Chapter 3

Environmental Consequences

This chapter presents information about current resource conditions in the MEL (Malo East Lake) planning area, and the direct, indirect and cumulative effects of implementing the proposed action. These effects are the scientific and analytic basis for the Deciding Officer to base their decision on. The information presented in this chapter summarizes and cites the specialists' reports that are found in the project analysis file. Full versions of these specialists' reports are available at the Three Rivers Ranger District office in Kettle Falls, Washington.

Chapter 3 is organized into three parts:
1) A list of other actions (past, present, and future) considered by specialists when analyzing Cumulative Effects in their reports.
2) A brief discussion of the effects of not conducting the project. It should be noted that under the Healthy Forest Restoration Act, agencies are not expected to develop a full no-action alternative; however evaluation of the effects of failing to implement the project is considered useful to the decision maker.
3) Analyses of the effects of the proposed action by resource or topic area. Each resource area or topic section is organized similarly as follows:

- **Introduction:** Contains a short overview of why, who, and from whence the following section came. It also includes a description of the data collection.
- **Framework:** A brief list of the primary laws and direction under which the proposed action is governed in relation to the resource of topic area.
- **Issues, Direction, and Measures:** Issues identified by the District Ranger and the IDT from public comments (see Chapter 1, Public Involvement page 14) and incorporated into the project design and effects analysis. These issues are summarized in Chapters 1 and 2, and are re-listed here along with measures used in their analysis. The reader is directed to the appropriate section or discussion to read the analysis. Additional measures are dictated by the framework and the purpose and need. These are also outlined in this section with reference to the appropriate discussion area and analysis measure.
- **Existing Conditions, Direct and Indirect Effects:** This section includes discussion of existing conditions and background information necessary to understand the analyses. Direct effects are those caused by the action and occurring at the same time and place. Indirect effects are caused by the action that are later in time or farther removed in distance, but are still reasonably foreseeable. An exception to this organization in made in the Wildlife section which is organized first by species and then by existing conditions and effects.
- **Cumulative Effects**: This is a discussion of impacts resulting from the incremental impact of the action, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions.

OTHER ACTIONS CONSIDERED

In the analysis process past, present, and reasonably foreseeable future actions that might have cumulative impacts with the MEL proposed action were identified. Those actions are listed below. Each resource area considered different mixes of these actions, depending on the cumulative effects boundary for the resource area and the resource affected. For example, the cumulative effects boundary for grazing considers the range allotment boundaries whereas the cumulative effects boundary for hydrology is watershed. Only those past, present and reasonably foreseeable actions that overlap the geographic analysis area boundary for each particular resource are considered, and only if those other actions are expected to have overlapping effects with the MEL project.

Land Use and Population Changes

Ferry County reports an increase in total population from 6,295 in 1990 to 7,260 in 2000, an increase of approximately 15 percent in ten years (State of Washington OFM 2007). The majority of the non-federal lands in the County are held as either public property or as Indian lands. Private land is becoming more expensive as the population grows and more property is developed. This factor combined with the mountainous nature of the County's geography is expected to produce higher demands on privately held land in the future. Recent land sales include a large track of land adjacent to NFS land in the South Fork St. Peter Creek drainage by Vaagen Brothers Timber Company to a private individual.

Private Forestry Practices

The Washington State Department of Natural Resources (DNR) maintains a database for Forest Practices Applications. When past and current applications are combined, about 4,700 acres of private lands in watersheds of the MEL planning area will have been harvested by the year 2009. Logging on private lands typically removes the best and largest trees in the stand, all snags, and large down wood. This puts the onus on the Forest Service to manage NFS lands for superior genetic strains of trees, large trees, snags, and down wood.

Timber Harvest- National Forest System Lands

About 7,000 acres of NFS lands within the planning area have been logged since the 1950s (table 3.1). About 2,000 acres were logged more than once. Effects of past logging include removal of large trees, and an unnatural increase in stands of small, uniform trees. Those stands (areas of forest with similar tree species composition and size) resulting from clearcuts still lack snags and down wood that provide wildlife habitat. The following table summarizes the logging history of the planning area by decade.

Table 3.1. Past Timber harvest on NFS lands in the Malo East Lake planning area

Decade	General Prescription	Acres
1950s	Clearcut, seedtree, shelterwood	47
	Overstory Removal, thinning, salvage & other partial removal	811
1960s	Clearcut, seedtree, shelterwood	1,785
	Overstory Removal, thinning, salvage & other partial removal	1,756
1970s	Clearcut, seedtree, shelterwood	21
	Overstory Removal, thinning, salvage & other partial removal	1,865
1980s	Clearcut, seedtree, shelterwood, fire salvage	622
	Overstory Removal, thinning, salvage & other partial removal	722
1990s	Clearcut, seedtree, shelterwood, fire salvage	881
	Overstory Removal, thinning, salvage & other partial removal	962
2000s	Clearcut, seedtree, shelterwood, fire salvage	40
	Overstory Removal, thinning, salvage & other partial removal	0

There are no other Forest Service fuel reduction projects occurring in the planning area. No other projects on NFS lands besides the MEL project are planned at this time would reduce the risk of wildfire from reaching private lands.

The Herron Wildland Urban Interface timber sale is planned and treatment is expected to begin in 2008 adjacent to the south boundary of the planning area. The Herron timber sale includes 436 acres within the Herron watershed of commercial and non-commercial treatments. It will contribute in part toward improving access and egress along FS road 2154 and reducing the risk of wildfire moving into the planning area from the south. Trout and Vulcan are ongoing Forest Service timber sale projects in the cumulative effects analysis area for wide ranging wildlife species that could affect their seclusion and hiding cover.

Violations in personal use wood cutting on NFS lands, especially via breaching closed roads, continues to suppress snag numbers for wildlife and large woody debris available to maintain creek stability.

Timber Harvest- Land Managed by Other Agencies

No Washington State Department of Natural Resources (DNR) sales are planned in the near future within the planning area boundary (Nielsen 2007). One sale is currently under way in the Long Alec Creek drainage.

The U.S. Department of the Interior, Bureau of Land Management (BLM) has a proposed fuels reduction project in the Lambert Creek Watershed (T37NR34E Sec 5, E 1/2). The total acreage within the BLM planning area boundary is 426 acres, however only about 60 percent (265 acres) contains commercial timber land. The remainder of their planning area is open, grass/brush, south slopes that will not be affected by their proposed action. This is a stewardship project and will include 0.5 miles of new permanent road that will be closed to the public. Leave tree spacing is to about 50 feet between boles (trunks); this is equivalent to a more open shaded fuel break. Leave trees per acre would be approximately 20 to 25 trees (Gardner 2007). This will contribute to Lambert Creek WUI fuels treatments, and may affect water resources in the watershed.

Fire

In watersheds of the planning area, the Aeneas Fire burned 2,220 acres in 1988; the Copper Butte Fire (1994) burned a total of 10,580 acres, and the Mt. Leona Fire burned 6,144 acres (2001). These fires have formed a mosaic burn pattern of different intensities across the landscape. They have isolated the forests in the planning area for some far ranging species like grizzly bear, from unburned areas east of and along the Kettle Crest. They have also impacted streams with debris flows and sedimentation. The fires contributed to Lambert Creek exceeding the State Water Quality standard for temperature and the Forest Plan threshold for equivalent clearcut acres.

These lightning caused fires typically started up high and moved down slope towards private land, a pattern that the proposed WUI treatments are attempting to prevent. Many private landowners are reducing the fuels around their properties and homes. This is very helpful in preparing the WUI for the next fire event and will aid fire fighters.

Prescribed Fire

The everyday activities that produce vehicle exhaust, dust, home woodstove smoke, and other emissions are the background emissions that forestry and agricultural burning must take into account before they are permitted. State and national air quality regulations work to limit the rate of emissions so the production of particulates does not exceed the natural cleansing abilities of the atmosphere.

Fire Suppression

A century of fire suppression in the planning area has generally created a condition of excessively dense, disease infested stands that are increasingly prone to stand-replacing fires. Many of these stands historically had frequent low intensity ground fires that tended to clear out the understory and promote open single-story stand structures. The Forest Service is expected to keep suppressing all fire starts and no changes are expected to Forest Service fire suppression policies in the next 3 to 5 years. Fuels treatments like

the MEL project, where fire can be reintroduced in a safe and intentional manner becomes vitally important for the maintenance of the planning area's fire adapted biophysical environments.

Insects and Disease Infestations

Overly dense forests in the planning area have created a situation highly susceptible to insects and diseases. The situation could, if left unchecked, become epidemic killing large populations of certain species like Douglas-fir and ponderosa pine.

Noxious Weed Management

Noxious weeds have occurred within the planning area for many decades and the Forest has been treating them across the Forest since approximately 1992. Vehicles, humans, animals, and other vectors will continue to carry new noxious weed threats onto NFS lands. The Forest will continue to work with the County Weed Board to treat them, but some, like St. John's-wort, are expected to become widespread and common. Private property near the Forest appears to support greater noxious weed populations. This is partly due to the amount of open, un-forested, areas on private property.

Climate Change

Many scientists predict that climate change is expected to increase vegetation growth and density, alter vegetation types and species survival at the limits of their range, increase insect outbreaks resulting in snags, and increase the likelihood of lightening strikes and wildfire starts in eastern Washington.

Contributions toward global warming from forest removal have been discussed in regards to climate change. An article donated by the public "A plan to keep carbon in check," (Socolow and Pacala, Scientific American 295:3) lists stopping all deforestation as one method for reducing the future output of carbon emissions. Carbon dioxide is a major green house gas thought to be contributing to climate change. Deforestation is not, however, defined in the article, but is assumed to mean removal of all trees on a site. The accompanying use of fossil fuels for extraction of trees would add, in part to global warming as defined by this article. However, deforestation in the sense that all trees are removed would not occur in the proposed action.

Based on a recent Scientific American article (Schultz 2008), forests dominated by large trees sequester more carbon than ones comprised of many smaller trees. Hurteau et al. (2008) concluded that dry type forests "thinned to approach pre-settlement tree density and stand structure harbor substantially more carbon after wildfire than adjacent dense stands that have not been thinned. Moreover, the biomass removed by thinning is available for wood products or energy generation, the latter replacing fossil-fuel emissions…" Treatments to remove the majority of small-diameter trees and manage for large trees preserve more carbon in forests because when they burn, less carbon is catastrophically released as smoke, and therefore contributes less to green house gasses (Hurteau et al. 2008).

Several events have occurred within the last 20 years that continue to shape the landscapes in these watersheds. The analysis area experienced five wetter than average years between 1995 and 1999. This resulted in saturated soils on unstable slopes which produced several landslides and debris flows in the headwaters of these basins. The 1998 May storm resulted in an estimated 3.5 million dollars in property damage in Ferry County (NOAA, National Climatic Data Center, U.S. Dept. of Commerce). Many roads in the planning area were severely damaged. Current road maintenance budgets prevent the CNF from maintaining and improving culverts and roads in some areas to standards that would minimize the potential damage of such a storm event.

Debris Slides and Erosion

A series of landslides, slumps, and debris torrents have occurred recently in the headwaters of several of the drainages within the planning area. Though these debris slides occurred generally outside of the planning area, they have affected sedimentation and channel structure in Aeneas, Lambert, and St. Peter Creeks. Most of these slides resulted from the combination of wildfire denuding the upper portions of the drainage and large rain events.

Livestock Grazing

Livestock grazing has occurred in the planning area since the area was settled in the late 1800s. Forest Service records date back to the mid 1940s and include both sheep and cattle grazing. The planning area is within the North and South St. Peter Creek, the Copper-Mires, and Lambert allotments. It is expected that numbers of livestock and grazing systems will continue in the planning area in a manner similar to what they are today. Cattle access to creeks has been a cause of bank instability in the planning area, and cattle have been linked to transport of noxious weeds.

Between approximately 1975 and 1995 there was a dramatic increase in the amount of roads and timber harvest units which provided livestock access to riparian areas. In the past, many of these activities also prescribed the use of palatable forage species when seeding for erosion control. This created an environment that attracted livestock into riparian areas and provided forage that allowed them to stay rather than moving to uplands.

Recreation

Dispersed recreational use on State and Federal lands will increase slightly in direct proportion to population growth in the County and in urban areas such as Spokane.

Road Construction

Approximately 200 miles of private and non-private roads exist in the watersheds of the planning area. The addition of new roads for future timber harvest, mining, and other activities is not likely to add appreciably to the existing transportation system since existing roads currently provide good access. Future residential development in the lower watersheds may add short road segments (driveways) and created openings. This development is likely to be slow based on the current growth rate (15 percent total

population per decade) and economic conditions of the county. New stream crossings will likely be added slowly at the same rate as new roads.

People will continue to illegally create and use unauthorized roads which will facilitate spread of noxious weeds and disturbs wildlife.

Road Maintenance

Roads in the planning area are dominantly classified as Level 1 and Level 2 road maintenance (see page 129 for definitions). According to the CNF document titled "Forest Scale Roads Analysis" (USDA Forest Service 2005b) it is estimated that 16 percent of Level 1 roads, 25 percent of Level 2 roads, and 100 percent of Level 3-5 roads are maintained yearly. Declining road maintenance budgets has lead to the situation where the yearly maintenance needs on the estimated 372 miles of Level 3-5 roads (estimated at $272,000) require nearly 100 percent of the current CNF road maintenance budget leaving little funding available for lower priority maintenance needs on Level 1 and 2 roads. This trend is expected to continue.

CONSIDERATION OF NO ACTION

Introduction

About 190 million acres of Federal forest and rangeland in the lower forty-eight States face high risk of large-scale insect or disease epidemics and catastrophic fire due to deteriorating ecosystem health and drought. While the increased risk of catastrophic wildland fire is often blamed on long-term drought or expansion of the wildland-urban interface (WUI) in the Western United States, the underlying cause is the buildup of forest fuel and changes in vegetation composition over the last century. Unnaturally dense stands competing for limited water and nutrients are at increased risk of unnaturally intense wildland fires and insect or disease epidemics (USDA Forest Service and USDI Bureau of Land Management 2004).

Framework

All laws, regulations, and Forest direction would apply

Issues, Direction, and Measures

When considering the consequences of taking no action, the degree to which the purpose and need would be met is the primary consideration.

Direction from Framework, and Purpose and Need

Break up the existing fuel continuity on National Forest System lands, and reduce the risks of wildfire damage to private lands and structures.

- See Surface and Ladder Fuels/Fire Regime Condition Class, Crown Fire Susceptibility/Crown Continuity, and Wildland-urban Interface discussions below

Improve overall forest health on National Forest System lands through active management as it relates to the forest health within the WUI and will have a direct influence on long term fire prevention and fire suppression.

