorized (SPM) area. The access to these units would be improved, slightly, to accommodate logging traffic. Closing and rehabilitating the road, as is the case with all the roads that are to be closed following treatment, will be imperative.

New roads will be an enticement to OHV and 4-wheel drive enthusiasts. Closures need to be effective and immediate. Keeping C24 open following the timber sale would potentially provide additional road opportunities, however access onto this side of the mountain may also invite unauthorized motorized use on other closed logging roads.

The pine beetle epidemic is changing the character of the entire forest. Cumulatively, the open canopy will affect dispersed recreation experiences, but the alternative of a dead forest has a more devastating effect. The safety of the public will be less of an issue along the road and inside the campground with this treatment.

Alternative 2

The effects of this alternative are similar to the proposed action, however, there are benefits to recreation from reduced impacts to wildlife, increased habitat, and fewer miles of road. The reduction in road mileage would have little or no effect on motorized recreation, because, by definition, Level 1 roads are closed to motorized use. Overall, there may be some slight disruptions to people recreating in the area, but no significant long-term effects. New temporary roads would be an enticement to OHV and 4-wheel drive enthusiasts, but with proper closure methods this shouldn't be a problem.

Inventoried Roadless Areas (IRAs)

Although the Never Summer North (2,391 acres) and Never Summer South (1 acre) IRAs are within the Owl Mountain North Analysis Area, all project activities are at least three miles to the northwest of the IRAs. The analysis area also includes the Never Summer Wilderness (6,607 acres) to the east of the IRAs. The project will have no effect on the IRAs or Wilderness.

Scenery

There would be short-term effects on visual resources when forest visitors traveling on roads or trails, camping and/or recreating within the project area would notice the forest landscape and ground disturbed by mechanical treatments that contrast with the surrounding undisturbed landscape. Some treated sites would not be noticed or partially noticed due to the vegetative and landform screening. Portions of proposed salvage/clearcut units located in the foreground zone of NFSR 740 would appear as Modification VQO instead of Partial Retention VQO due to the removal of most beetle-killed trees for public safety, fuel reduction, and to allow for regeneration of new green healthy trees. Beetle-killed trees would be removed adjacent and within the Pine Campground, resulting in loss of shade and screening of campsites. Some beetle-killed mature trees would remain for wildlife snags. Temporary roads constructed to access units would be rehabilitated after the treatments. Treatments would occur within the old strip cut area and units with linear edges as to restore to a natural appearing landscape mosaic pattern. Over time, when treated sites are greened up and covered with new healthy trees, visual impacts would be lessened and would enhance scenery and forest setting experience for future forest users. Effects could occur if Forest visitors ride OHVs off improved access roads onto sensitive areas such as wetlands or meadows, causing visible resource damage of the landscape.

If no management activities take place, only the forces of natural events such as wildfire, wind, insects and disease would change the visual landscapes. Standing beetle-infested trees would continue to infest adjacent trees and would reduce scenic quality in recreation areas and travel corridors. Strong winds could blow down dead and dying trees across roads and campsites and create a hazard to forest users and travelers. Although the downed trees would be cut to open access through travelways as required by the Highway Safety Act of 1966, they would not be removed and would impact scenic quality due to the evidence of cut ends of logs when viewed from the immediate foreground of travelways. Travelers could create new paths around the road or trail corridor blocked by naturally fallen trees that have not been yet removed, resulting in visible resource damage of the landscape. A large scale wildfire can cause a lasting visible scar until new tree vegetation is established.

Past harvest activities and road construction have been implemented within and adjacent to the analysis area. Many of the past harvest units are covered with new vegetation in various stages of ages and heights. Treatments would occur within the old strip cut area (only a small portion in Alternative 2) and units with linear edges as to restore to a natural appearing landscape mosaic pattern. Timber harvest and fuel reduction treatments would allow the existing characteristic landscape of the Owl Mountain Geographic Area to be maintained for present and future generations. A future hazard tree removal project is proposed within developed recreation areas, trailhead parking areas, roads and trails within and adjacent to the analysis area. The No Action alternative, which would not implement vegetation treatment, could result in lower scenic quality when beetle-killed trees begin to fall to the forest floor and visitors would find it as an undesirable appearance in near view. Proposed Action and Alternative 2 would implement removal of beetle-killed trees to allow quicker regeneration of new green trees and improve scenic quality in the long term.

Alternative 2

Effects for Alternative 2 would be similar to the Proposed Action except that several units were dropped to protect and maintain wildlife habitat and there would be fewer miles of new roads constructed. Only a small portion of the old strip cut area would be treated to reduce strip cut pattern as to protect and maintain wildlife habitat. There would be an increase in numbers and miles of roads to be decommissioned which would help to improve the scenic integrity of the analysis area.

Soil

Effects of the proposed action include increased rates of soil displacement, erosion, and compaction above existing condition. The removal of vegetative cover (canopy and surface) reduces interception and exposes the soil surface to the erosive forces of rainfall. Ground disturbing activities associated with mechanized timber harvest increase soil surface exposure and erosion rates and may also result in soil displacement and rutting.

The potential to increase erosion rates would be more pronounced as slope steepness increases. The majority of proposed mechanized treatments are planned for a landscape with slopes less than 40 percent, which greatly reduces the risk of mass failures. No historic mass failures were observed within the project area. This lack of historic failures also suggests that the area is inherently low in mass failure risk.

Clearcut units would have the highest rates of cover reduction (up to 100% in places) and would have the highest probability of soil erosion. Design criteria for coarse woody debris (CWD) retention would reduce post-harvest soil erosion rates.

Mechanized timber harvest methods increase soil bulk density and may lead to detrimental compaction within an activity area. Landings also create detrimental soil compaction. Minor increases in bulk density will decrease over time. Detrimental soil compaction may require mechanical treatments to reduce bulk density and increase infiltration, especially on high traffic areas such as main skid trails and landings. Limiting skid trail-related impacts through layout and design would help prevent increases in detrimental impacts in excess of the 15% Regional and Forest Plan soil quality standard. Additional indirect effects include probable short-term decreases in soil productivity within the treatment area, most specifically in association with skid trails and landings.

Proposed slash treatments include machine piling and burning, machine trampling, lop and scatter, and whole tree skidding. Effects of machine piling include increased soil displacement, increased erosion through reduction of effective ground cover, and soil compaction. A potential effect of machine trampling is increased soil compaction. Lop and scatter of harvest-generated slash in the treatment units would provide more post-harvest ground cover as well as greater woody debris and soil organic material (SOM) contributions. Whole tree harvest units typically have minimal post-harvest woody debris and SOM contributions. It is anticipated that most whole tree harvest units in this project would have adequate amounts of CWD and cones left in the stands due to dead trees losing limbs and cones during falling. Presence of this material would need to be verified at adequate levels after harvest. Whole tree harvest units also exhibit greater landing area disturbances due to the increased area needed to process whole trees and high slash accumulations.

The impacts of slash pile burning include soil heating, reduction of soil productivity, and the potential for the introduction of hydrophobicity. Slash pile size limits are included in design criteria to minimize detrimental burning of soils.

A variety of new road construction activities are included in this proposal. Effects include increases in soil bulk density and soil erosion. Reclamation of new temporary roads would include re-contouring the entire road template to natural ground contour, and to the extent feasible, placing the top soil back on the soil surface. New road construction would be added to the transportation system and closed after logging operations end.

The combined effect of the mountain pine beetle epidemic and a stand replacing fire would result in irreversible and irretrievable effects to the soil resource within the project area. Fire in these affected stands would result in detrimentally burned soils. These types of events would most likely result in large amounts of post-fire erosion.

Water

Effects from the proposed action include water yield increases due to removal of the remaining canopy cover following the beetle epidemic. There would be no direct effects to floodplains or the riparian or wetland resources from the beetle treatments.

The new road construction would add one additional road-stream crossing and increase the overall road density in three of the four watersheds. With any ground disturbing activity, there is the potential for increased erosion and delivery of sediment to the stream system. The new road construction is not progressing toward zero connected disturbed area, but it still complies with the standard 'Limit roads and other disturbed sites to the minimum feasible number, width, and total length consistent with the purpose of the specific operations, local topography, and climate.'