- See Inter-Tree Competition/Species Composition/Forest Insects and Diseases discussion below.

Existing Conditions, Direct and Indirect Effects

Under the no action alternative, current Forest Service plans continue to guide management of NFS land in the planning area. On-going activities such as fire prevention and suppression, livestock grazing, dispersed recreation, mining, road maintenance, noxious weed treatments, and established special use permits would continue. No new activities would be initiated to accomplish proposed project goals. Management activities on non-federal lands are assumed to continue at or near current levels.

Two scenarios are possible if no action is taken. The first assumes that no large, uncontrollable wildland fires will occur within or adjacent to the planning area in the foreseeable future. The second assumes that some type of high intensity, stand replacement fire would occur.

As discussed in Betcha et al. (2001) stands at the highest risk to uncharacteristic wildfire are those in biophysical environments that had low to moderate severity fire historically. That describes approximately two thirds of the planning area; the Warm, dry Douglas-fir/shrub biophysical environment (page 98). District lightening records show the frequency of fire starts is high. Without vegetation and fuel treatments, wildfires are expected to be increasingly severe. It is reasonable to assume that severe impacts to resources would follow a large, uncontrollable fire.

Surface and Ladder Fuels

Fuel surveys in the planning area noted a high level of both surface and ladder fuels. In general, ladder fuels were more widespread than surface fuels, but overall, the current levels of each are greater than would be expected if natural fire regimes were intact. With no action, ladder fuels would not be cut and the base-to-crown height (a measure of distance from ground and ladder fuels to the stand's canopy) would remain as it is, or decrease. It will be increasingly difficult to prevent fire ignitions from reaching tree crowns. Fire severity throughout the planning area is expected to increase as fuels build.

Crown Fire Susceptibility/Crown Continuity

Stand data from the planning area demonstrate that the units proposed for treatment have a high risk of fire reaching and being sustained as a crown fire (crown fire susceptibility). Without treatments, this risk would remain or increase. The current trend toward a more uniform landscape would continue. If the proposed action was not implemented the risk to private land would not be reduced as per the intent of the National Fire Plan and the Ferry County, Washington Wildfire Protection Plan. This risk would increase as fuels build and forests become denser.

Assuming no wildfire event or pathogen outbreaks occur, (although unlikely) the landscape would eventually reach a condition dominated by multi-story structure with large and old trees. However, the landscape would be strikingly different from the historic more fire resistant conditions. Taking no action would mean that no multi-storied forests with large trees are converted to the historic condition of single-storied stands with large trees in accordance with Eastside Screens (USFS 1994). Hazardous fuels would not be reduced in these stands and risk of losing them would remain high.

Without treatments, private land would not be protected by treating the surrounding wildland-urban interface on NFS land. Should a wildfire occur, risk of a running crown fire reaching private ground in this area would remain as is, or increase.

Inter-Tree Competition/Species Composition/Forest Insects and Diseases

Stand densities and resulting inter-tree competition would continue to increase throughout the area. As densities increase, growth and vigor decline and mortality occurs (Drew and Flewelling 1979; Reineke 1933). In addition, stress caused by excessive density makes the stands prone to injury and mortality caused by insect and disease (Powell et al. 2001). As mortality of the overstory occurs, regeneration of Douglas-fir, a species prone to forest pathogens and fire damage when young, will establish in openings increasing the amount of multi-storied stands and ladder fuels.

In general, increased multi-storied conditions and excessive tree densities would reduce stand vigor, encourage stagnation, and weaken trees making them more susceptible to pathogen colonization. As pathogen levels increase, mortality of the infected trees would occur and add to the dead wood or fuel component of stands. The mature and old ponderosa pine and larch would continue to die due to insects or severe wildfire and would rarely be replaced by new seedlings. The understory would continue to fill in with shade tolerant Douglas-fir. Pathogens that have existed as endemic pests would verge on the epidemic. Global climate change would increase this damaging trend if the area becomes more arid adding stress to the more moisture demanding understory Douglas-fir trees.

Access and Egress

If the proposed action was not implemented firefighter and public safety would not be improved as per the intent of the National Fire Plan or the Ferry County, Washington Wildfire Protection Plan. Residents along roads accessing the major drainages in the planning area would continue to be at risk of having evacuation routes cut off. Access into Art Creek drainage would remain time consuming for fire fighters exposing the surrounding private land to risk of wildfire escape.

Impacts to Resources

Wildfire has a bigger impact on resources than prescribed fire activities. The resource damage and disturbances that occur on large wildfires include emergency fireline construction, constructed safety zones, and roads. Prescribed fire activities sometimes necessitate firelines and other disturbed areas but these impacts are typically less than those created by wildfires. If a wildfire started, it would be increasingly difficult to put

out and intensities would be much greater than were found historically, causing crown fires and soil sterilization in areas. Fires would be more prone to spread from the drier areas to the wetter plant associations due to severe fire behavior. This would endanger valuable mature and old trees and wildlife habitat, and fire-fighters, as well as private property.

Wildlife Habitat

Taking no action contributes toward meeting Forest Plan direction over the short term by avoiding any treatments that may impact existing habitat for late and old structure dependent species such as barred owl, pileated woodpecker, pine marten and northern three-toed woodpecker. Over the long term, by increasing the risk of insect infestations, disease, and wildfire, it does not contribute toward development or maintenance of healthy diverse forest conditions that will continue to support these species across the landscape. For example, if no action were taken, larger snags would remain on-site as down wood, and thus continue to contribute to pileated woodpecker habitat. Should a wildfire occur, a stand-replacing fire would cause a flush of snags, which would benefit pileated woodpeckers in the short term, but result in a long-term decrease because once the dead trees fell (about 20 years) the area would not provide pileated woodpecker nesting habitat until large trees again grew on the site, at minimum about 100 years.

Riparian, Fisheries, Soils, and Hydrology

Without a wildfire occurrence sediment loads would maintain or decrease as upstream reaches in the old burn areas re-vegetate and hydrologic recovery occurs.

Depending on the size, location, and intensity of a wildfire, peak flows in streams of the planning area would be higher with increased rates of bedload movement, scouring, bank erosion, and downcutting in the higher, steeper transport reaches of these streams. The most dramatic effect would be a large increase in sediment delivery to streams. Sheet, rill, and gully erosion from upslope soils exposed by extreme burning conditions would directly increase sediment delivery to streams and reduce upland soil productivity. Increased stream flows may increase the short-term risk of flooding, not only within the project area, but also in low-lying downstream areas along Curlew Creek as well.

Existing roads will continue to contribute sediment to streams and riparian areas from cuts, fills, and the road travelway at road/stream crossings and where roads are located adjacent to streams. Some of the existing culverts on forest roads were installed a long time ago and are reaching the end of their normal life expectancy. This condition is aggravated by insufficient road maintenance budgets for Forest Service roads. If a wildfire did occur, road segments adjacent to streams and at stream crossings would be at higher risk of failure.

Stream temperature and cattle access without treatments would slowly improve. Vegetation will grow over streams where past fire or management has removed it, and the vegetation will increasingly prevent cattle access. Changes are not expected to be measurable in the short term. Should a severe wildfire occur and shading riparian vegetation removed, temperatures would be expected to exceed State water quality

standards. Cattle access would be more plentiful, which could result in coliform bacteria populations going up.

Without action, riparian habitat quality should maintain or improve in some areas, but continue to decline in areas where woody debris along creeks is actively being harvested by forest users. If a wildfire occurred, the affected streams would see a corresponding decline in trout habitat quality. Brook trout populations would be favored over rainbow trout populations in the affected streams.

Heritage

Fire suppression has allowed for the continued buildup of fuels from downed woody debris and from the density of trees, and could cause an adverse effect to historical properties. Unchecked fire within the planning area would destroy standing and downed historical structures, affecting National Register eligibility characteristics of these historic properties.

DISCUSSION OF EFFECTS FROM THE PROPOSED ACTION, SECTIONS BY RESOURCE OR TOPIC

Fire and Fuels

Introduction

The MEL (Malo East Lake) proposed action is based on the priorities laid out in the Ferry County, Washington Community Wildfire Protection Plan (Schlosser et al. 2006b pages 143-148). New development is occurring in rural fire-prone areas, often adjacent to NFS (National Forest System) land, creating a wildland-urban interface or WUI; an area where structures and other human development meet or intermingle with undeveloped wildland. This increasing phenomenon means that more communities and structures are threatened by fire. Wildland firefighters today often spend a great deal more time and effort protecting structures than in earlier years. Consequently, firefighting has become more complicated, expensive, and dangerous.

The Ferry County, Washington Community Wildfire Protection Plan (CWPP) identifies Malo as a community "within the vicinity of Federal Lands that are at high risk from wildfires" (Schlosser et al. 2006a page 79). It also shows a high risk of wildfire to homes east of Malo in the neighborhoods of Tonasket, Aeneas, Art, North St. Peter, and South St. Peter Creek drainages. The proposed project would occur on NFS lands near these identified at risk neighborhoods.

The following report is excerpted from the CWPP and the Fire and Fuels report by Lisa Green and others, located in the project analysis file (Green et al. 2008).

Data Collection

Stand exam data was collected in 2006 on 148 commercial sized stands and 47 non-commercial sized (trees less than 7 inches in diameter) stands across the planning area. The exams included a range of resource inventory observations including fuel models, fuel loading, tree sizes and counts, plant association, stand size, structure, and species composition. This information was used to predict crown fire potential, determine existing fuel loading and insect and disease occurrence, and determine project treatments.

Fuel exam data was collected in 2006 on 25 units to determine their suitability for natural fuels (underburning) treatments. In addition, fuels data (a total of 125 plots) was collected across the Aeneas drainage in 2001. Information included major and minor tree species, slope, aspect, average tree diameter, existing fuel loading, past fire activity, fuel model, fuel continuity and arrangement, stand condition, noxious weeds present, and plant associations.

Framework

The Colville National Forest Plan (USDA Forest Service 1988 pages 4-59 and 4-60) provides the following direction with regards to fuel treatments:

- Alternative methods of treatment for activity residues (logging slash) and natural fuels will be addressed in project level planning and will be commensurate with resource management objectives.
- Burn plans will be prepared in advance of ignition and approved by the appropriate line officer for each prescribed fire. Burn plans will define what an escaped fire is. A fire that escapes will be declared a wildfire and a Wildfire Situation Analysis (WFSA) will be prepared.
- Normally, prescribed fire will be by planned ignition. There are no provisions in the Colville National Forest Fire Management Plan for unplanned or natural ignitions. A Wildland Fire Use Implementation Plan may be added as an addendum to the Fire Management Plan once further analysis has been completed.
- All fuel treatments conform to air quality guidelines.
- Provide for the retention of the kind and amount of residues needed on-site for the benefit of multiple resources (for example soil, water, and wildlife).
- Recognize the social and economic values of, and provide for, individual firewood gathering.

The National Fire Plan is a strategy developed by Federal fire-fighting agencies and Congress to prioritize and fund activities that will mitigate the growing threat of wildfires to life, property, and resources.

The purpose of the Healthy Forest Restoration Act (U.S. Congress 2003) is to reduce wildfire risk to communities, municipal water supplies, and other at-risk Federal land through a collaborative process of planning, prioritizing, and implementing hazardous fuel reduction projects. It was also created to facilitate efforts to protect forests from the threat of stand-replacing wildfire.

The Wildland and Prescribed Fire Management Policy Implementation Procedures and Reference Guide (Zimmerman and Brunnell 1998) provides information and standardization for Federal agencies implementing prescribed fire and fire use. This guide is the foundation for the administration, planning, and implementation of controlled burns and the burn plans that guide them.

Issues, Direction, and Measures

Issues from Public Input

Concern over the risk of prescribed fire escaping, and, or reaching private land

- See Wildland-Urban Interface, and Prescribed Fire Management discussions below
- Measure: Linear miles of Forest Boundary treated, Acres treated by watershed

Concern regarding roads and what happens to them after the MEL project is finished. (This was a road maintenance issue).

- See Wildland-Urban Interface discussion below
- Measure: Qualitative assessment

Direction from Framework, Purpose, and Need

Decrease the probability that a future wildland fire would develop into, or be sustained as, a stand-replacing or crown fire

- See Surface and Ladder Fuels, and Fire Regime Condition Class (FRCC) discussion below; also see Crown Fire Susceptibility page 102 and Crown Continuity page 104
- Measures: Linear miles of Forest Boundary treated, Acres by treatment type, percent acres of reduced FRCC class

Increase the ability to provide for public and firefighter health and safety during a wildland fire.

- See Wildland –Urban Interface discussion below
- Measure: Qualitative assessment

Existing Conditions, Direct and Indirect Effects

Wildland-Urban Interface (WUI)

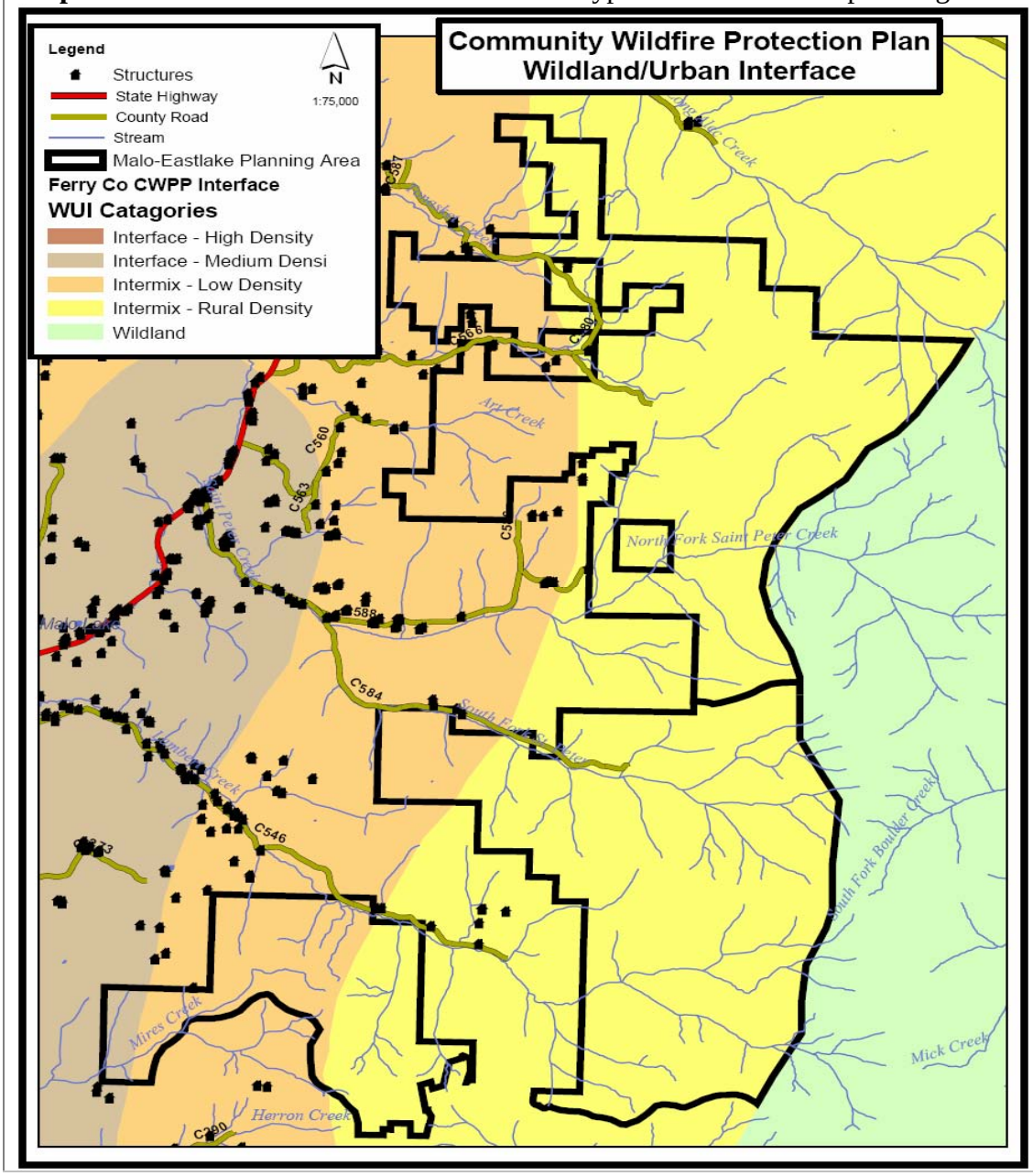
The following map shows the WUI boundary as displayed in the Ferry County Wildfire Protection Plan (Schlosser et al. 2006c page 9) with the planning area superimposed. The majority of the planning area is contained within the Intermix Rural Density and Intermix Low Density areas. The Intermix condition is described in the CWPP (County Wildfire Protection Plan) as: "A situation where structures are scattered throughout a wildland area. There is no clear line of demarcation, the wildland fuels are continuous outside and within the developed area. The development density in the intermix ranges from structures very close together to one structure per 40 acres" (Schlosser et al. 2006a page 83). A small amount in the southwestern corner of the planning area falls in the Medium Density Interface. The interface condition is defined as: "…a situation where structures abut wildland fuels. There is a clear line of demarcation between the structures and the wildland fuels along roads or back fences. The development density for an interface condition is usually 3+ structures per acre" (Schlosser et al. 2006a page 83).

The CWPP states: "Residents of Lambert Creek in the East Lake[1] neighborhood are at moderate to high risk of wildfire. Large fires occur frequently in the Kettle River Range; remnants of which are evident by the large stands of dead timber visible from State Route 21. Many homes in the Lambert Creek drainage have created a defendable area between their structures and the forest lands, yet there are many landowners with high risk trees and other vegetation adjacent to or even overhanging buildings. Furthermore, many homes in this area have been using highly ignitable wood siding, decking and roofing. Even if an actual flame front does not enter the drainage, residents could be at high risk

[1] "East Lake" is a name used in the Ferry County, Washington Community Wildfire Protection Plan to describe the neighborhood east of Curlew Lake.

due to hot gases and toxic fumes that may be funneled through the draw. Since Lambert Creek Road (C546) is the sole main access route, it will be imperative that residents are evacuated well in advance of an oncoming wildfire" (Schlosser et al. 2006a page 91).

Map K. Locations of Wildland Urban Interface types within the MEL planning area

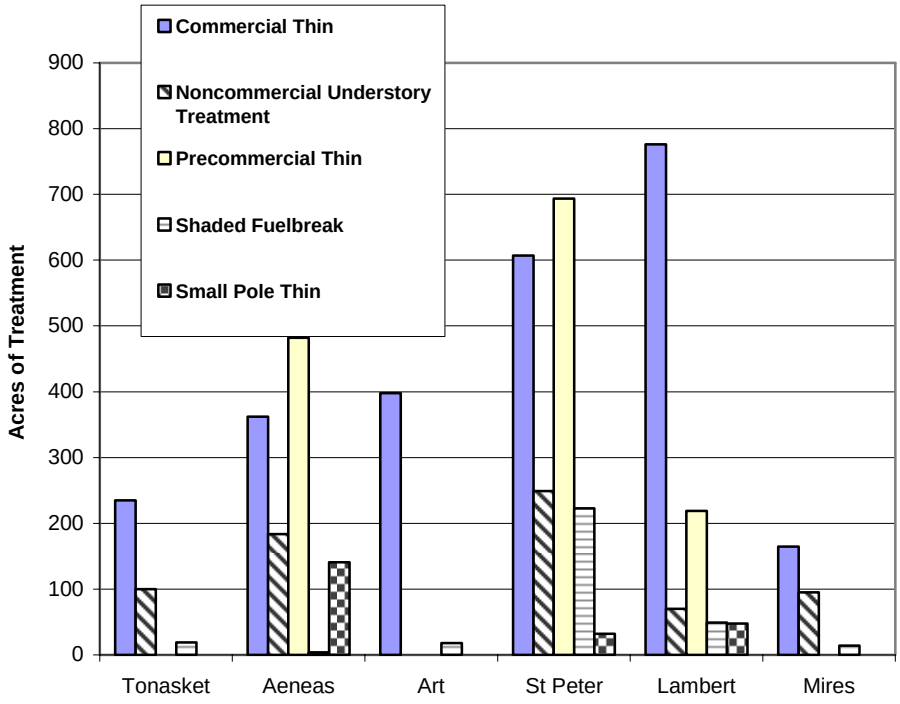


The CWPP goes on to say: "Residents in the St. Peters Creek (and) Tonasket Creek…have a high risk of experiencing a wildland fire, particularly those in the forest land fuels. Not only do the fuels in these watersheds pose a great risk to residents, but in the event of a fire, smoke and toxic gases may be funneled through the narrow draws. The main St. Peters Creek Road splits off into the North and South St. Peters Creek

roads, which are both dead ends (C588 and C584). Additionally, many individual homes in these neighborhoods are accessed via private driveways that may or may not be accessible with large emergency response equipment…People with homes in the Art Creek and Aeneas Creek drainages have a high risk of wildland fire. Fires in these drainages would be expected to move very quickly though the grasslands and light timber; thus increasing the risk of entrapment" (Schlosser et al. 2006a page 106).

Proposed treatments are displayed by watershed in figure 3.1. Treatments are more abundant in Lambert, St. Peter and Aeneas drainages. According to the CWPP, residents in these neighborhoods are at high or moderate risk of wildfire.

Figure 3.1 Malo East Lake Vegetation Treatments by Watershed



An objective of the vegetation treatments is to improve public and firefighter safety as outlined in the National Fire Plan. The CWPP describes two access and egress routes of importance in the planning area. For areas near Malo East Lake the plan states: "Lambert Creek Road accesses homes in the Lambert Creek drainage. This is a fairly well-maintained, two-lane, gravel road bordered by dense forest vegetation on the south side and a mix of grass, tree and house sites on the north side. The safety of residents in this area would be improved by conducting a fuels reduction project along the south side of Lambert Creek Road. Additionally, Forest Route 2154 provides a connection to the Herron Creek Road; however, evacuation via this route may be difficult for some types of vehicles" (Schlosser et al. 2006a page 92).

Many of the treatments shown in figure 3.1 occur south of Lambert Creek road, along Forest Road 2154 that connects with Herron Creek. Treatments along this road when combined with proposed light road reconstruction would leave at least the north half of this road in better condition that it is currently. The pending Herron Creek Fuels Reduction project is expected to leave the southern half of this road in better condition than it is currently. Cumulatively the improvements will probably enable vehicles, including passenger cars, to travel this road into Herron Creek during the summer wildfire season.

The CWPP goes on to say: "The Aeneas Creek Road, Art Creek Road and St. Peters Creek Road, which access their respective drainages, are typically two-lane, gravel routes. These are generally well maintained roads that pass through both grassland and timbered areas. Fuels reduction projects may be necessary to improve safety in areas where forestland fuels directly abut the road right-of-ways" (Schlosser et al. 2006a page 106).

In these drainages a minimal amount of NFS land abuts these roadways. The treatments that make the most difference would occur along Otis road; the road that connects the North Fork of St. Peter Creek and Aeneas Creek. These treatments would allow for an alternate evacuation route for residents of either drainage. At the landscape level, risk of wildfire spread is decreased when a mosaic of treatments are implemented across the landscape. Commercial and non-commercial thinning of units accompanied by a pile or underburn down slope of Otis road, increases the likelihood that fire would stay on the ground and out of the tree canopies and therefore be more controllable.

The Forest boundary within the planning area (WUI) was measured at about 51 linear miles. Along this boundary, about a third is un-forested and slightly less than half would receive fuels treatments. The treated acres include about 13 miles of commercial thinning followed by piling of slash and natural fuels (either mechanical or by hand) and pile burning. This method is preferred along the forest boundary because pile burning poses less risk of escape than underburning and can be conducted over a broader range of weather conditions. Nearly 5 linear miles would receive other types of prescribed fire not associated with a commercial harvest (generally hand piling and pile burning). These treatments have the same benefit as mechanical piling and burning, but are conducted in areas where heavy machinery is not desired or feasible for use. Another 5 linear miles of treated boundary is along optional underburning units. These areas typically have low fuel loads, and would act as buffers between underburning and jack pot burning units in more interior locations. Slightly less than a mile would be pre-commercially thinned.

Surface and Ladder Fuels

At its simplest, four primary fuel types or arrangements carry fire vertically into tree crowns and laterally across the landscape; surface and ladder fuels, and continuity of tree crowns and fuels. Treatments are designed to reduce these either individually or in combination.

Surface fuels: Fuels that generally lie on the forest floor. They may be natural fuels that grow on the forest floor or fall from trees, or fuels produced from vegetation treatments like slash from tree removal. These fuels carry fire laterally below tree crowns, though they contribute to flame length, fire intensity, and the ability of fire to reach tree crowns. Treatment of surface fuels would reduce the fuel load as measured in tons per acre.

Ladder fuels: These are fuels that connect surface fuels to tree crowns and may be comprised of flammable mistletoe brooms, lower branches, dead trees, and in many cases, small and mid-sized green trees and brush. Changes in ladder fuels are measured as a change in the Canopy Base Height, or distance between crown and ladder fuels (often the understory tree canopy). Treatment of ladder fuels would raise the crown base height.

Crown continuity/Species composition: This indicates how fuels are arranged above the ground and includes both tree density (tree spacing) and crown bulk density (mass of tree crowns). For example, where trees are close together, they may, in effect, form a continuous fuel source across a stand. Additionally, species with high tree crown bulk density like Douglas-fir are more susceptible to crown fire than western larch which has low crown bulk density. This aspect of fuels contributes to the occurrence of a running crown fire. Since the primary method for treating crown continuity and species composition is through commercial and precommercial thinning, this topic is covered in the Forest Vegetation section page 96.

Fuel continuity: At the landscape scale, fuel continuity is described as how areas of dense trees or heavy fuels are arranged across the landscape. Uniformity and connectivity of dense stands across a landscape allows for fire to build intensity and move rapidly to new areas. Breaking continuity of fuels slows this progress and gives fire fighters safe locations from which to operate. All treatments including commercial thinning contribute to breaking up fuel continuity across the landscape. Shaded fuel breaks are probably the most extensive vegetation treatment type designed to achieve this goal and are used primarily along the Forest boundary and access and egress routes. Commercial thinning and commercial shaded fuel breaks are a vegetation treatment type rather than a fuel disposal type and are discussed in the Forest Vegetation section page 96.

The following table illustrates the principles behind fuels reduction treatments and the effects of such treatments. Definitions of treatments can be found in Chapter 2 pages 29 to 32.

Table 3.2 Principles and effects of fuel treatments for increasing stand resilience (adapted from Agee 2002, and Hessbrug and Agee 2003)

Fuel Treatment	Principle	Effect	Advantage	Acres of Treatment*
Underburning Handpile Machine pile Jackpot burn Optional burn Slash Removal	Reduce surface fuels	Reduces potential flame length and fire intensity.	Ground forces are likely to be more successful when suppressing fires with lowered flame lengths and fire intensities. Less torching.	6400
Underburning Jackpot burn Decomposition Shaded fuelbreak Non-merchantable understory thin Precommercial thinning	Increase height to live crown (ladder fuel reduction)	Raises canopy fuels above the range of flame impingement from surface fire.	Reduces likelihood of surface fires climbing into overstory trees. Reduces potential for torching and spot fires.	5190
Commercial thinning Precommercial thinning Shaded fuelbreak	Decrease canopy continuity	Create space between individual tree crowns.	Makes tree-to-tree crown fire less probable. Reduces potential for crown fire and spot fires.	4280
Commercial thinning Precommercial thinning Small pole thinning Underburning	Encourage fire resistant species	Less tree mortality for same fire intensity	Generally preserves historic structure that is resilient to fire.	5680

*Rounded to the nearest 10 acres; multiple treatments may occur on the same acres.

Fuel reduction treatments are aimed at the four principals listed in table 3.2. Effects of commercial thinning and precommercial thinning are discussed in the Forest Vegetation section beginning on page 96. The effects of fuels treatments on surface and ladder fuels are discussed in the following paragraphs.

Fuel and stand exam surveys in the planning area noted high levels of surface and ladder fuels. In general, ladder fuels were more widespread than surface fuels, but overall, the current levels of each are greater than would be expected if natural fire regimes were intact. The fuels profile (amount and arrangement of fuels) after treatments should mimic, as much as possible, the fuel conditions represented in the historic environment. It is assumed that because the historic environment coexisted with frequent fires that the amount of fuel was less, and the arrangement of fuels more patchy and discontinuous.

Surface fuels in dry stands would be maintained at somewhere between 5 and 10 tons per acre. Most units in the proposed action have a current surface fuel level above the ideal for these dry forest stands.

Wildfires in dry summer conditions can easily generate spot fires that extend over a mile ahead of the flaming front. This is particularly true where the source fire is in the tree crowns. Each of the large fires that have burned in the nearby Kettle Range in the last 20 years have exhibited spot fire activity from ¾ to 1 ½ miles. Fires that spread by spotting are much more difficult to contain than fires spreading through surface fuels. Preventing fires from reaching tree crowns (in essence keeping them on the ground in the surface fuels) is largely done by increasing the distance from the surface fuel source to the tree canopy (crown base height) through ladder fuel reduction. Underburning, whip felling, and non-merchantable understory thinning would raise the average canopy base height by removing understory material, small trees and lower limbs. Where currently the treatment units have a general canopy base height of 1 to 8 feet, there would be an increase to around 15 to 20 feet.