There is always the potential for future wildfires which, depending on the intensity and areal extent, could affect the water resources. Effects occur through increased overland flow and associated surface erosion which could increase sedimentation to the stream network, destabilize stream beds and banks, and degrade water quality through both ash deposition and increased sedimentation. Wildfire behavior depends on multiple local factors including weather, which cannot be predicted at this time.

If no action is taken, water yield would increase as a result of the beetle epidemic, but the standing tree boles would still provide for some interception. Water yield increases would decline with regeneration of the affected stands and return to baseline levels within 80 years. Destabilization of channels due to increased water yields may have indirect effects on riparian areas.

Alternative 2

Effects under this alternative would be similar to the Proposed Action, although overall ground disturbance would be less, and there would be less road construction. Water yield increases would be slightly lower than the Proposed Action.

The proposed road management would help to restore the hillslope hydrology and reduce the extended channel network, which would help to maintain dispersed subsurface flows that are critical to maintaining late summer low flow conditions, and not increasing peak spring flows. This would also help to reduce the connected disturbed area and sedimentation to the stream system. The road management plans would help to reduce the cumulative effects of past road construction and ground disturbance on watershed function.

Wildlife

Project design and analysis for wildlife was conducted for Management Indicator Species (MIS) and for Threatened, Endangered, and Forest Service Sensitive Species as surrogates for all wildlife species that could potentially inhabit the project area. The proposed action meets the Forest Plan standard for maintaining old growth within the cumulative effects area and retaining snags and downed large woody debris.

Threatened and Endangered, and Sensitive Species

Forest Service policy is to protect the habitats of federally listed proposed, candidate, threatened, or endangered species from adverse modification or destruction, as well as to protect individual organisms from harm or harassment.

Species carried forward for further review include: **Threatened** Canada lynx, **endangered** pallid sturgeon, **sensitive** northern goshawk, boreal owl, black-backed woodpecker, northern three-toed woodpecker, olive-sided flycatcher, American marten, boreal toad, northern leopard frog, and wood frog. The project would not affect the continued viability of any native or desired non-native wildlife species. Mitigation to minimize potential adverse effects was incorporated into project design.

Table 7 summarizes the findings for Threatened, Endangered, and Forest Service Region 2 Sensitive Species occurrences and habitat within the Owl Mountain North Analysis Area. Refer to the Wildlife and Aquatic Species Biological Evaluations in the project record for more information on these species.

Management Indicator Species

The National Forest Management Act (NFMA) requires that MIS be selected as part of the Forest Plan to estimate the effects of planning alternatives on fish and wildlife populations. MIS are used as barometers to evaluate the effects of forest management on wildlife within the Forest. The Routt Forest Plan identifies 6 MIS, all of which were reviewed to determine presence and to identify those likely to be affected by the project.

Species carried forward for further review include: Brook trout, golden-crowned kinglet, and northern goshawk.

Forest Plan direction for MIS is to retain suitable habitat to maintain viable populations. The proposed project is within the historic range of variability for the species identified. Population trend for all MIS for the planning unit is considered stable.

Refer to the Wildlife MIS Report and the Amphibian and Fisheries Specialist Report in the project record for further information on selection of MIS and project effects to the selected species.

Plants

No Federally listed Threatened, Endangered, or Proposed (TEP) plant species have known occurrences or potential habitat within the analysis area.

Eleven Region 2 sensitive plant species have potential habitat within the area of influence of the proposed action and were carried forward into the field reconnaissance portion of the analysis. Surveys were adequate to determine that nine of the eleven plant species were absent from the area of of influence of the proposed action and they were excluded from further analysis. However, moonworts (*Botrychium* spp.) are very small, often ephemeral species that may not appear above the ground every year and it is possible that populations of this genus could go un-detected during survey efforts. Because the absence of *Botrychium* tax. nov. "furcatum" and *B. lineare* cannot be reasonably determined in surveys, presence was assumed. Of the proposed treatment units within the analysis area, an estimated 5% is considered habitat that *Botrychium* species are likely to occupy.

Based on the best available information, the following determination is made for the *Botrychium* tax. nov. "furcatum" (forkleaf moonwort) and *B.* l*ineare,* (narrowleaf moonwort): "*May adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend toward federal listing or a loss of species viability range wide*". Refer to the Plants BABE in the project record for further information on these plant species.

Table 7. Determination for TES Species Carried Forward for Analysis

	Status	Habitat	Determination of Effect
Plants			
Botrychium lineare	S	*	MAII
Botrychium furcatum	S	*	MAII
Amphibians			
Boreal toad	S	*	MAII
Northern leopard frog	S	*	MAII
Wood frog	S	*	MAII
Birds			
Northern goshawk	S	*	MAII
Boreal owl	S	*	MAII
Black-backed woodpecker	S	*	MAII
Northern three-toed woodpecker	S	*	MAII
Olive-sided flycatcher	S	*	MAII
Pallid sturgeon	E	D	No Effect
Mammals			
Canada lynx	T	*	May affect, NLAA
American marten	S	*	MAII

E=Endangered; T=Threatened; P=Proposed; C=Candidate (Federally listed)

S=Sensitive (Region 2)

* Habitat within Analysis Area (AA)

-- Suitable habitat not present

D=Downstream riparian & riverine habitat of the Platte River system (suitable habitat/species not present in AA)

MAII=May adversely impact individuals but not likely to result in a loss of viability in the Planning Area, nor cause a trend to federal listing or a loss of species viability range or Forest wide

NLAA=Not likely to adversely affect

AGENCIES AND PERSONS CONSULTED

In February 2006 the Forest Service distributed a Scoping Report to more than 50 individuals, Federal, state and local agencies, tribes. In addition, a legal notice was published in the *Jackson County Star* requesting comments on the proposed project. As a result of public outreach, twelve comments were received. Collaboration with interested parties resulted in the development of an additional alternative.

The Forest Service received input from the following individuals, Federal, state and local agencies, and tribes during the development of this environmental assessment:

Individuals

Jean Krause
Jim Dustin
John Rich
Jenifer Morrissey
Don Cruz
Brook Lee
Meg Halford
Cathy and Sam Addams

Agencies/Organizations

Mountain Parks Electric
CSU Extension Office
Grand County Board of Commissioners
Colorado Wild
Biodiversity Conservation Alliance
Rocky Mountain Chapter of Sierra Club
Tom Swissler
Colorado Division of Wildlife

INTERDISCIPLINARY TEAM MEMBERS

Joanne Sanfilippo, ID Team Leader
Mark Westfahl, Silviculture
Mark Cahur, Fire & Fuels
Rob Bringuel, Fire & Fuels
Marcia Pfleiderer, Wildlife
Liz Schnackenberg, Hydrology
Rick Henderson, Fisheries
Sarah Crump, Heritage
Steve Mottus, GIS
Ann Marie Verde, Engineering
Derek Milner, Soils
Mary Sanderson, Recreation
Mike Alpe, Range Management
John Proctor, Botany
Rebecca Roof, Lands/Minerals/Special Uses
Jeff Tupala, Scenery
Diana Hood, Writer/Editor