Fire Regime Condition Class

FRCC (Fire regime condition class) is a measure directed for use in the Healthy Forest Restoration Act to rate the degree to which fuels conditions and other key resource elements (like species composition and density, and the occurrence of insects and disease) have been negatively influenced by the interruption of the historic fire regime through fire suppression. One objective of HFRA projects is to change condition class across the landscape by moving stands from a high condition class (FRCC 2 or 3) to a lower one through application of fuel treatments. Though typically applied at a landscape scale, application in this document is by unit or stand. A brief discussion of Fire regime condition class follows; more information can be found at the FRCC web site http://www.frcc.gov/ and in the Fire and Fuels specialist report in the MEL project analysis file.

FRCC needs to be discussed in the context of: (1) historic (natural) fire regime, and (2) biophysical environment. The historic fire regime provides an important reference point to assess changes in vegetative patterns and the associated risks of uncharacteristic fire. Fire regime refers to a combination of attributes including fire type, frequency, intensity, duration, and extent. Fire regime is tied to a location's biophysical environment, and vice versa. Biophysical environments are a grouping of similar vegetation types (plant association groups) that would be found in a typical late structure forest in a given area. These biophysical environments result not only from the soil, climate, elevation, latitude, and aspect in which they occur, but are a product of natural disturbances including fire regimes (see Biophysical Environments page 98).

The majority of the planning area (67 percent) is within the Warm, dry Douglas-fir/shrub biophysical environment with the historic Fire Regime I. Fire Regime I is described as having a fire frequency (average number of years between fires) of 0 to 35 years. Fire severity was typically low (surface fires most common), though there may have been minor occurrences of mixed severity fire where less than 75 percent of the dominant

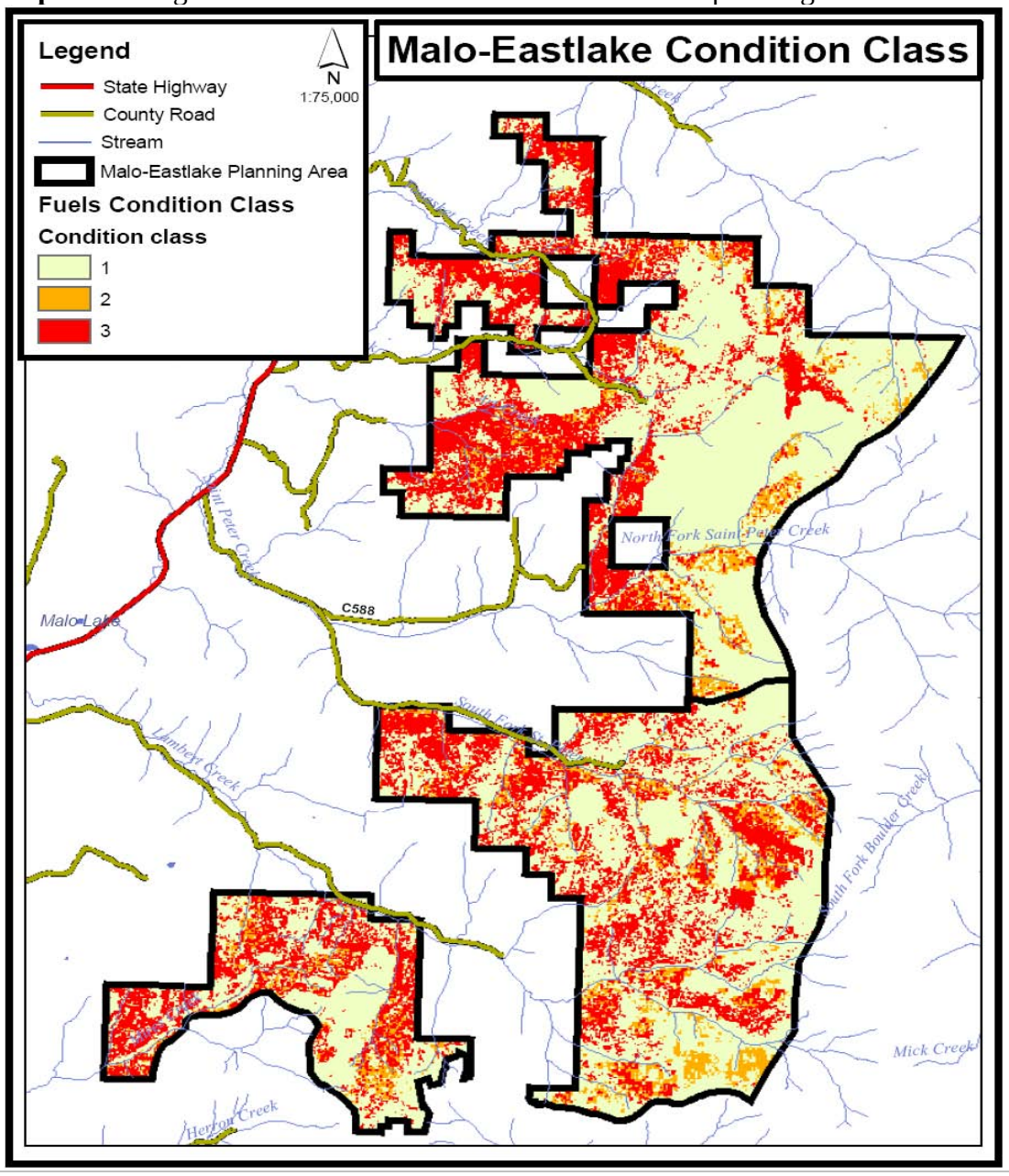
overstory vegetation was replaced. Large stand-replacing fires occurred under certain weather conditions, but were rare events (every 200 or more years). Typical fuel loads were light and ladder fuels, where they existed, were patchy.

The remaining third of the planning area is in Fire Regime III, a fire regime with a 35 to 100 or more year frequency of generally mixed fire severity (less than 75 percent of the dominant overstory vegetation replaced). This regime usually resulted in patchy landscapes. Large stand-replacing fires may have occurred but were usually rare events. Within these landscapes a mix of stand ages and size classes are important characteristics; generally the landscape would not be dominated by one or two age classes. In the planning area, Fire Regime III is found in the Cold mesic subalpine fir/forb and shrub biophysical environment, generally at the upper elevations, and in the Very moist Engelmann spruce/subalpine fir bottoms (riparian) biophysical environments. These areas typically have greater amounts of fuels, both on the ground and as ladder fuels, but due to their moist and, or, cool natures, are less prone to fire events than the Warm, dry Douglas-fir/shrub biophysical environments (Fire Regime I).

When an area on the landscape has had alterations to its historic fire regime (for example due to fire suppression or harvest), the area experiences changes in key ecosystem components such as vegetation characteristics (species composition, structural stage, stand age, and canopy closure), fuel composition, fire frequency and severity, and other associated disturbances, such as insect and disease mortality. FRCC provides a method for measuring the degree to which an area is out of balance with its historic fire regime and the degree to which the proposed action restores key ecosystem components.

Three FRCC levels are assigned to units: no or low (FRCC 1), moderate (FRCC 2), and high (FRCC 3). All represent the degree of departure from the historic fire regime. Characteristic vegetation and fuel conditions found in FRCC 1 (low departure), are considered to be those that occur within the historic fire regime. Because these areas are at or near their reference condition, the risk of losing key ecosystem components from the occurrence of fire is relatively low. Where appropriate, maintenance prescribed fire and hand treatments can prevent these stands from developing into a higher FRCC type. Stands in FRCC 1 exist largely in the optional burn units of the planning area and in areas that were recently burned (see map L below).

Map L. Fire regime condition classes in the Malo East Lake planning area.



In the MEL planning area, fire regime condition classes 2 and 3 describe stands where fire regimes have been interrupted. For example, forests may exhibit increases in density, loss of large tree structure, encroachment of shade tolerant species, or loss of shade intolerant tree species (also called early seral species) caused by fire exclusion, logging, or insects and disease. Surface shrubs and grass may be replaced with woody fuels and litter. In the planning area this resulted in vegetation becoming denser, ground and ladder fuels building and stands becoming more susceptible to damage from fire, insects and diseases (see Forested Vegetation discussion page 96). Areas of FRCC 2 may need

moderate levels of restoration treatments such as prescribed fire and hand or mechanical treatments to restore fuel and stand conditions under the historical fire regime. Thinning of overstory trees through commercial and precommercial thinning may also be necessary.

Fire regime condition class 3 represents areas where there is a high risk of losing key ecosystem components to disturbance. Because of departure from the historic fire regimes, surface fuels, ladder fuels, and crown density have accumulated to levels much higher than historically occurred. To restore historic conditions these lands may require high levels of restoration treatments such as hand and mechanical treatments before prescribed fire can be utilized.

Stands in FRCC 3 may have heavy surface fuels where if fire were to occur, fire intensity and spread would kill overstory trees because of intense heating. Additionally, the build up and in-growth of ladder fuels provides vertical continuity in these stands allowing surface fire to climb into the crowns of trees. Because the overstory is dense, crowns are close together which allows crown fire to move from tree to tree. Conditions in the planning area include large areas where crown fire could be carried from tree to tree. One objective of the MEL project is to reduce the FRCC class of the planning area by reducing fuels, both ground and ladder, thinning trees to reduce continuity of tree crowns, and reintroducing fire; in short, creating conditions more similar to the historic.

The MEL proposed action places approximately 95 percent of all treatments in stands with FRCC 2 or 3. The remaining 5 percent, currently in FRCC 1, are largely optional burn areas and tend to be either open natural grassland and woodlands, or areas that burned recently. They would remain in the same FRCC class after treatment. As the condition class is decreased in the WUI so does the fuels hazard.

In the proposed action FRCC would be reduced across the planning area. Unfortunately, due to scale and mapping differences, a direct comparison to the entire planning area is not possible at this time. Most treated areas will show an improvement with about two-thirds of the treated area being moved to, or maintained at fire regime condition class 1 (table 3.3). Importantly, these treatments would occur in key areas adjacent to private property and escape routes. This would greatly increase the potential to protect life and property in the planning area, and improve firefighter safety.

Table 3.3 Percent of treated acres by fire regime condition class before and after treatment.

Fire Regime Condition Class	**Existing condition** (percent of treated acres)	**Predicted FRCC after treatment** (percent of treated acres)
FRCC 1 (low)	5	66
FRCC 2 (moderate)	46	30
FRCC 3 (high)	49	4

Prescribed Fire Management

The possibility of prescribed fire escape is minimized by thorough planning and documentation in a burn plan prior to each burn. Each site-specific burn plan includes steps to be taken should a prescribed fire exceed its planned prescription and includes a geographic and resource contingency plan to bring the fire back into prescription. The risk of escape can be mitigated by using common firefighting tactics to limit fire spread. Safeguards to contain fire may include firelines, black lines, wet lines, natural barriers, or roads. Burning is done when weather and fuel moisture conditions make unmanageable fire behavior unlikely, such as during the spring or fall. Burns are monitored until they can be declared out.

In many cases, if a fire escapes designated boundaries but is within a geographic area on NFS land where limited ground fire spread would cause no harm and is still meeting resource objectives, then the fire would be monitored. In most cases, the fire either burns itself out or is put out by weather (rain or snow). If the controlled burn escapes into an area where fire is not desirable, or if the fire behavior is determined unacceptable, then control action is taken using resources on-site. If needed, designated contingency resources are called. However, if necessary holding action exceeds the capability of contingency resources, or poses a substantial threat to life, property, or high value resources, a new strategy will be developed through a Wildfire Situation Analysis (WFSA) to guide further suppression actions.

Two modifications to the proposed action were made in response to public concern regarding prescribed fire escapes. First, units designated as Optional Burn Areas are placed as buffers in many locations between prescribed fire treatments, including underburning, and private land. These buffers are generally of open grassland where fire is more easily controlled, and where many fire barriers exist like rock outcrops and roads.

The second modification is a reliance on the fuel treatment method known as pile burning. In all the proposed treatment areas adjacent to private land, fuel treatments would be conducted using mechanical or hand piling of slash and natural fuels followed by burning individual piles during the appropriate weather conditions; generally mid to late fall after precipitation has been received. The advantage of this method is that pile burning can occur during a more cool and moist season than underburning and is generally less likely to escape.

Cumulative Effects

The BLM is proposing a timber sale in Lambert Creek adjacent to NFS lands. Many private landowners are also reducing the fuels around their properties and homes. Additional fuels treatments as well as past and future timber harvest on BLM, private, and State lands would enhance firefighter and public safety and reduce the risk of stand-replacing fire in the WUI for the next decade or two. The BLM Lambert fuel reduction project to be conducted in fall of 2007 would occur between the Forest boundary and private land. The BLM prescription is to thin trees to a spacing of 50 feet between boles, in essence, creating a shaded fuel break. The proposed action on NFS lands would provide for greater protection to forests, and public and firefighter safety.

As previously mentioned, proposed reconstruction along FS road 2154 together with the Herron Creek Fuels Reduction project to the south is expected to greatly improve access and egress over this road, giving residents an alternative evacuation route.

Forest Vegetation

Introduction

Fire suppression eliminated the natural tree thinning action of fire in the MEL planning area, resulting in denser forests. Trees growing closely together are in direct competition with each other for light, water, and nutrients (inter-tree competition). When resources become scarce, as in dense stands or under drought conditions, the trees become less vigorous and therefore, more vulnerable to insects and diseases. The resulting increase in insect and disease caused tree mortality adds to the already heavy fuel load. Through use of commercial and pre-commercial harvests, coupled with other fuel treatments, tree density and hence inter-tree competition would be reduced. This in turn, would increase forest vigor and resistance to insect and diseases.

As the forests of the MEL planning area became denser, this caused changes to forest species composition (amounts of different types of trees). In dense stands, typically, only trees that can tolerate shaded forest conditions, like Douglas-fir, reproduce successfully. The forests we see today have more Douglas-fir, and fewer shade intolerant species like ponderosa pine and western larch than historically occurred. Because ponderosa pine and western larch have the ability to survive low intensity ground fires, favoring them over less fire tolerant species would, over time, create more fire resilient forests.

Forest structure (size and arrangement of trees) in the planning area has changed over time from stands dominated by large trees in a single-story arrangement (SS 7) to: (1) large trees in a multi-storied arrangement (SS 6) that is susceptible to crown fire, and (2) more uniform stands of small trees. These changes largely occurred due to historic forest practices, stand-replacing wildfires, and insect and disease caused mortality. Thinning from below would change multi-storied stands with large trees to single-story stands with large trees, a condition more fire tolerant and reflective of the historic condition. Consistent with the Eastside Screens, there would be no loss of forest structure with large trees. Thinning in dense stands without large trees would reduce inter-tree competition and speed the rate at which smaller stands grow into large tree dominated, fire resistant stands.

This section focuses on the vegetation treatments that affect the risk of crown fire and fire spread. The following discussion is excerpted from the Silviculture and Fire and Fuels specialists' reports available in the project analysis file (Rourke 2008; Green et al. 2008).

Data Collection

The existing condition of the vegetation was determined by 148 stand exams in commercial sized stands conducted according to FSVEG protocol (USDA Forest Service 2006a), 42 stand exams in non-commercial sized stands, informal walk-through exams (2006), information from the Final Supplement to Final Environmental Impact Statement for East Curlew Creek Area Timber Sales (USDA Forest Service 1995), Mt. Leona Fuels

Reduction and Timber Stand Improvement Project Categorical Exclusion (USDA Forest Service 2003), fuels surveys (2006), and annual aerial insect and disease survey flights analyzed by Connie Mehmel, Forest Service Area entomologist (Mehmel 2007). In addition, the Silviculturist conducted informal field exams and aerial photo interpretation. The planning area was analyzed to determine the extent and placement of plant associations and subsequent biophysical environment groupings, forest stand structure, fuel parameters, and current insect and disease populations and potentials.

Framework

Healthy Forest Restoration Act (HFRA) section 102(e)(2) provides specific language for fuels reduction activities within HFRA projects. The act states that actions "shall fully maintain, or contribute toward the restoration of, the structure and composition of old growth stands according to the pre-fire suppression old growth conditions characteristic of the forest type, taking into account the contribution of the stand to landscape fire adaptation and watershed health, and retaining the large trees contributing to old growth structure."

The HFRA goes on to say in section102(f)(1) that in general, the project shall be carried out in a manner that: "(A) focuses largely on small diameter trees, thinning, strategic, fuel breaks and prescribed fire to modify fire behavior, as measured by the projected reduction of uncharacteristically severe wildfire effects for the forest type (such as adverse soil impacts, tree mortality or other impacts); and (B) maximizes the retention of large trees as appropriate for the forest type, to the extent that the trees promote fire-resilient stands."

The National Forest Management Act of October 22, 1976 (NFMA) requires assurance that the lands can be adequately restocked within five years after final regeneration harvest (FSM 1921.12g). No timber harvest for the purpose of timber management will occur on lands deemed unsuitable for timber production as defined by 36 CFR 219.12 (a)(2). Land suitability was determined by aerial photography analysis followed by an examination of the affected areas on the ground. In addition to unsuitable land obvious to the eye, particular soil types coupled with plant associations were used to indicate the possibility of unsuitability. The areas have been mapped and were used to supplement information in the Forest Plan Condition Maps. Vegetation harvest may occur on these lands for purposes other than timber management, like fuels reduction.

In 1995 the Eastside Screens (USDA Forest Service 1995a) established riparian, ecosystem and wildlife standards for timber sales. In addition it requires an analysis of the historic range of variability (HRV) be done on areas proposed for timber harvests. The desired future condition for the planning area is to have stand structures reflect what was historically found for each biophysical environment (forest type). The assumption is that the historical condition (both size and arrangement) of stand structures across the landscape (measured in percent of the landscape) are from a time when wildfire dominated the landscape and are therefore more fire resilient and resistant. Based on the outcome of the HRV analysis, certain restrictions are placed on timber harvest practices (see Historic Range of Variability discussion page 101).

Issues, Direction, and Measures

Issues from Public Input

- See Late and Old Forest Structure section page 110

Direction from Framework, Purpose, and Need

Decrease the probability that a future wildland fire would develop into or be sustained as, a stand-replacing or crown fire.

- See Crown Fire Susceptibility, Crown Continuity, Species Composition, and Inter-tree Competition discussions below; also see Surface and Ladder Fuels discussion page 78
- Measures: Basal Area, Tree spacing, Acres of treatment

Move the distribution of stand structures within areas designated in the Forest Plan as commercial timber lands toward the Historical Range of Variability

- See Historic Range of Variability discussion below
- Measure: Acres of treatment by structural stage

Reduce unacceptable stand susceptibility to damaging fire, insects and diseases by increasing resistant species and overall stand vigor.

- See Species Composition, Inter-tree Competition, and Forest Insects and Diseases discussions below
- Measure: Acres of treatment

Existing Condition, Direct and Indirect Effects

Biophysical Environments

Biophysical environments in this document are assemblages of plant association groups (PAGs) contained in the Plant Association Grouping (PAG) maps (Colville NF, GIS cover) and field checked during timber stand exams. Biophysical environments include plant association groups with similar historic fire regimes and other historic patterns of natural disturbance (like insect outbreaks), and types of vegetation (plant species) found in its typical late structure forest (Berube and Kovalchik 1994). The following is a list of the dominant forested biophysical environments and a brief description of their locations on the landscape and disturbance regimes.

Warm Dry Douglas-fir/Shrub Biophysical Environment : This biophysical environment (BE) makes up about 67 percent of the forests in planning area, especially on south and west facing forested slopes. A century of fire suppression in this BE has generally created conditions of excessively dense, disease infested stands increasingly prone to stand-replacing fires. Under historic conditions, the Warm, dry Douglas-fir/shrub BE was characterized by Fire Regime I, with frequent, low intensity, low severity wildfires (ground-fires) with occasional fire events of moderate intensity and severity. High intensity, stand-replacement fires were rare and small in size; usually the result of ground fires "crowning out" in a patch of denser trees. This BE experienced small to moderate sized outbreaks of

insect and disease. Late structure stands were dominated by ponderosa pine, western larch and Douglas-fir.

During the Mt. Leona, Aeneas, and Copper Butte wildfires, ground-fire occurred over some areas of the Warm, dry Douglas-fir/shrub BE. However, in many places, especially the older more mature stands, fire behavior was more severe than was found historically and large patches of stand-replacing fire occurred. This was due in part to the large amount of ladder fuels (dense in-growth of young trees, insect killed trees, and dwarf mistletoe brooms) and the build up of surface fuels due to fire suppression.

Cold Mesic Subalpine Fir/Forb, and Shrub: The Cold mesic subalpine fir/forb and shrub biophysical environment makes up approximately 16 percent of the forests in the planning area. It is characterized by historic Fire Regime III; relatively infrequent fire of moderate to high intensity and moderate to high severity. Fires tend to create a mosaic pattern as they burn with a mix of fire intensity depending on fuels accumulation and stand structure. These areas experienced low to high intensity outbreaks of insect and disease. Late and old structure is dominated by subalpine fir, Englemann spruce, and Douglas-fir.

This BE is found more extensively in higher elevations adjacent to the planning area. During the Copper Butte and Mt. Leona fires much of it burned with high severity, in this case stand-replacing. In the planning area this BE is restricted mainly to riparian sites, though it also occurs in two patches; one each in northeast portion of the North block, the southeast part of the South block. These stands may have a partially open canopy when mature, but they may also be composed of dense lodgepole pine and larch stands that typically burn before progressing to the fir dominated late structure.

Very Moist Spruce-Subalpine Fir Bottoms: Very moist spruce-subalpine fir bottoms make up about 17 percent of the planning area forests and are found almost exclusively in riparian and other wet areas. This BE is characterized by small to high intensity outbreaks of insect and disease and moderate to high intensity and severity wildfires. Late structure vegetation is dominated by Englemann spruce, subalpine fir, and Douglas-fir. Though generally too wet and cool to burn, under extreme weather and drought conditions, high intensity wildfires that enter these stands from adjacent drier stands burn very hot, and are stand-replacing.

Stand Structure

Forest structure is the term given to the physical and temporal distribution of trees in a stand. The distribution can be grouped based upon the size of trees, number of canopy strata, tree age or cohort, canopy closure, and overall structural diversity (USDA Forest Service 1995a). The percent of land in each stage varies over time and current forest structure is a result of past disturbance. Disturbances in this area include wildfire, fire suppression, endemic and epidemic insect and disease activity, windthrow, snow damage,

climate change, and human activities such as timber harvest. In theory, without disturbance, stands grow toward a late structure condition. However, disturbance is a real and necessary part of a landscape. Moderate to high intensity disturbances move stands backward in succession to earlier stages, creating the mosaic patterns found on a healthy landscape. Disturbance often reduces tree density creating growing space that results in faster tree growth and increased vigor.

Structural stages (SS) are an arrangement of trees, not necessarily associated with stand age or seral development. The following definitions from the Eastside Screens define structure.

Early (SS 1 and 2): These stages occur following a stand-replacing disturbance such as a fire or timber harvest. Seedlings reoccupy the stand and start growing toward full utilization of the growing space. Trees are generally the same age class, but there may be a few older trees present. Tree size may range from seedlings to small pole size. Understory may contain forbs, grasses and shrubs.

Early (SS 3): This stage occurs when the young trees have fully utilized the site. There is not enough light or moisture present for new trees to begin growing in the understory. Trees may be small to large pole sized, large enough to be economically harvested in a commercial small pole thin operation.

Middle (SS 4 and 5): As single trees die (due to forest pathogens, small spot fires and other generally small disturbances) openings fill in with a second cohort of trees that become established under the older, typically early seral (trees that grow best in open conditions) overstory. The overstory canopy becomes discontinuous and two or more canopy layers are present. The stand may have a mix of sizes; however, large trees are uncommon.

Late Multi-story (SS 6): These stands are multi-storied and large trees are common. This stage characterizes stands that contain two or more cohorts of trees in two or more canopy strata. Medium and large trees dominate the overstory, though all sizes may be present. Late structure stands have an average of 8 or more trees per acre with a diameter of 21 inches or greater.

Late Single-story (SS 7): These stands have a single-story and large trees are common. A single layer of medium or large early seral trees is present. The understory is absent or sparse in clumps of seedlings and saplings. The “park-like” conditions found in some ponderosa pine, Douglas-fir, or western larch stands are included in this category. Late structure stands have an average of 8 or more trees per acre with a diameter of 21 inches or greater.

Historic Range of Variability

Historic Range of Variability (HRV) is used to determine the extent to which the proposed action fulfills the purpose and need of the project. Similar to FRCC (Fire Regime Condition Class page 90), HRV is a measure of how the current and historic conditions compare. In this case, the comparison incorporates structural stage, size and spatial patterns of biophysical environments (BE) (as described on page 98). The HRV is the estimated range of the percent of forested stands in early, middle, and late structural stages (listed above) that historically occurred within each biophysical environment. This is compared to what exists on the landscape today and so provides managers with a condition to strive for. It is assumed that HRV reflects a time when the predominant disturbance was fire and represents a landscape that is more resilient and resistant to stand-replacing fire, insects and diseases than today. The HRV and existing conditions were analyzed for all lands in the planning area (16,465 acres), and included aerial photo interpretation of inholdings. The results are summarized in table 3.4.

Table 3.4 Comparison of existing structural stage distribution to historic range of variability.

Biophysical Environment		Early	Middle	Late 6	Late 7
Warm Dry Douglas-fir/Shrub	Existing Condition	40%	35%	25%	<1%
	Historic Range of Variability	10-25%	10-25%	5-20%	30-75%
Cold Mesic Subalpine Fir/ Forb and Shrub	Existing Condition	44%	31%	25%	NA*
	Historic Range of Variability	10-30%	25-65%	30-60%	NA
Very Moist Spruce – Subalpine Fir Bottoms	Existing Condition	37%	26%	37%	NA
	Historic Range of Variability	10-35%	20-75%	15-80%	NA

*NA: Late 7 structure negligibly occurred historically in these biophysical environments.

The MEL planning area has a higher percent of stands with early structure in all three biophysical environments than historically occurred (table 3.4). This is mainly due to the three large wildfires that impacted the eastern part of the planning area, and a history of even-aged (clear cut) timber harvest (see Other Actions Considered page 72). Most of these stands were planted and are reaching a point (SS Early 2 and 3) where precommercial thinning would reduce density (inter-tree competition) and increase stand resilience and resistance to wildfire, insects and disease (see Inter-tree Competition discussion page 105). Approximately 36 percent of treatments are proposed in early structure stands of the Warm, dry Douglas-fir/shrub and Cold mesic subalpine fir/forb and shrub BEs.

The amount of middle structure (SS Middle 4 and 5) is above historic levels for the Warm, dry Douglas-fir/shrub BE and within the HRV for the Cold mesic subalpine fir/forb and shrub BE. Middle structural stands are generally dense with an overall condition of low vigor and predisposition to fire and insect and disease damage. Thinning in these units would decrease inter-tree competition, ladder fuels and surface fuels. Additionally, because inter-tree competition is reduced, it would help to decrease the amount of time necessary for these stands to grow important components of late structure, in essence, to grow large trees. Approximately 49 percent of treatments are proposed in middle structure stands of the Warm, dry Douglas-fir/shrub and Cold mesic subalpine fir/forb and shrub BEs.

The Eastside Screens prohibits treatment in late structured stands where the existing acres are below the historic range of variability. Therefore no treatments are proposed for late structure stands of the Cold mesic subalpine fir/forb BE.

The Warm, dry Douglas-fir/shrub BE is lacking in single-storied late structure (SS 7) and is above HRV for multi-storied late structure (SS 6). As previously stated, historic forest stand structures for this BE were more open and populated by species generally adapted to relatively frequent fire occurrences (Fire Regime I). Low severity underburning reduced the understory tree population while keeping insects and disease in check. Today, the inappropriate multi-story structure of these SS 6 stands include ladder fuels, tree crown continuity, and bulk density that greatly increases the risk of unacceptable fire behavior. To restore a distribution of late structure more similar to the HRV, approximately 15 percent of treatments would occur in SS 6 stands of the Warm, dry Douglas-fir/shrub BE with the objective of moving them toward the currently lacking SS 7. There would be no net loss of LOS, but the resulting distribution of structural stages between multi-storied and single-storied stands would be more closely aligned with the HRV. The proposed action would move approximately 5 percent of the forests in the planning area from a Late 6 multi-storied stand with large trees to a Late 7 single-storied stand with large trees for the Warm, dry Douglas-fir/shrub BE.

Stands of Very moist spruce-subalpine fir bottoms BE are within or slightly above the HRV for all structural stages. In general, this BE is a low priority for fuels treatments because they generally do not burn or only burn during very extreme fire conditions. Commercial treatments in these riparian areas are unlikely to affect fire behavior during a severe event. No treatments other than allowing underburns to creep in are proposed in this biophysical environment.

Crown Fire Susceptibility

Part of the purpose and need of the MEL project is to decrease the probability that a future wildland fire would develop into, or be sustained as, a stand-replacing or crown fire. Crown fire involves two actions, first the fire must reach the tree crowns and second the fire must be carried from crown to crown across the landscape. Climate and weather conditions aside, the risk of a fire reaching tree crowns is a function of flame length, crown moisture and crown base height (the distance from fuels to the tree crown) (Graham et al. 2004). Surface fuels and ladder fuels are the primary conduits for fire to

reach a tree's crown, they are discussed above in the Surface and Ladder Fuels discussion page 78.