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FIGURE 1. VICINITY MAP

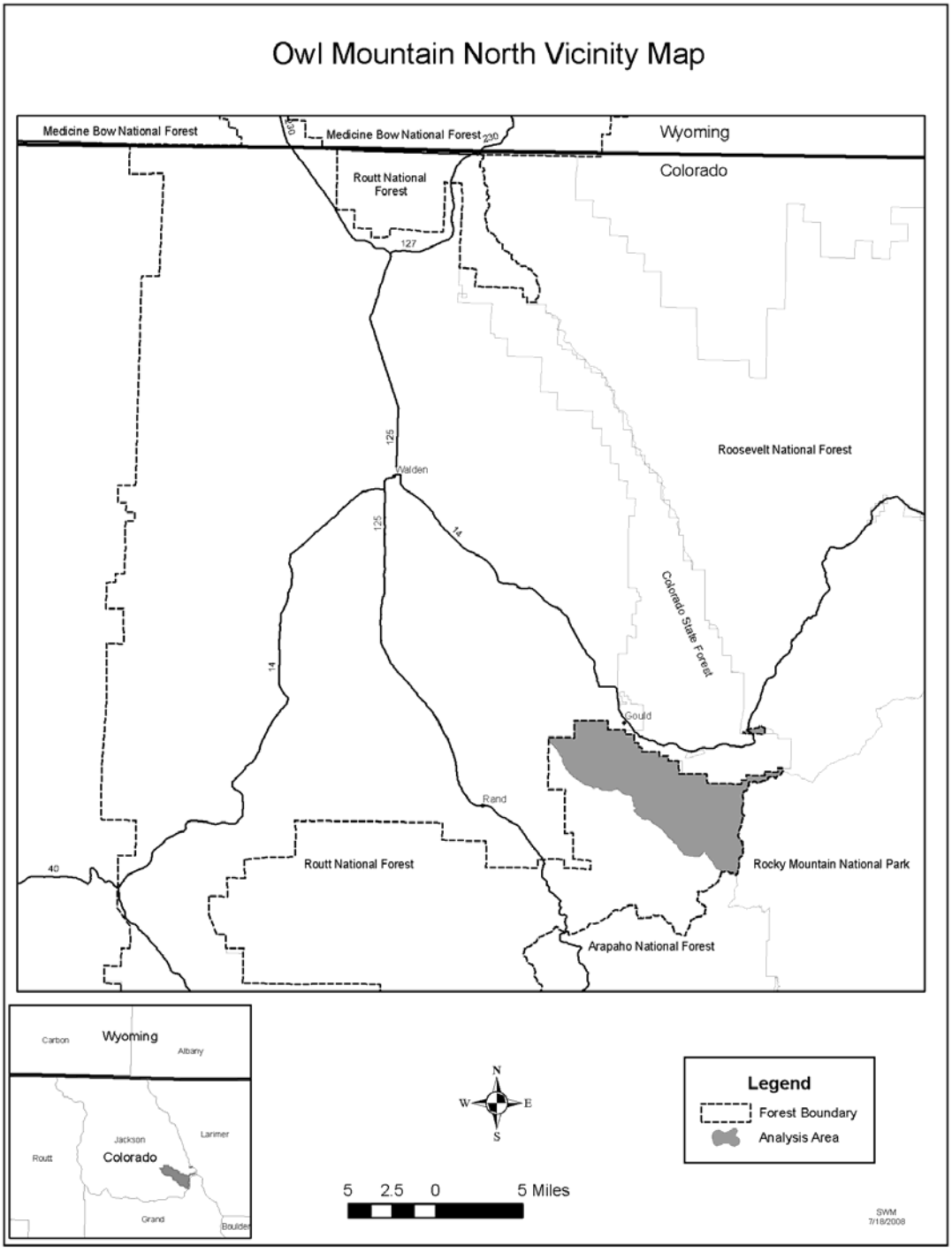


FIGURE 2. ANALYSIS AREA AND MANAGEMENT AREAS

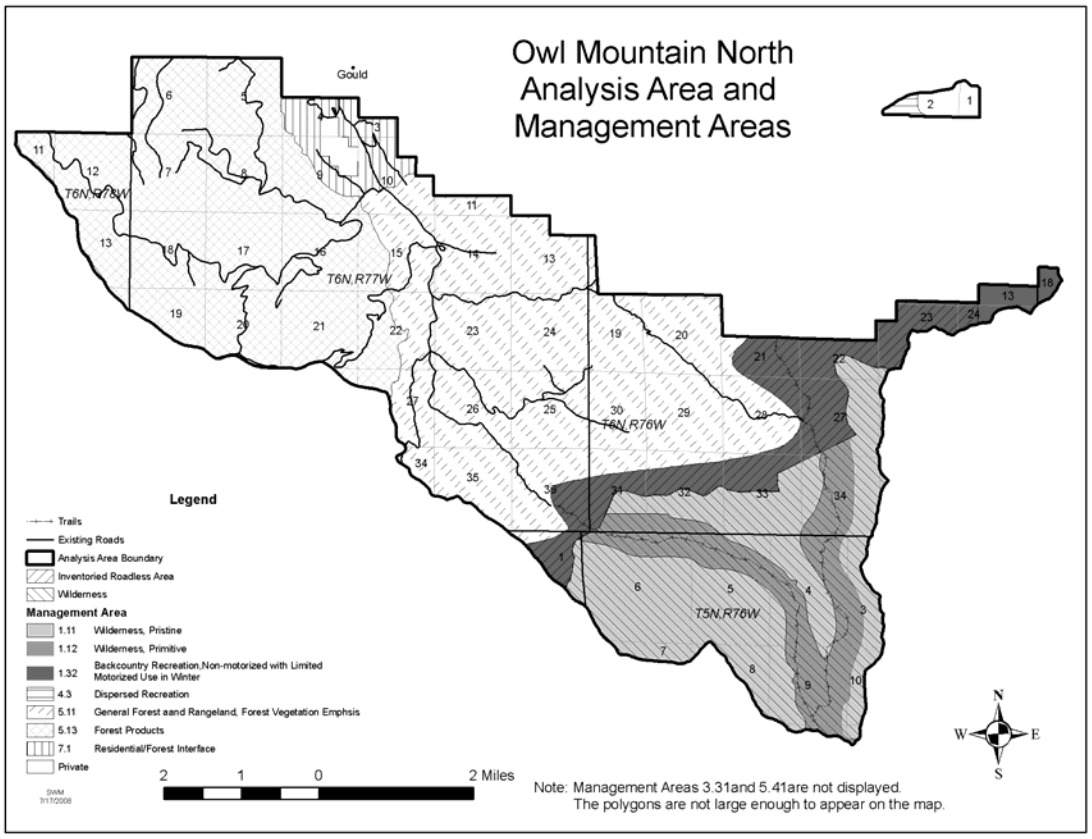


FIGURE 3. PROPOSED ACTION

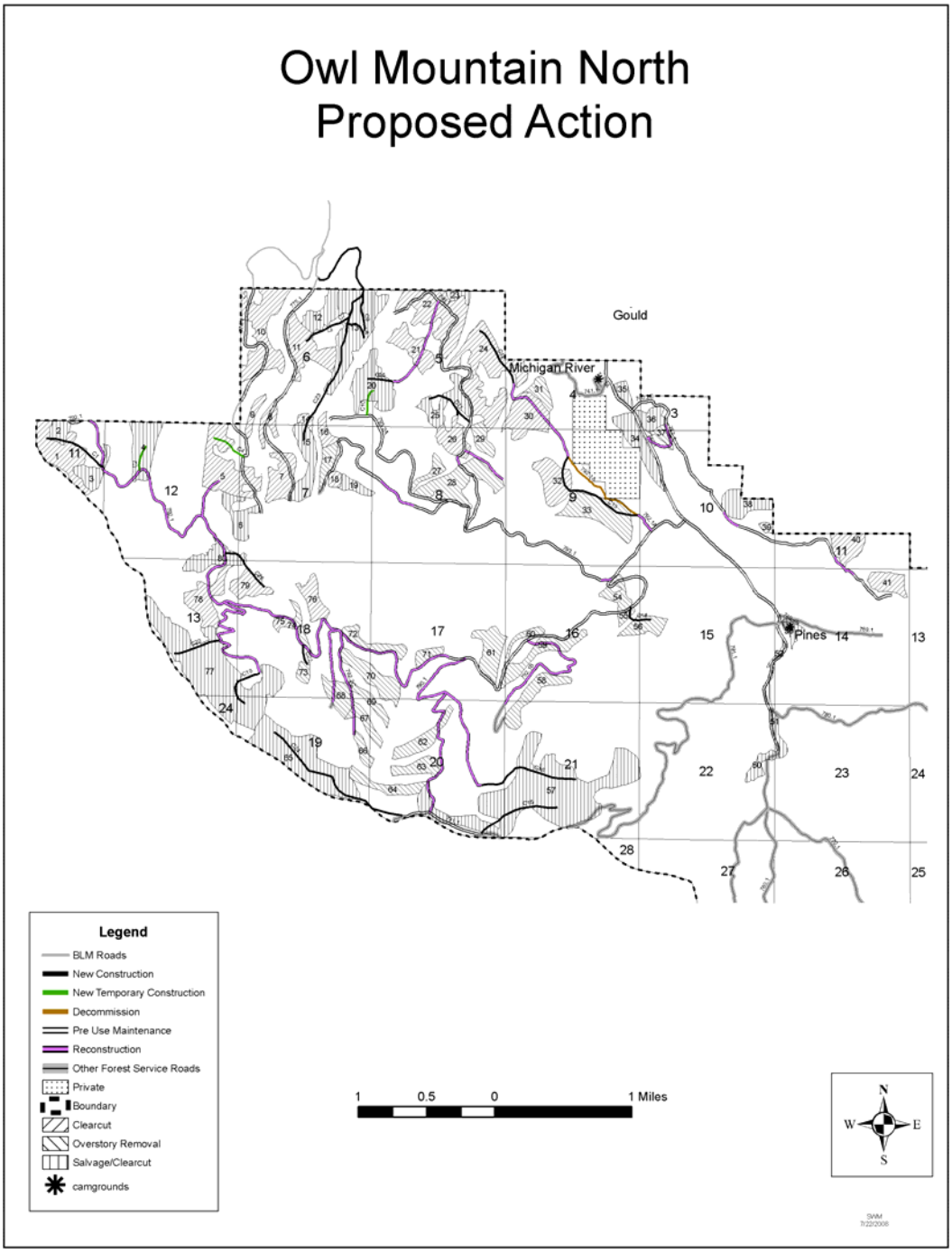
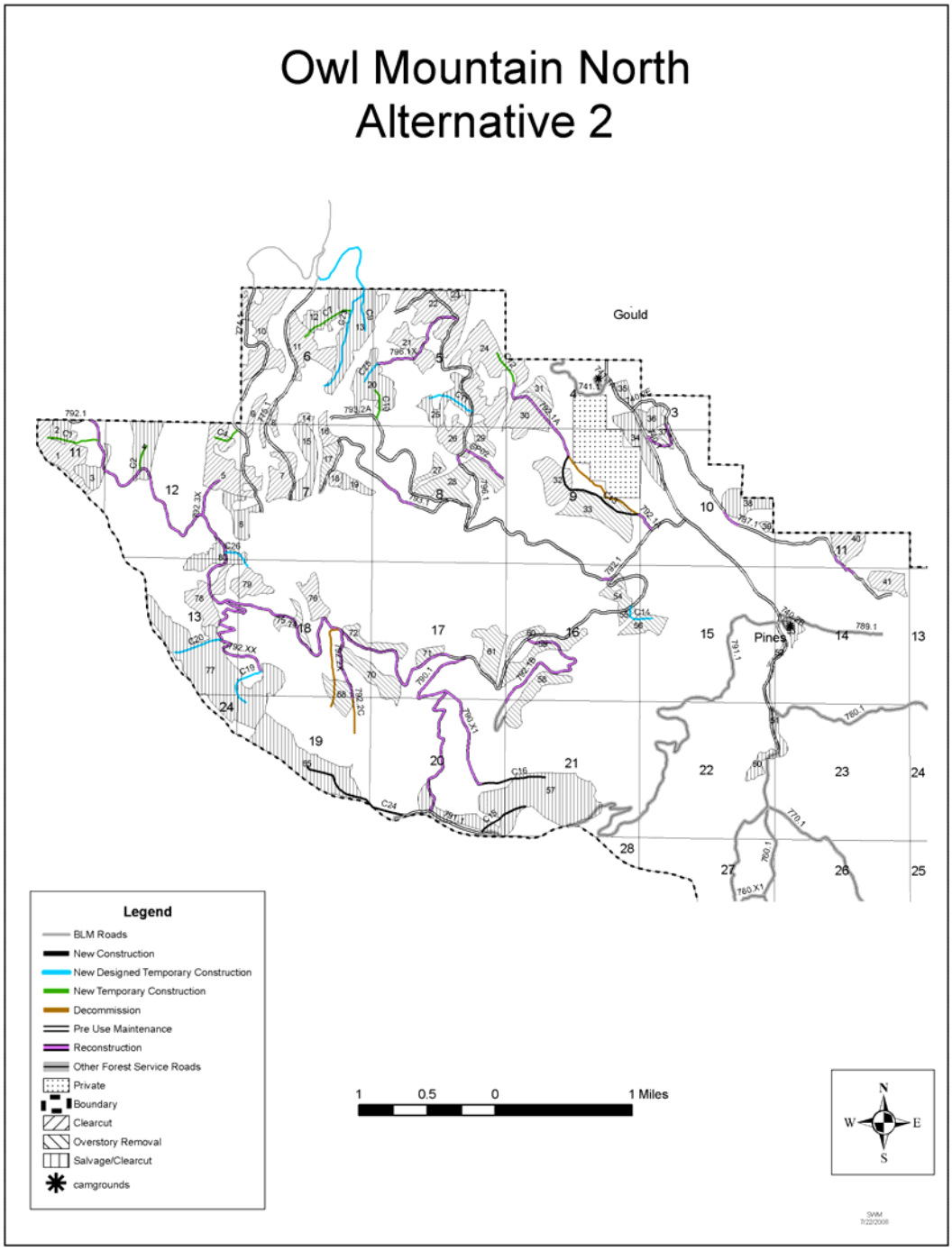


FIGURE 4. ALTERNATIVE 2



APPENDIX A

Design Criteria

The design criteria listed here apply to both the proposed action and Alternative 2, unless specifically stated as applicable to only one. Mandatory Watershed Conservation Practices (FSH 2509.25) and Best Management Practices [33 CFR 323.4 (a)(6)] are listed after the project specific design criteria below.

Communication

- Keep Mountain Parks Electric informed of work near their structures—especially when cutting or burning around live powerlines (Lands).
- Keep private property owners informed of work near their property (Lands).
- Keep Forest Service District office informed of logging activities for visitors' safety (Recreation).

Timing

- Prohibit log hauling on holidays and on holiday weekends (Recreation).
- Prohibit log hauling on weekends once snow depths are greater than 18" (Recreation).
- Prohibit or limit log hauling on opening weekends of big game hunting seasons, specifically rifle moose and the four main rifle seasons (Recreation).
- Schedule cutting and hauling out of the Pines Campground during the spring and fall (Recreation).
- Restrict timber harvest activities during the elk calving and fawning "season" from May 15 – July 1 in the Peterson Creek and Owl Creek drainages. Limited access only with the written consent of a FS Wildlife Biologist.
- Develop a spring seasonal restriction on use of travelways in certain priority areas to minimize disturbance to big game areas. The timber sale administrator will meet with the FS Wildlife Biologist, and CDOW District Wildlife Manager or Terrestrial Biologist pre-contract (Wildlife).