Once in a tree's crown, fire spread depends on crown bulk density (mass of the crown), crown continuity (how close is the neighboring tree), wind, slope and other environmental factors. Powell (2005) developed a measure of the susceptibility of a stand to a crown fire based on basal area (the number of square feet of stump surface that a stand has if all trees were removed). Basal area is tied to tree density and size; the greater the number of trees, or the larger the trees, the greater the basal area. Because basal area is tied to tree size, Powell assigned crown fire susceptibility ratings based on the average tree size, here represented by structural stage. Based on the 2006 stand exams, on average, all structural stages in the treatment units are highly susceptible to crown fire (table 3.5). That is, the density of trees (basal area) averaged across each structural stage falls within what Powell considers a high risk of crown fire. Table 3.5 shows the existing basal area and the range of tree density that the silviculture prescription would aim for. Also included are Powell's ratings of crown fire susceptibility.

Table 3.5 Crown fire susceptibility (Powell 2005) before and after vegetation treatment

Structural Stage	Existing Basal Area (sq. ft./acre*)	Existing Crown Fire Susceptibility	Target Basal Area (sq. ft./acre*)	Crown Fire Susceptibility After Treatment
Early	70	High	50-60	Moderate
Middle	110	High	55-70	Moderate
Late	140	High	90-110	Moderate

* Square feet per acre. These are average values and are meant as such, rather than a hard and fast limitation on each and every acre. For example, where environmental conditions do not support the required square feet per acre this element would not be met.

Exceptions to this average are units 5, 9, 117, 145, and 132 that are suffering from root-rot and insect infestations. These units would have on average a residual basal area of between 90 and 110 square feet per acre on those portions of the units not affected by treatments to address root rot pockets, and there is no residual basal area specification in the portions of these units that are within root-rot treatment prescriptions (see Late and Old Forest Structure section page 110).

Based on the values in table 3.5, vegetation treatments in the proposed action would, on average, reduce the crown fire susceptibility of stands from high to moderate levels across all structural stages. Overall, vegetation and fuel treatments would reduce crown fire susceptibility on nearly 4,300 acres, or about 25 percent of the planning area. This figure does not include the optional burn areas because they typically are already open with low crown fire susceptibility.

Crown Continuity

Decreasing the stand's susceptibility to a crown fire moving from tree to tree is a function of tree spacing. By isolating a tree's crown from its neighbors, it makes rapid spread of crown fires less likely. To prevent crown fires, optimum spacing between ponderosa pine crowns is usually considered to be a minimum of 20 feet apart with less than 70 percent crown closure (Evers 2001). Measurements of the distance between large trees in uncut stands in the Eagle Rock (Schultz 1996) and Berton Environmental Analyses (Vaught 1998) showed that historic spacing and crown closure for the Late SS 7 (single-storied structure with large trees) in the Republic District was about 5 to 15 feet between tree crowns. Though wider spacing would be more effective at meeting fuel objectives, due to multi-use objectives, 5 to 15 feet between crowns is what most projects strive for to protect resource values in units with medium or small structure. Due to public concern over treatments in units with late and old structure (as depicted in the EA), a spacing of about 2 feet is anticipated unless the unit is within 300 feet of the forest boundary, or is being treated for insects or diseases. In these cases tree spacing will likely be in the 5 to 15 foot range.

For operational purposes, this translates to tree spacing (distance trunk to trunk rather than crown to crown). Table 3.6 lists the likely effects of tree spacing on distance between crowns. Depending on tree size, commercial thinning would increase tree spacing to a distance of approximately 20 to 40 feet between trunks of dominant or co-dominant trees. Because of safety objectives to enlarge fire fighter defensible space along roads, access, and egress routes, spacing in shaded fuel breaks is more critical and may require as much as 50 feet between leave trees to reach management objectives (minimum of 20 feet apart with less than 70 percent crown closure). Note that to achieve the desired minimum distance of 5 feet between tree crowns, late structure stands would require thinning to more than 30 feet between dominant tree trunks. However, as previously mentioned, public concern for units with LOS structure tree spacing will likely be less, with exceptions for along the Forest boundary, and in diseased stands. Treatments are still expected to contribute toward the ability of stands to withstand wildfire

Precommercial and non-merchantable thinning would typically leave trees at an average of 14 to 20 feet between trunks. Precommercial thinning is typically conducted on units with trees smaller than those shown in table 3.6.

Table 3.6 Effect on distance between tree crowns cause by thinning trees to spacing between trunks of 20, 30 and 40 feet. Effects are given for three diameter size classes of trees.

Average diameter at breast height (inches)	Distance between crowns at 20x20 spacing	Distance between crowns at 30x30 spacing	Distance between crowns at 40x40 spacing
10-14.9	Crowns touching	10 feet	20 feet
15-19.9	Crowns touching	6 feet	16 feet
20 plus	Crowns touching	2 feet	12 feet

Species Composition

As the forests of the MEL planning area became denser, this caused changes to forest species composition (amounts of different types of trees). In dense stands, typically, only trees that can tolerate shaded forest conditions, like Douglas-fir reproduce successfully. The forests we see today have more Douglas-fir, and fewer shade intolerant species like ponderosa pine and western larch than historically occurred. Because mature ponderosa pine and western larch have the ability to survive low intensity ground fires at a smaller size, favoring them over shade tolerant species would, over time, create more fire resilient forests. Fire tolerant, early seral species like western larch and ponderosa pine would be encouraged in all vegetation treatments. Encouraging western larch over Douglas-fir is also helpful because western larch has a lower crown bulk density and is less flammable (Graham and McCaffrey 2003). When practical, natural or created openings would be planted with larch and ponderosa pine with genetically improved seedling stock to strengthen the planning area gene pool and maintain species diversity. During commercial, non-merchantable and precommercial treatments, the healthiest western larch and ponderosa pine and (where appropriate) Douglas-fir trees would be selected for leave trees. Species composition improvements would occur over approximately 6,780 acres or approximately 40 percent of the MEL planning area. This number includes underburning and other prescribed fire only treatments because prescribed fires will favor existing fire resistant species.

Inter-Tree Competition

When trees grow in close proximity they are in direct competition with each other (inter-tree competition) for light, water, and nutrients. When resources become scarce, as in dense stands or under drought conditions, the trees themselves become less vigorous, grow more slowly and are more vulnerable to insects and diseases. The resulting tree mortality adds to the already heavy fuel load and increases susceptibility of the stand to fire. In order to reduce inter-tree competition precommercial and non-merchantable thinning is proposed for overly dense stands (stands beginning to self prune or lose vigor) and in multi-storied stands. Such thinning would leave the largest, most vigorous, disease free trees for the residual stand. Thinning these dense stands when combined with other fuel treatments also reduces the time needed to attain late structure because resources are more available for individual tree growth. Small pole thinning,

precommercial and non-merchantable understory thinning would occur on approximately 2900 acres of Warm, dry Douglas-fir/shrub biophysical environment (BE), and on about 60 acres of Cold mesic subalpine fir/forb and shrub BE.

Forest Insects and Diseases

Endemic populations of insect and disease have always been present in the MEL area. In the past, historical fire occurrence kept populations in check by limiting both susceptible conditions and number of low vigor trees. When there is adequate moisture, sunlight and nutrients stands are in good condition and insect and disease populations are low (endemic). However, when growing resources become scarce, forest pests respond by increasing populations and attack frequencies. In severe cases, populations may become epidemic.

When insect and disease activity increases, mortality of large overstory trees occurs, leaving gaps in the stand that fill in with shade tolerant species. This perpetuates the multi-storied condition with high inter-tree competition, increasing pathogen activity. Because large trees are more susceptible to some of the common insect caused mortality, this causes a downward trend in a stands average tree size, species diversity and stand vigor.

Areas in the early structural stages are generally free of the insects and diseases. However, as stands grow they become overly dense, especially without frequent underburning as historically occurred or precommercial thinning. The density of stands puts enormous stress on individual trees by exceeding the carrying capacity of the site. At a certain point, very dense stands are said to reach a “zone of imminent mortality” where trees begin to die (Oliver and Larson 1990 pages 53-54). However, just prior to this condition, forest pathogens, (especially bark beetles and defoliators) may become epidemic.

The following discussion details some of the most prevalent pests in the Malo East Lake planning area.

> **Douglas-fir Beetle:** An outbreak of Douglas-fir bark beetle is currently occurring in the eastern half of the northern block of the planning area. Connie Mehmel Zone Entomologist (Mehmel 2007) found: “The most extensive damaging agent in Tonasket Mountain (Aeneas) was Douglas-fir beetle. Numerous pockets were detected throughout the analysis area. An estimated 240 acres were affected, and about 780 Douglas-firs killed.” Other older Douglas-fir bark beetle mortality is found throughout the analysis area; most of these have stopped spreading rapidly.
>
> **Western pine beetle:** Western pine beetle populations have increased throughout the District in the last couple of years and are the primary insect problem in the planning area. A report by the Forest Health Protection program listed the Colville National Forest as having the highest level of western pine beetle in Oregon and Washington (USDA Forest Service 2006b). Western pine beetles attack and kill larger diameter ponderosa pine and can be found in the vicinity of

Art and Tonasket Creeks. They tend to be found in dryer and poorer sites where large ponderosa pine trees are present (Miller and Keen 1960). Stand exams show that 10 percent of the inspected stands display western pine beetle damage.

Dwarf Mistletoe Diseases: Currently, the biggest forest pathogen problem in the area is Douglas-fir and western larch dwarf mistletoes. Dwarf mistletoes are plants that attach themselves to host trees and drain nutrients from them. Overstory mistletoe infection passes on to the understory as seeds from mistletoe fruiting bodies literally rain down. Dwarf mistletoes reduce the growth and vigor of infected trees and eventually may result in mortality. Drought worsens the impact of mistletoe on tree growth and survival (USDA Forest Service 2006b). When infected, the tree responds by forming "brooms" where the infection stimulates growth. Broom wood tends to have a higher amount of compression wood and flammable resins that makes them more resistant to decay than normal branches, thus maintaining the fire hazard for a longer period of time (Alexander and Hawksworth 1975). In addition, the brooms increase crown bulk density in the canopy layer and provide a good means for spreading of crown fires. Spot fires have been observed to increase dramatically where brooms are present (Alexander and Hawksworth 1975). These brooms tend to fall off and can cause large build-ups of surface fuels, or may remain on the tree as highly flammable ladder fuel.

Root and Butt Rots: Armillaria root rot (*Armillaria ostoyae*) and Schweinitzii butt rot (*Phaeolus schweinitzii*) are found in pockets throughout the planning area. They are mainly found in late structure stands. Douglas-fir is typically the hardest hit by root and butt rots while western larch is the most resistant of the tree species. In the planning area approximately 24 percent of all stand exams showed signs of root rot.

As discussed previously, the planning area has high endemic levels of several forest pests. The contiguous overly dense multi-story conditions provide excellent habitat for those pests as well as others such as defoliators to become epidemic. Even without epidemic insect and disease levels, there is a danger of adding to dangerous fuel levels and of killing the large trees that make up the late structure stands.

The proposed action includes 6,845 acres of vegetation treatments. In general, treatment is expected to open dense stands, remove infected individuals, and generally create conditions unfavorable to forest pathogens. Acres of each individual pathogen were not mapped, but diseases and insects were noted during stand exams and in follow up walk through exams. Of the 148 stands surveyed, the following table indicates the percent identified with insects or diseases that would be treated in the MEL project. Approximately eighty-five percent (or more) of each type of known insect or disease infestation found in the stand exams would be treated.

Table 3.7 Percent of stands in the MEL planning area found to contain diseases that would be treated in the proposed action.

Treatment Type	Dwarf Mistletoe		Western Pine Bark Beetle	Root Rot
	Douglas-fir	Western Larch		
Commercial Thin	65%	65%	70%	60%
Precommercial thin	10%	10%	2%	5%
Fuel Treatment	10%	15%	20%	20%
Percent not treated	15 %	10%	8%	15%

Cumulative Effects

Extensive harvest of private, commercial timber company, and the Washington State Department of Natural Resources (DNR) lands occurred in the past 10 years or so. The Bureau of Land Management (BLM) is planning a timber sale in the Lambert Creek drainage. Vaagan Brothers Timber Company recently sold a parcel abutting NFS land in the South Fork St. Peter Creek drainage to a private citizen. In short, the land surrounding the Malo East Lake planning area is in flux and can not be relied on to provide late structure habitat. At the watershed scale, the portion of land administered by the Forest Service is small. However, it contains the majority of timbered mid-elevation and upland habitat and contains most of the late structure in the Warm, dry Douglas-fir/shrub biophysical environment. Fires generally start in the high country of the Kettle Range and burn down to private lands. For example, this occurred in the recent Copper Butte and Mt. Leona fires. Therefore, treating the Forest Service portion is expected to have a positive effect in protecting private lands in the WUI beyond the number of acres involved.

Fire exclusion and past harvests have caused the Malo East Lake planning area to lose resistance and resiliency to wildfires and forest pathogens. Percentages of acres in early and middle structure are above historical levels and tree densities have reached unsustainable maximums over much of the area. Attainment of structures in biophysical environments more in balance with HRV is reliant upon restoration of stands within the Federal ownership to ensure increases in late stand structures (Late SS 6 and SS 7). Successful treatments of the proposed action can begin the process to restoring single-story late structure in forests of NFS lands. Over time and with subsequent treatment, this will help the watershed achieve a more sustainable balance across all ownerships by reducing the stress on the stands, increasing vigor and decreasing the potential for insect and disease outbreaks, and increasing the resilience to wildfire, mainly by reducing stand densities and weakened trees through harvest treatments.

Climate change is expected to exacerbate the instability of the MEL area by increasing vegetation growth and density, changing vegetation types and species survival in the lower parts of their range, increasing insect outbreaks resulting in subsequent snags, and increasing the likelihood of lightening strikes and wildfire starts. Treatment of stands in the MEL planning area will help prepare the landscape for these changes.