- Prohibit all logging activities, including log haul, within ¼-mile of an active raptor nest between March 15 and September 15. Use of open National Forest System roads is exempt. A wildlife biologist must determine nesting status (active or inactive) for each year during sale implementation (Wildlife).
- Prohibit falling and skidding activities within 100 feet of any boreal owl nest until July 15 (Wildlife).
- Cease operations until site specific mitigations can be implemented if sensitive amphibian breeding sites are found (Fisheries).

Water

- Designate all USGS blue-line streams as protected stream courses (Hydro).
- Designate the crenulation that flows through unit 29 and immediately adjacent to units 26 and 30 as a protected stream course (Hydro).
- Designate streamside management zones where wet depressional areas, springs, or other riparian and wetland habitats exist within units. Do not allow heavy equipment to operate within these zones (Hydro).

- Protect the ditch within and adjacent to units 24, 30, and 31. Identify necessary crossings during layout to ensure crossings will not affect ditch function or stability. Avoid harvesting immediately adjacent to or downstream of the ditch when flowing (Hydro).
- Locate landings immediately adjacent to the road in units 33, 34, 51, 52, 53 (next to the South Fork Michigan River) to minimize the potential effects to the river from burning of slash (Hydro).
- Do not operate heavy equipment within 200 feet of identified fens that support well developed peat. Hand operations may be permitted (Plants).
- Do not operate heavy equipment in riparian areas, hydric soils, streams, lakes, or ponds. Hand operations may be permitted. Leave felled trees in riparian areas, hydric soils, wetlands, fens, or stream courses unless identified as a fuel hazard (Plants).
- Follow mandatory Watershed Conservation Practices (FSH 2509.25) and Best Management Practices [33 CFR 323.4 (a)(6)] at the end of Appendix A.

Vegetation Treatment Units

- Design the shape and pattern of treatment units to complement and maintain the landscape character (Visuals).
- Follow natural contour lines and avoid straight lines when laying units (Visuals). Leave peninsulas or patches of trees along the boundary to vary the shape of the edge. (Silviculture).
- Protect residual stand in all units except clearcuts (Silviculture).
- All operations will be conducted within painted unit boundaries and designated road right of way. Areas outside of unit boundaries and road right of ways are excluded to protect riparian areas, wetlands, sensitive plants and animals, and heritage resources (Hydro).

Live Tree & Snag Retention

- Retain all old-growth lodgepole pine trees not infested (at the time of timber marking) with MPB. Old-growth pines can be identified by their structural conformation (Mehl 1992, p. 111), which is reflective of advanced age (150+ years old). Trees over 150 years old typically have boles, crowns and individual limbs that are distinctive from trees of lesser age (second growth). However, tree diameter at breast height might not be substantially larger than nearby second growth (especially wolf) trees, so care in identification is needed. Live old-growth trees do not necessarily need to be reserved by marking (painting) each tree but their retention must be unequivocally clear to loggers during harvesting. However, marking of old-growth pines within units is encouraged to fulfill live character tree retention requirements (Wildlife).
- A minimum of 40% post-harvest overstory is required to be left in the overstory removal and salvage units. Leave all live non beetle infested trees. In the event 40% of the unit is dead, use dead to obtain the 40% standard. Leave a mix of lodgepole, spruce/fir where possible, except in lower elevation lodgepole pine stands. Lower elevation lodgepole pine stands are not subject to this 40% post harvest overstory remaining requirement (Wildlife).

- Retain on average two existing 'hard' snags (typically, lodgepole pines killed by mountain pine beetles or spruces killed by spruce beetles, decay class 1 or 2) per acre within treatment units. Distribute snags singly or in groups of up to 16 trees (equivalent to 2 snags/acre x 8 acres). Leaving a mixture of single snags (occasionally) as well as snag groups (2 to16 trees/group). Snag clumps are preferred and when the opportunity exists place in the locations of rare plant species. If a stand does not contain adequate snags to meet this criteria, meet this requirement by retaining this required tree density as additional snag replacement 'live trees' Use the design criteria for 'live tree' retention for marking guidance.

  Selected 'hard' snags should have a larger-than-average diameter for the stand and be at least 25 feet tall, but in no case should a retained snag be smaller than 10 inches diameter at breast height. Snags with evidence of existing wildlife use (cavities, nests, etc.) should receive precedence for retention. Select snags that are away from roads or likely landing locations and that appear to be firmly rooted and free of potentially dangerous defects (such as an unstable top or "widow maker" limbs). It is acceptable to connect some snag groups to the unit perimeter (a "peninsula") but most groups ($\geq$ 70% by stem count) should be "islands" retained inside the treatment unit perimeter.

  Retain all 'soft' (*i.e.,* rotten, decay class 3 to 5) snags unless they are a safety hazard (Wildlife).
- Paint retention snags (hard and soft) with an identifiable "wildlife tree" marking. Protect snags under special provisions identified in Section A (of the timber sale contract), List of Special Provisions, by distinguishing marked snags as "reserve trees" under provisions C[T]2.3# (Reserve Trees) and C[T]6.32# (Protection of Reserve Trees). **Retention snags should be considered and avoided in the sale layout of skidding and timber removal activities. Should it be determined at the time of logging that a reserve snag would be in a skid trail or that it is a hazard to people, fell (or top) the snag; however, the snag shall be retained on site as coarse woody debris and an equitable replacement snag within the unit should be marked for each snag that cannot be avoided** (Wildlife).

Spruce-Fir

- To meet Lynx habitat needs, 40% of the overstory will be left uncut in the spruce-fir stands designated for overstory removal and salvage. All live non-beetle infested overstory trees will be left first and if necessary a mixture of dead species will be left to meet the 40%. This 40% requirement does not include lodgepole pine stands. (Alternative 2 only) (Silviculture).

Scarify

- Scarify detrimentally compacted areas of temporary roads, landings, and skid trails. Lift teeth every 75 to 100 feet so as to not introduce a continuous furrow (Soils).

Ground Cover (Coarse Woody Debris or Slash)

- Establish or maintain ground cover on disturbed areas (temporary roads, landings, skid trails, etc.) concurrent with harvest operations. Complete immediately preceding seasonal periods of precipitation or runoff (Soils).

- Use the ground cover criteria for all harvest units (Soils):

Required Minimum Percent Effective Ground Cover		
Erosion Hazard Class	**First Year After Disturbance**	**Second Year After Disturbance**
Low	20-30	30-40
Moderate	30-45	40-60
High	45-60	60-75

- Leave five to ten tons per acre of coarse woody debris in treatment units (Soils).
- Scatter slash, for at least 50% groundcover, on skid trails following completion of use. Close all skid trails in the same season of use (Soils).
- To the extent practicable, and where available, retain in place within timber harvest units some existing deadfalls (whole trees) or logs (portions of tree boles) measuring ≥16 inches in diameter and that are ≥20 feet in length. Where existing large (*i.e.*, ≥16" x 20') deadfalls and logs are plentiful within a cutting unit, no attempt should be made to retain all (or even most) existing down woody pieces because interference with cutting and skidding operations would result. In particular, avoid retention of deadfalls and logs in areas close to proposed landings or near to open access roads. On the other hand, in cutting units where deadfalls and logs are sparse, retention of much or most of the existing large woody material should be emphasized.

  Large deadfalls and logs identified for retention need not be painted or marked as "reserve" trees/timber. However, to effectively "retain" this material in place on the site during harvest operations, use standing leave (non-included timber) or wildlife reserve trees (snags and live character trees) to shield the deadfall or log from mechanical damage or displacement. The conservation purpose is to maintain the existing integrity of a deadfall or log by preventing cutting (bucking), displacement from its "bed" or utilization of the material during harvest operations.

  In addition to purposeful retention of existing large deadfalls during sale preparation, coarse woody debris conservation should be the continuing objective during slash disposal operations conducted in post-harvest cutting units. Only limbs, tops and short chunks of woody material should be the targets of debris collection. Rotten or otherwise unutilized whole down trees or logs left scattered throughout a stand following logging, and that are larger than 8 inches diameter on the small end, should not be targeted for disposal. To the extent practicable, leave this larger woody debris well-distributed in treatment areas and expend diligent effort to conserve coarse woody debris on site (Wildlife).
- Whole tree skidding is allowed when necessary to meet resource objectives other than timber (Silviculture). Whole tree skidding or lop and scatter slash treatment or post sale site preparation could occur in units include 22, 23, 24, 29, 30, 31, 32, 34, 35, 36, 37, 38, and 40 to reduce fire carrying capacity of the treated area (Fuels).
- Keep all slash out of perennial, intermittent, and ephemeral stream courses, and all riparian areas and wetlands (Hydro).
- Leave one in ten, randomly placed, slash piles unburned for an array of wildlife species to utilize. These slash piles should be no less than 15'x 15' and no greater than 20'x 20', and no greater than 5' high. Where possible these piles should be constructed to rest against existing boulders or rock outcroppings (Wildife).

Burn Piles

- Limit burn piles not located on landings or designated slash disposal areas to approximately 300 square feet (Soils).
- Spread out burn pile remains and plant or seed the burned areas (Soils).

Along NFSR 740 and within Pines Campground

- Minimize damage to rock outcrops, young healthy trees, understory trees of lodgepole pine, aspen and spruce/fir and shrubs from mechanized equipment; cut stumps low to the ground as feasible; remove heavy slash; locate slash piles and landings away from the immediate foreground (approximately 25 to 200 feet from edges of road and trail) of NFSR 740 and within Pines Campground (Visuals).