Late and Old Forest Structure

Introduction

The Eastside Screens created two categories of late and old structure (LOS), single-storied and multi-storied stands, with large trees considered common. (See definitions in Stand Structure discussion page 99). The single-story stand with large trees (Late SS 7) in the Warm, dry Douglas-fir/shrub BE is open and can be park-like in nature. Prior to fire-suppression, this structure is thought to have occurred naturally under native disturbance regimes on between 30 and 75 percent of the biophysical environment (see Historic Range of Variability discussion page 101). Today these stands occur less frequently across the landscape primarily due to past management activities and suppression of wildfire. The multi-storied with large trees category recognizes LOS where two or more canopy layers are present. Stands of this type occur frequently across the eastside forests, usually artifacts of fire-suppression. When this structure stage is compared to its historic levels, in the MEL planning area, it is greater in abundance now than in the past. Consequently, timber harvest proposed in the MEL project in multi-storied with large trees (Late SS 6), like a thinning from below, can be implemented consistent with current direction (Eastside Screens). Such a treatment reduces stress to the large trees, as well as competition and risk of mortality. Thinning would establish a balance between the multi-storied and single-storied LOS more reflective of historic abundance. No loss of the LOS would occur under the proposed action.

Large trees are defined in the Forest Plan as amended by the Eastside Screens as having a diameter at breast height (4.5 feet) of 21 inches or greater. Units of Warm, dry Douglas-fir/shrub BE that qualify as LOS have an average of 8 or more large trees per acre (TPA).

The following section is excerpted from the Fire and Fuels, Forest Vegetation and Soils reports located in the project analysis file (Glines 2008, Green et al. 2008, Rourke 2008).

Data Collection

Determination of late structure was primarily based on stand exams. Stand exam data was collected according to FSVEG protocol in 2006 on 148 stands across the planning area. A few late structure stands were included based on aerial photos and, or, field observations. These units are noted and where possible information is extrapolated from an adjoining stand.

Framework

The Colville Forest Plan designates areas managed for old growth forest structure as management area 1 (MA-1). Additionally the Forest Plan directed the establishment of Management Requirement areas (MR areas) for late structure dependent species; pileated woodpecker and pine marten/northern three-toed woodpecker. These management areas

are lain out on a grid-like basis across the Forest. They are established on a project by project basis and once established may be adjusted during subsequent project planning.

The Eastside Screens Forest Plan amendment established additional direction to ensure that connectivity was maintained between these late and old growth habitat areas (MA-1 and MR areas) to facilitate species movements across the larger landscape. Additionally it established the structural stage definitions used in this document to describe late structure. The Eastside Screens prohibits treatments that reduce late structure if existing levels (acres) are below the expected historic range of variability (see Historic Range of Variability discussion page 101).

Issues, Direction, and Measures

Issues from Public Input

Activities proposed in the MEL project will negatively affect late and old structure.

- See Management Area 1, Management Requirement Areas, and Late and Old Structure Unit Description discussions below; also see Historic Range of Variability discussion page 101
- Measures: Acres of treatment by structural stage, Acres treatment by management area

Activities proposed in LOS in the MEL project will affect late and old structure dependent species.

- See Management Area 1 and Management Requirement Areas discussions below; also see Barred Owl, Pileated Woodpecker, Pine Marten, and Northern Three-toed Woodpecker discussion page178
- Measures: Acres of treatment by structural stage, Acres treatment by management area

Direction from Framework, Purpose, and Need

Ensure proposed activities meet the Forest Plan management area and management requirement area direction.

- See Management Area 1 and Management Requirement Areas discussions; also see Barred Owl, Pileated Woodpecker, Pine Marten, and Northern Three-toed Woodpecker discussion page178
- Measures: Acres of treatment by structural stage, Acres treatment by management area

Allow no loss of late and old structure (LOS).

- See Late and Old Structure Unit Descriptions discussions; also see Barred Owl, Pileated Woodpecker, Pine Marten, and Northern Three-toed Woodpecker discussion page178, and Historic Range of Variability discussion page 101
- Measures: Acres of treatment by structural stage, Acres treatment by management area

Existing Conditions, Direct and Indirect Effects

The MEL project may affect late structure in three ways; (1) by conducting activities in specifically designated late structure habitat areas (MA-1 and MRs), (2) by conducting activities in existing late structure stands outside MA-1 and MRs, and (3) by managing middle and early structure stands to facilitate their future development into late structure. The latter of these is discussed in detail above in the Forest Vegetation section, Inter-tree Competition discussion page 105. The first two are discussed below and include a unit-by-unit site specific discussion of the reason for treating these existing late structure forests.

Management Area 1

Management Area 1 (MA-1) as designated in the Forest Plan has a goal to provide essential habitat for wildlife species that require old growth forest components, and contribute to the maintenance of diversity of wildlife habitats and plant communities. The MEL planning area contains one MA-1. It meets the minimum Forest Plan core size requirement (300 contiguous acres or more) and contains mostly larger trees. About 250 acres of foraging habitat lie in 2 blocks, east and west of the MA-1 in other management areas. Scheduled timber harvest is not permitted in core areas, but is permitted in the adjacent foraging areas as long as corridors are maintained. No activities are proposed for the MA-1 core area, or the foraging areas surrounding it.

Management Requirement Areas

Pileated Woodpecker Management Requirement Areas (MR areas) are intended to meet the habitat needs of a pair of pileated woodpeckers, each pileated woodpecker MR area consists of at least 300 acres of older conifer habitat, with minimum specified snag densities. Timber harvest and other activities are allowed (but often deferred) in these MR areas as long as Forest Plan Standards and Guidelines for pileated woodpeckers are followed. The MEL planning area contains one pileated woodpecker MR area in the northwest part of the planning area. Nearly the entire MR contains fairly good, suitable habitat, though no concentrations of snags or down wood were noted during field surveys. A grove of aspen grows in the northeast corner of the MR, along Tonasket Creek. Forest records show that a large portion of the MR was partially harvested in the 1960s.

About two-thirds of the pileated woodpecker MR is proposed for harvest (units 4, 8, 10 and 12). Only unit 4 currently meets the definition of LOS. The effect as described in the Wildlife section of this EA (page 179) includes a small short-term loss but long-term improvement of pileated woodpecker habitat. No additional habitat exists on NFS land adjacent to this MR to either move it to, or supplement the habitat with. Within treatment units in Pine Marten (see below) and Pileated Woodpecker Management Requirement areas and units with late structure all standing and down non-merchantable trees greater than 16 inches DBH would be retained as practicable. Within MR areas, if harvest-caused felling of standing snags results in levels less than 4 per acre overall, snag levels would be increased to this level by creating snags.

The Malo East Lake planning area contains all or portions of 9 pine marten/northern three-toed woodpecker MR areas. These MR areas were intended to ensure that pine marten and three-toed woodpecker habitat needs were addressed across the landscape. Because the planning area consists primarily of warm, dry habitats, it does not serve as pine marten habitat, thus all but two MR areas will not be managed for pine marten but will be managed for other wildlife that depend on large trees (see Barred Owl, Pileated Woodpecker, Pine Marten, and Northern Three-toed Woodpecker discussion page 178).

Each of these MR areas is to consist of 160 acres of mature or older coniferous forest. These MR designations do not change the underlying management area established in the Forest Plan, and management activities are permitted as long as other Forest Plan Standards and Guidelines are followed. MR areas were mapped as dedicated units in the planning area because of the broken terrain, with patches of cover interspersed with patches of dry, very open habitats. Harvest is proposed in 4 pine marten/northern three-toed woodpecker MRs (see table 3.16 page 180). Additionally, depending on the MR, considerable habitat exists outside the MR, some of which is proposed for harvest and some which is not. Treatments within MR areas must not prevent it from meeting the requirements listed in the Forest Plan. Effects are expected to be similar to treatments in the pileated woodpecker MRs described above. There would be a small short-term loss but long-term improvement of habitat.

Potential corridors between MRs, MA-1 and late structure habitat were identified and mapped during project planning. Though some commercial thinning units will narrow an identified corridor, sufficient cover remains on the north sides of slopes and in riparian areas to allow animals to move between MRs and the MA-1.

Late and Old Structure Unit Descriptions

Twenty-nine stands classified as LOS (late and old structure) based on stand exams and field observations (see Stand Structure discussion page 99). Of these, six units were dropped from the proposed action for concerns over late structure dependent species (pileated and other woodpeckers), economics, and fear of incurring resource damage to wetlands. The remaining 23 units were reviewed, eight were proposed as fuel disposal only units while 15 were proposed for commercial thinning or commercial shaded fuel-break treatments. Treatments are listed by unit in table 3.8.

Table 3.8 Proposed Treatments in units with late and old structure

Unit #	Acres	Vegetation Treatment	Fuel Disposal
4	46	CT	SR/HP/UB
5	73	CT	HP/UB
9	25	CT	HP/UB
32	55	CT	JB
39	86	CT	UB
40	26	CT	SR/HP/UB
47	20	CT	HP/JB
48	158	X	OB
49	33	CT	HP/JB
117	46	CT	UB
132	13	CT	UB
145	18	CT	UB
149	7	NUT	UB
166	19	NUT	HP
167	37	CT	UB
168	12	X	OB
173	15	X	OB
174	13	CT	SR/HP/UB
176	36	CT	UB
178	11	X	OB
212	24	X	OB
251	35	X	OB
252	7	SFB	SR/HP/UB
Total	**815**		

CT=Commercial Thinning
NUT= Non-merchantable Thinning
SFB=Shaded Fuel-break (commercial)
UB = Underburn
JP = Jackpot burn
MP = Machine pile and burn
HP = Handpile and burn
OB = Optional Burn Areas
X = No treatment
SR= Slash >3” diameter removed

Vegetation Treatments

Commercial Thinning

Proposed for commercial thinning using a thin from below strategy are 15 LOS units totaling 534 acres, or 18 percent of all proposed commercial treatments. It should be noted that these units are a mosaic of stand conditions with only portions meeting the late structure requirement; therefore, 534 acres is probably slightly greater than actually occurs on the ground. Stand exams indicate that these units are in multi-storied structure

with large trees; contain two or more cohorts of trees in two or more canopy strata and contain at least 8 large trees per acre (TPA). Medium and large trees dominate the overstory, though all tree sizes may be present. These units are in the Dry Douglas-fir Biophysical Environment which is above HRV for multi-story late structure (SS 6). As previously described in the Historic Range of Variability discussion in Forest Vegetation above, single-story late structure (SS 7) is considered the dominant historic condition and is more resistant to crown fire than multi-story late structure (SS 6). Consistent with the Eastside Screens, treatments are aimed at converting these multi-story late stands to single-story.

What follows is a brief discussion of the over arching prescription for these stands followed by a unit by unit discussion of the current conditions and the objective behind the recommended treatments.

Commercial thinning all units would leave all trees equal to or greater than 21 inches DBH except those that are incidentally removed for safety or operational reasons. Trees in units with late structure would be "thinned from below" (removing smaller, less vigorous trees) to a spacing between tree trunks of 20 to 35 feet based on tree size and vigor. Basal area retention is expected to be on average between 90 and 110 square feet per acre.

Patches of 25 percent or more of each LOS unit as depicted in the EA would be left untreated except if underburning or jackpot burning enters them. Where treatments occur, trees would be yarded (removed from the unit) with ground based equipment. Understory ladder fuels would be whipfalled or precommercial thinned (see Chapter 2 for definitions). Fuel disposal would vary depending on proximity to the forest boundary and current fuel load. Because no mechanical piling of fuels would be employed in LOS units, some units would have newly created slash (fuels greater than 3 inches in diameter) removed during commercial harvest. This allows for follow up treatment of underburning, jackpot burning, or handpiling and pile burning. Portions of units at the forest boundary would receive hand piling and pile burning; the remaining acres in these units may be underburned, if needed and if conditions allow.

Down wood and snags larger than 16 inches diameter would be protected in these stands. Where snags 16 inches DBH or greater are felled for safety reasons, the felled trees would be retained on site. There would be clearing of small trees around larger trees to remove potential ladder fuels. All LOS units except unit 4 would be winter logged as defined in design elements.

Trees with mistletoe Hawksworth rating greater than 3 would also be removed (Hawksworth 1977[2]). Douglas-fir in root rot pockets would be cleared to a distance of 50 feet from the pocket edge. This may result in openings up to one half acre in size.

[2] Hawksworth created a 6 point system for rating dwarf mistletoe infestation in confers. This method relies on the use of optical estimates.

Thinning would encourage single-story late structure and begin the process of moving the landscape closer to achieving a resilient and crown fire resistant landscape.

- **Unit 4 (46 acres)** is located in the northwest corner of the planning area. It is bounded on two sides by private land with residences. This unit is considered a high priority because of its location along the forest boundary and because it is in fire regime condition class 3. It has moderate surface fuel loading (13 tons per acre on average) and abundant ladder fuels (294 trees per acre less than 7 inches DBH[3]). Because this unit is adjacent to private lands, fuel would be disposed by slash removal (remove newly created material greater than 3 inches in diameter) followed by hand piling and burning piles as needed during appropriate weather conditions. Where conditions allow, portions of the unit (generally greater than 300 feet from the forest boundary) would be underburned or jackpot burned.

  Access requires obtaining permission from at least one land owner to use an existing road on private land and creation of a temporary road (estimated at 0.2 miles) on NFS land. User created roads existing in this unit would be utilized during treatment, where possible, in order to minimize detrimental soil effects. Due to uneven and rocky terrain, this unit would be summer logged under definitions stated in the design elements. No RHCAs (riparian habitat conservation areas) are in this unit and detrimental soil conditions are expected to remain well below the Forest Plan allowable maximum of 20 percent. Records show that portions of this unit were logged in the 1960s. Since then woodcutters have been accessing the unit. Stand exams show there are approximately 8 large TPA (trees per acre) that average 150 years old.

- **Units 5 and 9 (98 acres)** are adjacent to each other and are bounded in part on two sides by private land, one with a full time resident. Treatment of these units would help to reduce fire severity if a wildfire approached the private properties from the relatively unburned Long Alec Creek drainage to the northeast. Both units are in fire regime condition class 3 and surface fuels average of 17 tons per acre. Ladder fuels are abundant with an average of 310 TPA less than 7 inches DBH. Douglas-fir beetle has affected much of the stand and left high numbers of recent mortality (5.5 TPA recently dead). In addition, there are several pockets of root rot. Dwarf mistletoe is widespread throughout with about 5 to 10 percent of the overstory exhibiting symptoms. Surface fuels are expected to increase as pathogens progress, and the understory dies due to inter-tree competition. Crown fire susceptibility is high (Powell 2005).

  The proposed treatment is a commercial thin with areas of salvage as necessary, including clearing around root rot pockets. Because these units are in big game winter range, groups of trees would be maintained untreated and unburned to serve as wildlife cover. Hand piling and pile burning would occur along the forest boundary as needed. Where conditions allow, portions of the unit could be underburned or jackpot burned. It is likely that both mechanical and hand fire line construction may

[3] DBH = Diameter at breast height, TPA = Trees per acre, FRCC = Fire regime condition class

be employed. There is a possibility that the underburn would back into the RHCA in unit 5, though no direct lighting of fuels would occur in this area.