Roads & Skid Trails

- Designate skid trails in all units except clearcuts (Silviculture). Restrict skidding to designated skid trails (Soils).
- No road construction through existing tree plantations (Alternative 2 only) (Silviculture).
- All new specified road locations will be reviewed by a watershed specialist (Hydro).
- Minimize disturbance to roadbeds with established sod layer during maintenance and reconstruction activities (Transportation).
- Provide adequate cover to maintain screening, through time, along roads where timber management activities are taking place to minimize disturbance and harassment of deer and elk. The appropriate timber sale representative will coordinate with the Biologist on the respective district to coordinate retention and revegetation efforts that will comply with the above standard (Wildlife).
- Perform needed roadside brushing along arterial and collector roads before haul (Transportation).
- Use hardened fords rather than culverts for road-stream crossings where possible (Hydro).
- Do not drain water bars into ephemeral draws on dissected slopes (Soils).
- Construct and maintain temporary roads with the following drainage spacing guidelines (Soils).

Recommended Maximum Distance Between Rolling Dips (meters)		
Road Grade %	Low to Non-Erodible Soils	Erodible Soils
0-3	120	75
4-6	90	50
7-9	75	40
10-12	60	35
12+	50	30

- Use the following water bar spacing guidelines for closed and/or rehabilitated temporary roads and skid trails (Soils).

Recommended Water Bar Spacing (meters)		
Road/Trail Grade %	Low to Non-Erodible Soils	Erodible Soils
0-5	75	40
6-10	60	30
11-15	45	20
16-20	35	15
21-30	30	12
30+	15	10

- Close and rehabilitate all roads, so as not to invite illegal motorized use (Recreation).
- Identify the method of closure and mark the location prior to constructing roads (Transportation).
- Restore all identified closed and temporary roads to a hydrologically self-maintaining state and restore hillslope hydrology to the extent feasible. **This will require more extensive waterbarring than standard practices,** removal of culverts at stream crossings, and may require subsoiling. On temporary roads, this may also result in areas of recontouring (Hydro).

Hauling

- Haul most of the timber off the west side of Owl Mountain, especially during the winter (Recreation).
- Warn people of on-coming log truck traffic especially where roads are only one lane wide, using live flaggers and/or warning signs (Recreation).
- Eliminate the log hauling routes temporarily from the Snow Snakes' snowmobile trail grooming permit (Recreation).

Range Fencing

- Build fences where timber harvest removes vegetation used to limit livestock travel or manage grazing, to prevent livestock from traveling into the adjacent Forest allotment, onto BLM, Colorado State, or private land (Range).

Noxious Weeds

- Treat infestations of noxious weeds in disturbed areas. At a minimum treat weeds identified in the Jackson County Weed Management Plan (Range).
- Clean machinery before it is used on NFS lands (Range).
- Inspect logging equipment and other vehicles before entering the FS boundary to prevent further spread of noxious weeds (Range).
- Clean equipment before moving from a known weed infested area to another area (Range).

Revegetation

- Revegetate disturbed soils on landing, burned slash pile sites, skid trails and temporary roads with native seed mixture after the completion of treatments (Visuals).
- Use genetically local (at the sub-section level), native plant species for revegetation efforts where technically and economically feasible. Use weed-free seed mixtures. Where native perennials are becoming established, nonnative annuals or sterile perennial species may be used to prevent soil erosion. The timber sale representative will coordinate with the Botanist or Range Conservationist on the respective district to coordinate revegetation (Wildlife).
- Where seeding is appropriate and local native seed is available, Mountain District Broad Spectrum Upland Mix is recommended for upland habitats, such as disturbed ground in aspen or coniferous cover types, mesic to dry mountain meadows, and sagebrush or mixed mountain shrub sites with at least moderately deep soils; foothill, montane and subalpine zones. Suggested seeding rate: 20-25 lbs/ac. (Plants).

Species	**Percent of Mix by Weight**
Big bluegrass (*Poa ampla*) or Canby bluegrass (*Poa canbyi*)	4
Mountain bromegrass (*Bromus marginatus*)	40
Blue wildrye (*Elymus glaucus)*	33
Slender wheatgrass (*Elymus trachycaulus,* formerly *Agropyron trachycaulum*)	23
Total	**100**

Goshawks (Wildlife)

- The Forest will provide the resources necessary to survey suitable goshawk nesting habitat in the same summer that these specific stands are to be treated and before these specific stands are treated. Prior to the award of the TS contract, train timber sale, engineering and resource personnel to identify and report active goshawk nests (or goshawks defending a territory) found during routine field work. Surveys will be completed in all suitable goshawk nesting habitat where the applied treatment is more intensive than Forest Service employees removing $\leq$ 10 trees/acre. Surveys will follow established protocols (Kennedy and Stahlecker 1993, Joy et al. 1994) and occur generally from May 1 through July 31. An adequate survey requires appropriate surveys of the area for two consecutive years. If the Forest does not have the additional resources necessary to complete goshawk surveys (Kennedy and Stahlecker 1993, Joy et al. 1994), it should be assumed that the territory(ies) are active and harvest should not occur in order to ensure compliance with these Forest Plan standards.

- Where management actions are proposed within a 3/8-mile radius of a known goshawk nest site, a wildlife biologist will delineate three 30-acre nesting habitat protection areas. One protection area of no less than 30-acres shall be centered on the stand where goshawk nesting is currently active or where nesting occurred most recently. The other two 30-acre reserve areas would be used to protect two additional nearby stands (alternate sites) that are apparently suitable (structurally and compositionally appropriate) for goshawk nesting. Optionally, some or all 60 acres may be used to expand the 30-acre protection area of the active/recently active nest site or to create a single alternative nest stand larger than 30 acres. In any case, a total of no less than 90 mature-forest acres would be segregated as goshawk nest stand protection area(s). Trees within the nest stands and/or reserve nest stands shall not be marked for removal.

  Pursuant to TS contract standard provision B[T]6.25 (Protection of Threatened, Endangered and Sensitive Species), upon discovery of a new goshawk nest location or other TES wildlife species nesting/breeding (or other essential) site, suspend any active logging or other contract operations underway in the immediate vicinity until a wildlife biologist assesses the situation and determines appropriate action(s) to take for protection of habitat or individual animals. Completion of the assessment and determination of appropriate action should typically occur within 3 working days of discovery. Appropriate action(s) include(s): Imposition of a seasonal restriction to protect a TES species from disruption/harassment or habitat destruction; changes in timber marking (and included timber species or quantities) to protect or maintain existing habitat(s); or complete withdrawal of included timber within a specified protection area. Size of Area: Typically, these actions would not be applied over an area larger than 40 acres (roughly equivalent to the area of a circle having a 750 foot radius or a square having 1320 foot sides).
- Retain on average 4 live character trees per acre. Trees may be retained singly as well as in groups of up to 16 trees (equivalent to 1 tree group/4 acres). Leaving a mixture of single trees and groups would be the most desirable result. Select trees that are away from roads or likely landing locations. It is acceptable to connect some groups to the unit perimeter (a "peninsula") but most groups ($\geq$ 70% by stem count) should be "islands" retained inside the treatment unit perimeter.

  Select live trees that are dominant or codominant in the stand (but in no case should a retained tree be smaller than 8 inches DBH). Trees having obvious (even severe) mechanical bole or crown defects (broken top, forked bole, stem decay, cat face, bayonet top, lop-sided-crown, etc.) are preferred over undamaged, symmetrical trees. Any conifer species is an acceptable choice for retention. However, do not mark for retention any live tree infested with bark beetles (MPB or other species) or root disease, or that is an obvious safety hazard. Generally, select lodgepole pines with a Hawksworth dwarf mistletoe rating of 2 or less. Occasionally, however, it may be necessary to leave a pine with mistletoe rating of 3 or more to satisfy the spatial distribution standards above (i.e., no area larger than 4 acres should be devoid of live trees).

Retain on average 8 live character trees per acre. Trees may be retained singly or in groups of up to 32 trees (equivalent to 1 tree group/4 acres). Leaving a mixture of single trees and groups would be the most desirable result. Select trees that are away from roads or likely landing locations. It is acceptable to connect some groups to the unit perimeter (a "peninsula") but most groups (≥ 70% by stem count) should be "islands" retained inside the treatment unit perimeter. Select live trees that are dominant or codominant in the stand (but in no case should a retained tree be smaller than 9 inches DBH). Trees having obvious (even severe) bole or crown defects (broken top, forked bole, spike top, stem decay, cat face, bayonet top, lop-sided-crown, etc.) are preferred over undamaged, symmetrical trees. Any conifer species is an acceptable choice for retention. However, do not mark for retention any live tree infested with bark beetles (MPB or other species) or root disease, or that is an obvious safety hazard. Generally, select lodgepole pines with a Hawksworth dwarf mistletoe rating of 2 or less. Occasionally, however, it may be necessary to leave a pine with mistletoe rating of 3 or more to satisfy the spatial distribution standards above (i.e., no area larger than 4 acres should be devoid of live trees).

Raptors (Wildlife)

- Where management actions are proposed within a 3/8-mile radius of a known raptor nest site, a wildlife biologist will establish one nesting habitat protection area of no more than 30 acres in size. The size of a nest stand protection area necessary for a species' protection will vary by species and for many small owl species is typically no more than 5 acres. One protection area of no more than 30-acres shall be centered on the active or inactive raptor nest site. Trees within the nest stands and/or reserve nest stands shall not be marked for removal.
- Within ¼-mile of an active raptor nest, ***limited use*** of an existing road (that has been and is currently closed to public travel) ***may be granted*** to allow workers to access worksites more than ¼-mile beyond the nest. However, permission to use a road for daily access to a worksite would be granted on a case by case basis only and in consultation with a wildlife biologist. On average, no more than 4 separate vehicle passes/day would be allowed on a road that is adjacent to (*i.e.*, within ¼-mile of) an active raptor nest. One "pass" is defined here as the single disruptive event caused by 1 vehicle (or as many as 3 vehicles together) traveling along the road segment (adjacent to an active nest) on a single occasion. This limited use exception is NOT intended to allow log haul past the nest during the seasonally restricted period. Only vehicles used for transporting workers (including FS sale administration personnel), logging machinery, machinery maintenance equipment or fuel would be permitted to use a road during the seasonal restriction.

  Include language in timber sale contract provision C[T]6.25# (Site Specific Protection Measures for Threatened, Endangered and Sensitive Species) defining this nest-centered seasonal restriction. The roads and sections of roads where the seasonal restriction is potentially applicable may be displayed on the sale area map(s). For purposes of identifying in the TS contract areas where logging operations are seasonally restricted, roads or road sections affected by this project design criteria may be shown on contract maps.

Watershed Conservation Practices

The following are Forest Plan Standards (USDA 1997) and Watershed Conservation Practices (WCP) Management Measures with the associated Design Criteria (guidelines) adopted from the WCP Handbook (FSH 2509.25) which are pertinent to timber management. These practices are proven to protect soil, aquatic, and riparian ecosystems. Implementation of these standards and guidelines will protect the soil and water resources and ensure compliance with legal requirements for the water and riparian resources.

Routt Forest Plan Water and Aquatic Guideline 1: Incorporate appropriate practices and design criteria from the Watershed Conservation Practices Handbook (FSH 2509.25) into all project design, analysis, and decision documents.

RNF Water and Aquatic Standard 2; WCP management measure (1): Manage land treatments to conserve site moisture and to protect long-term stream health from damage by increased runoff.

Design Criteria: In each watershed containing a 3-rd order and larger stream, limit connected disturbed areas so the total stream network is not expanded by more than 10%. Progress toward zero connected disturbed area as much as practicable. Where it is impossible or impracticable to disconnect a particular connected disturbed area, minimize the areal extent of the individual connected disturbed area as much as practicable.

RNF Water and Aquatic Standard 3; WCP management measure (2): Manage land treatments to maintain enough organic ground cover in each land unit/activity area to prevent harmful increased runoff.

Design Criteria: Maintain the organic ground cover of each activity area so that pedestals, rills, and surface runoff from the activity area are not increased. The amount of organic ground cover needed will vary by different ecological types and should be commensurate with the potential of the site. Restore the organic ground cover of degraded activity areas within the next plan period, using certified local native plants as practicable; avoid persistent or invasive exotic plants.

RNF Water and Aquatic Standard 3; WCP management measure (3): In the water influence zone (WIZ) next to perennial and intermittent streams, lakes, and wetlands, allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition.

Design Criteria: Allow no action that will cause long-term change to a lower stream health class in any stream reach. In degraded systems (that is At-risk or Diminished stream health class), progress toward robust stream health within the next plan period.

Allow no action that will cause long-term change away from desired condition in any riparian or wetland vegetation community. Consider management of stream temperature and large woody debris recruitment when determining desired vegetation community. In degraded systems, progress toward desired condition within the next plan period.

Keep heavy equipment out of streams, swales, and lakes, except to cross at designated points, build crossings, or do restoration work, or if protected by at least 1 foot of packed snow or 2 inches of frozen soil. Keep heavy equipment out of streams during fish spawning, incubation, and emergence periods.

Ensure at least one-end log suspension in the WIZ. Fell trees in a way that protects vegetation in the WIZ from damage. Keep log landings and skid trails out of the WIZ, including swales.

Locate new concentrated-use sites outside the WIZ if practicable and outside riparian areas and wetlands. Armor or reclaim existing sites in the WIZ to prevent detrimental soil and bank erosion.

RNF Water and Aquatic Standard 5; WCP management measure (4): Design and construct all stream crossings and other instream structures to provide for passage of flow and sediment, withstand expected flood flows, and allow free movement of resident aquatic life.

Design criteria: Install stream crossings to meet Corps of Engineers and State permits, pass normal flows, and be armored to withstand design flows.

Size culverts and bridges to pass debris. Engineers work with hydrologists and aquatic biologists on site design.

Install stream crossings on straight and resilient stream reaches, as perpendicular to flow as practicable, and to provide passage of fish and other aquatic life.

Install stream crossings to sustain bankfull dimensions of width, depth, and slope and keep streambeds and banks resilient. Favor bridges, bottomless arches or buried pipe-arches for those streams with identifiable flood plains and elevated road prisms, instead of pipe culverts. Favor armored fords for those streams where vehicle traffic is either seasonal or temporary, or the ford design maintains the channel pattern, profile and dimension.

NOTE: Temporary bridges or vented fords (fords with pipes to pass low flows) are potential options where appropriate depending upon traffic use. Temporary bridges should be installed and removed seasonally. Temporary fords should be removed when the need for the crossing no longer exists. Pipe culverts pose the most risk of channel damage, migration blockage, and sediment, while fords can impact incised channels (WRENSS II.57; Terrene Institute 1994; Bohn 1998).

RNF Water and Aquatic Standard 6; WCP management measure (5): **Conduct actions so that stream pattern, geometry, and habitats are maintained or improved toward robust stream health.**

RNF Water and Aquatic Standard 7; WCP management measure (6): Do not degrade ground cover, soil structure, water budgets, or flow patterns in wetlands.

Design Criteria: Keep ground vehicles out of wetlands unless protected by at least 1 foot of packed snow or 2 inches of frozen soil. Do not disrupt water supply or drainage patterns into wetlands.

Keep roads and trails out of wetlands unless there is no other practicable alternative. If roads or trails must enter wetlands, use bridges or raised prisms with diffuse drainage to sustain flow patterns. Set crossing bottoms at natural levels of channel beds and wet meadow surfaces. Avoid actions that may dewater or reduce water budgets in wetlands.

Avoid long-term reduction in organic ground cover and organic soil layers in any wetland (including peat in fens).

Avoid any loss of rare wetlands such as fens and springs.

RNF Soil Standard 1; WCP management measure (9): Limit roads and other disturbed sites to the minimum feasible number, width, and total length consistent with the purpose of the specific operations, local topography, and climate.

Design Criteria: Construct roads on ridge tops, stable upper slopes, or wide valley terraces if practicable. Stabilize soils onsite. End-haul soil if full-bench construction is used. Avoid slopes steeper than 70%.

Avoid soil-disturbing actions during periods of heavy rain or wet soils. Apply travel restrictions to protect soil and water.

Install cross drains to disperse runoff into filter strips and minimize connected disturbed areas. Make cuts, fills, and road surfaces strongly resistant to erosion between each stream crossing and at least the nearest cross drain. Revegetate using certified local native plants as practicable; avoid persistent or invasive exotic plants.

Construct roads where practicable, with outslope and rolling grades instead of ditches and culverts.

Retain stabilizing vegetation on unstable soils. Avoid new roads or heavy equipment use on unstable or highly erodible soils.

Use existing roads unless other options will produce less long-term sediment. Reconstruct for long-term soil and drainage stability.

Avoid ground skidding on sustained slopes steeper than 40% and on moderate to severely burned sustained slopes greater than 30%. Conduct logging to disperse runoff as practicable.

Designate, construct, and maintain recreational travelways for proper drainage and armor their stream crossings as needed to control sediment.

During and following operations on outsloped roads, retain drainage and remove berms on the outside edge except those intentionally constructed for protection of road grade fills.

Locate and construct log landings in such a way to minimize the amount of excavation needed and to reduce the potential for soil erosion. Design landings to have proper drainage. After use, treat landings to disperse runoff and prevent surface erosion and encourage revegetation.

RNF Soil Standard 2; WCP management measure (10): Construct roads and other disturbed sites to minimize sediment discharge into streams, lakes, and wetlands.

Design Criteria: Design all roads, trails, and other soil disturbances to the minimum standard for their use and to "roll" with the terrain as feasible.

Use filter strips, and sediment traps if needed, to keep all sand-sized sediment on the land and disconnect disturbed soil from streams, lakes, and wetlands. Disperse runoff into filter strips.

Key sediment traps into the ground. Clean them out when 50% full. Remove sediment to a stable, gentle, upland site and revegetate.

Keep heavy equipment out of filter strips except to do restoration work or build armored stream or lake approaches. Yard logs up out of each filter strip with minimum disturbance of ground cover.

Design road ditches and cross drains to limit flow to ditch capacity and prevent ditch erosion and failure.

RNF Soil Standard 3; WCP management measure (11): Stabilize and maintain roads and other disturbed sites during and after construction to control erosion.

Design Criteria: Do not encroach fills or introduce soil into streams, swales, lakes, or wetlands.

Properly compact fills and keep woody debris out of them. Revegetate cuts and fills upon final shaping to restore ground cover, using certified local native plants as practicable; avoid persistent or invasive exotic plants. Provide sediment control until erosion control is permanent.

Do not disturb ditches during maintenance unless needed to restore drainage capacity or repair damage. Do not undercut the cut slope.

Space cross drains according to road grade and soil type as indicated below: (ex. 01). Do not divert water from one stream to another.

Empty cross drains onto stable slopes that disperse runoff into filter strips. On soils that may gully, armor outlets to disperse runoff. Tighten cross-drain spacing so gullies are not created.

Armor rolling dips as needed to prevent rutting damage to the function of the rolling dips. Ensure that road maintenance provides stable surfaces and drainage.

13.3 - Exhibit 01

Maximum Cross-Drain Spacing in Feet Based on Soil Types*

Unified Soil Classification - ASTM D 2487				
Road Grade (%)	ML, SM Extr. Erodible Silts-sands with little or no binder (d.g.)	MH, SC, CL Highly Erodible Silts-sands with moderate binder	SW,SP,GM,GC Mod. Erodible Gravels + fines & sands with little or no fines	GW,GP Low Erodible Gravels with little or no fines
1-3	600	1000	1000	1000
4-6	300	540	680	1000
7-9	200	360	450	670
10-12	150	270	340	510
13-15	120	220	270	410

*****Adapted from original work on the Siuslaw National Forest documented in the Transportation Engineering Handbook of the Pacific Northwest Region, 1966. Original spacings were based on rainfall intensities of 1 to 2 inches per hour falling in 15 minutes. Soil groups and spacings have been modified, based partly on ditch erosion information in WRENSS, to better represent climate and soil regimes found in the Rocky Mountain Region.

These are maximum spacings. They should be reduced if warranted by onsite factors such as expected road use, downslope stability and erosion hazards, and filter strip capability to trap runoff and sediment and conserve ground cover integrity given the extra water. Combine these spacings with common sense to place cross drains where damage to ditches, slopes, and streams will be minimized. For example, shorten or extend the spacing where needed to move a cross-drain outlet from a stream headwall to a convex slope.

Where berms must be used, construct and maintain them to protect the road surface, drainage features, and slope integrity while also providing user safety.

RNF Soil Standard 4; WCP management measure (12): Reclaim roads and other disturbed sites when use ends, as needed, to prevent resource damage.

Design Criteria: Site-prepare, drain, decompact, revegetate, and close temporary and intermittent use roads and other disturbed sites within one year after use ends. Provide stable drainage that disperses runoff into filter strips and maintains stable fills. Do this work concurrently. Stockpile topsoil where practicable to be used in site restoration. Use certified local native plants as practicable; avoid persistent or invasive exotic plants.

Remove all temporary stream crossings (including all fill material in the active channel), restore the channel geometry, and revegetate the channel banks using certified local native plants as practicable; avoid persistent or invasive exotic plants.

Restore cuts and fills to the original slope contours where practicable and as opportunities arise to re-establish subsurface pathways. Use certified local native plants as practicable; avoid persistent or invasive exotic plants. Obtain stormwater (402) discharge permits as required.

Establish effective ground cover on disturbed sites to prevent accelerated on-site soil loss and sediment delivery to streams. Restore ground cover using certified native plants as practicable to meet revegetation objectives. Avoid persistent or invasive exotic plants.

Best Management Practices

Mandatory Best Management Practices per 33 CFR 323.4 (a)(6) to qualify for the silvicultural exemption and meet the Clean Water Act.

- Limit road and trail system to the minimum feasible number.
- Except at crossings, locate all roads sufficiently far from streams and water bodies to minimize discharges.
- Crossings shall not restrict the passage of flood flows.
- Fills shall be stabilized before and after construction to prevent erosion.
- Minimize equipment disturbance in 'waters' outside construction zone.
- Take borrow material from upland sources wherever possible.
- Road construction shall not disrupt the movement of resident aquatic life.
- Minimize vegetative disturbance in 'waters' during and after construction.
- Avoid discharge into migratory waterfowl habitat, spawning areas, or special aquatic sites.

Winter Logging Best Management Practices

- Conduct winter logging operations when the ground is frozen to a depth of six inches or more, or when snow cover is adequate to minimize site disturbance. Do not cross springs, seeps and areas of water that do not freeze well.
- Before logging, mark existing culvert locations. During and after logging, make sure that all culverts and ditches are open and functional. Designate or mark all stream courses, including small streams, prior to snowfall.
- Where water crossings cannot be avoided or frozen conditions cannot be relied upon, use portable bridges or PVC pipe bundles.
- Design stream crossings to save the bank structure and accommodate high flows in the event of an untimely thaw.
- Plow or pack snow in the operating area to minimize the insulation value and facilitate ground freezing; clear enough area to accommodate future snow plowing.
- When hauling on constructed specified roads, haul only on a snow road that has been constructed by clearing snow, allowing the ground to freeze, and compacting snow on top.
- Monitor the operating conditions closely after consecutive nights of above freezing temperatures.
- Cease operations on roads and in salvage units when resource damage begins to occur.
- When daytime temperatures are above freezing, but nighttime temperatures remain below freezing, plan to operate only in the morning and cease operations when ground temperature is above freezing.

- Plan to move equipment and materials to upland areas prior to the occurrence of thawing conditions.
- Following completion of snow-road use, restore stream crossings to near pre-road conditions to prevent ice-dams.
- Do not use stream channels for roadways except for crossings.
- Return the following summer and build erosion barriers on any skid trails or roads that are steep enough to erode or over 10%.
- When plowing snow for winter salvage, provide breaks in the snow berm to allow road drainage.