Access would require temporary access through private land on an existing road. Temporary road construction of approximately 0.15 miles to reach a suitable landing location would occur on NFS lands. Detrimental soil conditions are expected to remain below the Forest Plan allowable maximum of 20 percent.

Units 5 and 9 are in the same stand exam group, and together, the units contain an average of 13 large TPA[4]. The larger trees are up to 185 years of age. Interestingly, the 12 to 16 inch trees were found to be around 150 years old; evidently much suppressed due to inter-tree competition. There is no indication of past logging, though some firewood removal has occurred. These units were delineated with cable logging in mind, however as a tractor unit being winter logged, it is anticipated that much of the northern portion of the units would be dropped as well as some smaller benches in unit 9.

- **Units 32 and 40 (81 acres)** are located at the top end of a south trending drainage from Aeneas Creek but straddle the divide into the Art Creek drainage. The location of these stands puts them in a unique position that if treated, could decrease fire intensity for fires moving upslope from Aeneas Creek Road toward homes along Otis road. Unit 32 is located about halfway between these two residential areas, while unit 40 is farther up slope and against the forest boundary at Otis road. Unit 32 is in FRCC 3 and is prescribed for jackpot burning. This unit has an average of 19 tons per acre surface fuels and abundant ladder fuels (287 TPA less than 7 inches DBH). A fire line would be created around this unit using a bull dozer where possible. Unit 40 is in fire regime condition class 2 and because of its location on the forest boundary, fuel would be disposed by slash removal (remove newly created material greater than 3 inches in diameter) followed hand piling and burning piles during appropriate weather conditions. Where conditions allow, generally in portions of the unit greater than 300 feet from the forest boundary, fuels could be underburned or jackpot burned. It has an average of 11 tons per acre surface fuels and few ladder fuels (about 50 TPA less than 7 inches DBH).

  Stand exams for unit 32 show an average of 11 large TPA that average around 185 years of age. The unit does not appear to have been logged before. Stand exams for unit 40 show an average of 15 large TPA that average about 170 years of age. Unit 40 is highly variable in structure, and some firewood gathering has occurred.

  Access to these units would require a small amount of temporary road construction on top of an unauthorized exiting road. This road would extend up to, but not into unit 32. The temporary road would be ripped, seeded and blocked after as soon as feasible after use. No riparian habitat conservation areas are in these units and detrimental soil conditions are expected to remain below the Forest Plan allowable maximum of 20 percent.

[4] DBH = Diameter at breast height, TPA = Trees per acre, FRCC = Fire regime condition class

- **Units 39 and 252 (93 acres)** are located at the southwest end of Art Creek. These units were formerly Washington State lands and were logged probably in the 1950s. Firewood gathering persists in this area. Residences are located to the north and west of these units, some less than 0.3 miles away. Unit 252 would be treated to create a shaded fuel break along the forest boundary while treatment of unit 39 (and 38, not late structure) would serve to reduce the fire intensity prior to approaching the shaded fuel break. Unit 252 would have slash removed during commercial harvest and remaining fuel hand piled and burned while unit 39 would be underburned. From unit 252, it is possible that fire crews could prevent large stand-replacing fires from leaving the Forest and spreading to private ground as occurred in the 1994 Copper Butte fire.

  Both units are in fire regime condition class 3. They have an average of 23 tons per acre of surface fuels and light ladder fuels (74 TPA[5] less than 7 inches DBH). They have about 9 large TPA that average 165 years in age. Art Creek is an intermittent creek, but INFISH buffers would apply to it and to the wetlands in the north end of unit 252. Detrimental soil conditions in unit 39 exceed 10 percent. They are not expected to exceed the Forest Plan allowable maximum of 20 percent due to the proposed action. An unauthorized existing road on NFS land would be used temporarily to access these units after which it would be closed, reseeded, and its entrances camouflaged (see Design Elements page 41). Access to NFS land would require temporary access through private lands.

- **Units 47 and 49 (53 acres)** are adjacent to each other and are located in the planning area at the west end of the Art Creek drainage, south of Art Creek proper and adjacent to the Forest boundary. The closest residence is approximately 0.2 miles north, though additional residences exist to the southwest. Both units are in fire regime condition class 3 though fuel compositions differ. Unit 47 has an average of 10 tons per acre surface fuels, and moderate ladder fuels (173 TPA less than 7 inches DBH). Unit 49 has an average of 18 tons per acre surface fuels and abundant ladder fuels (342 TPA less than 7 inches DBH). Stand exams for unit 47 show approximately 15 large TPA with a recorded age of about 80 to 108 years old. Unit 49 has 15 large TPA.

  They are both prescribed for jackpot burning and would require a mechanical, and, or, hand cut fire line be laid around them. Hand piling and pile burning along the forest boundary would occur as necessary. These units contain no riparian areas. Temporary road construction from unit 39 would provide access to these units only as far as necessary to place a landing (estimated at 0.1 miles into unit 47). Due to past logging and cattle use, unit 49 has existing detrimental soil conditions over 10 percent; however these conditions are not expected to exceed the Forest Plan allowable maximum of 20 percent from implementation of the proposed action. No evidence of past logging is seen in unit 47.

[5] DBH = Diameter at breast height, TPA = Trees per acre, FRCC = Fire regime condition class

- **Unit 117 (46 acres)** is located at the east end of Lambert Creek road and north of the Old Stage trailhead. It sits adjacent to two units that burned in the Copper Butte fire and contains patches that burned and have reforested since that event. The stand is mainly Douglas-fir with pockets of ponderosa pine and western larch. This unit sits approximately 1.2 miles from homes located farther down slope. It was found to be in fire regime condition class 3 with an average of 11 tons per acre of surface fuels. Ladder fuels are moderate with 198 TPA less than 7 inches DBH. There is an average of 9 large TPA and the overstory is approximately 150 years old.

  This unit has several pathogens and dead smaller diameter trees (less than 9 inches DBH[6]) are frequent. Currently the most damaging pathogens are Douglas-fir and western larch dwarf mistletoe. Thirteen percent of the overstory trees are infected with light to severe cases. Surface fuels are currently low, but fire hazard is expected to increase dramatically as mistletoe brooms drop and the understory dies due to inter-tree competition. Crown fire susceptibility is high (based on D. Powell 2005). The proposed treatment is a commercial thin with areas of salvage as necessary, including clearing around root rot pockets. Openings of up to ½ acre in size may be created. Treatment includes underburning and mechanical or hand cut fireline construction surrounding the unit.

  No system or temporary road access is required to treat this unit. Where user-created roads are encountered, they would be used, as required, to minimize creation of detrimental soil effects. No RHCAs are in this unit and detrimental soil conditions are expected to remain below the Forest Plan allowable maximum of 20 percent. Salvage logging has occurred on the unit edges.

- **Unit 132 (13 acres)** is located on the northward and westward facing slopes south of Lambert Creek, within about 0.6 miles of private homes. This area was identified in the Ferry County, Washington Community Wildfire Protection Plan (Schlosser et al. 2006a page 92) as important for treatment because it protects access and egress of homes in the Lambert Creek area (see Wildland-Urban Interface discussion page 84). This stand is heavily infested with Douglas-fir beetle, and has pockets of root rot. Large trees are dying rapidly and the stand is expected to revert back to middle structure without treatment. Unit 132 is in fire regime condition class 2 and has an average surface fuel load of 16 tons per acre. Ladder fuels are low as indicated by an average of 58 TPA less than 7 inches DBH. Stand exams show 22 TPA that are 21 inches DBH and greater with an average age of 150 years.

  The proposed treatment is a commercial thin with areas of salvage as necessary, including clearing around root rot pockets. Openings of up to ½ acre in size may be created. The unit would be underburned after thinning which would require mechanical, and, or hand cut fire line around the unit. Past logging, mostly along the unit eastern edge of the unit, and cattle activities have caused detrimental soil conditions in this unit. Additional activities are not expected to raise the level above Forest Plan standards. This unit is buffered along the Forest boundary by unit 125,

[6] DBH = Diameter at breast height, TPA = Trees per acre, FRCC = Fire regime condition class

which is an open, grassy optional burn unit. No riparian habitat conservation areas are in this unit. No road construction or private access would be required to access this unit.

- **Unit 145 (18 acres)** is located just north of the divide between Mires and Lambert Creeks. It is approximately 0.8 miles from the nearest residence. Though this unit does not directly protect any particular piece of private property, it has very high levels of Dougls-fir beetle and root rot. Approximately one-third of the trees in the 17 to 21 inch DBH class have died in the past two years and there are about 12 snags greater than 19 inches DBH per acre. Vigor is low and crown ratios average 30 percent in the trees over 7 inches DBH. The stand is mainly Douglas-fir with a few western larch. It contains about 8 large TPA averaging approximately 160 years old.

  This unit is currently in fire regime condition class 3 and has some of the heaviest surface fuel loading at an average of 32 tons per acre, primarily in large down woody debris (big logs). This unit would be underburned with the objective of retaining logs and snags greater than 16 inches in diameter. Unit 145 is buffered on two sides by optional burn units. Crown fire susceptibility is moderate overall (based on D. Powell 2005), but high in patches. Ladder fuels as indicated by small trees are low with an average of 66 TPA less than 7 inches DBH. Treatment objectives are to reduce the potential for crown fire by thinning to reduce crown densities, remove understory fuels, and remove susceptible trees in the immediate vicinity of root rot pockets. This may create openings from ¼ to ½ acre in size. Openings would be replanted with root rot and fire resistant western larch.

  A small amount of temporary road would be used to access this unit. Existing detrimental soil conditions are about 10 percent due to old logging mostly in the northern portion of the unit, and livestock use. Final detrimental soil conditions are expected to be about 10 to 12 percent, still below the Forest standard of less than 20 percent.

- **Units 167 and 176 (73 acres)** are adjoining units in the southwest corner of the planning area above a northerly fork of Mires Creek. Both units are within 0.3 miles of private property and treatment would provide an area of lower fire severity should fire approach from the Herron Creek drainage to the south and east. They are within the Ferry County, Washington Community Wildfire Protection Plan medium density interface area. No fuels data was collected in unit 167, but data from unit 176 indicate it is in fire regime condition class 3 with 24 tons per acre of natural surface fuels. Ladder fuels as indicated by small trees are moderate to high with an average of 211 TPA less than 7 inches in diameter. These units would be underburned following commercial harvest.

  Stand exams for 176 indicate 20 large TPA in a variable stand with trees up to 180 years of age. Exams for unit 167 averaged 9 large TPA at 140 years of age. Access would be along an existing forest road and along a new system road created by moderately reconstructing an unauthorized existing road. No riparian habitat

conservation areas are in these units and detrimental soil conditions are expected to remain well below the Forest Plan allowable maximum of 20 percent. Firewood gathering has occurred in both units. Harvest has occurred in the northeast part of 176 and over all of unit 167.

- **Unit 174 (13 acres)** is along the forest boundary in the southwest corner of the planning area and are within 0.3 miles of private residences and in the same general area as units 167 and 176, above a northerly fork of Mires Creek within the Ferry County, Washington Community Wildfire Protection Plan medium density interface area. Unit 174 is in fire regime condition class 2 and has an average fuel load of 15 tons per acre. It has extensive ladder fuels with an average of 327 small trees per acre less than 7 inches DBH. This stand is considered by Powell (2005) to be highly susceptible to a crown fire.

  Stand exams show unit 174 contains 9 large TPA with an average age of 110 years and that it has been previously logged. Close to the Forest boundary, fuel would be disposed by slash removal (remove newly created material greater than 3 inches in diameter) followed as needed by hand piling and burning piles during appropriate weather conditions. Where conditions allow, the unit (generally greater than 300 feet from the forest boundary) would be underburned or jackpot burned.. No riparian habitat conservation areas are in this unit and detrimental soil conditions are expected to remain well below the Forest Plan allowable maximum of 20 percent.

Non-merchantable Understory Thinning

Non-merchantable understory thinning (NUT) is proposed on 26 acres (units 149 and 166) to reduce ladder fuels before fuel disposal by removing small trees with chainsaws. This is followed with an underburn or hand piling fuels and pile burning to reduce surface fuels and fuels left on the ground from the NUT treatments. This is a stand maintenance prescription. The reduction of ladder fuels and surface fuels through NUT and the reintroduction of fire lowers the condition class, reduces fuel continuity, and increases the fire resilience of these stands. After treatment in these units, overstory trees would remain with only the smaller diameter ladder fuels being removed from the stand. The under burn will reduce surface fuels, especially the smaller size classes.

Fuels Disposal

Underburning and Jackpot Burning

The single-storied late structure stands (Late SS 7) were formed by periodic underburns at 0 to 35 year intervals. These stands were resistant to stand-replacing fire because the frequent low intensity underburns would clear away surface and ladder fuels, low hanging branches and mistletoe brooms. As listed in table 3.8, all LOS units would be underburned or jackpot burned if possible, following commercial thinning (or non-merchantable thinning. In general, treatments in these units are designed to protect large diameter trees by treating ladder and surface fuels. These design elements include raking fuels and removing smaller trees from around large trees where thought necessary to minimize potential tree scorch and char, and therefore reduces the likelihood that a tree

would be killed. Also ignition patterns, such as lighting upslope of large trees and allowing fire to back down around the boles (trunks), would be used to minimize fire intensity around the base of large trees. Burn plan objectives would include the retention of snags and large down woody debris greater than 16 inches in diameter to protect wildlife values.

Twenty-five percent in all LOS units as depicted in the EA would be retained in untreated pockets except where within 300 feet of the forest boundary, or in disease salvage pockets, would be retained in untreated pockets. However, these pockets are not excluded from underburning or jackpot burning. In these units it is likely that to some degree, these pockets will be avoided during burning operations so prevent burns from reaching crowns, particularly where conditions include heavy ladder fuels. This will prevent, to some degree, objectives for fuel reduction from being met.

The visible effects of underburns and jackpot burns would be superficial damage to existing understory vegetation (shrubs and forbs). If burned in the spring, shrubs and forbs typically re-sprout, often with more vigor, within a month of being burned. If burned in the fall, vegetation typically recovers sometime the next spring. Large down woody debris greater than 16 inches in diameter would be retained and exhibit some superficial char.

Optional Burn/Buffer Areas

Optional burn/buffer area units (255 acres) are units where underburns may occur if safety and agency resources allow. These units typically have lighter fuel loads and are either naturally open, or were previously burned. They provide buffers on the landscape and underburns would generally be done to maintain their fire resistance and resilience. If underburning occurs in an optional burn area, it would be done as part of a burn operation in an adjacent unit according to prescribed parameters to achieve resource management objectives. A designation of an optional underburn area does not guarantee that all or any will be actually burned. Units with a proposed optional burn would likely have only about 10 to 20 percent of their acreage treated. All the same objectives and design elements that apply to other underburn or jackpot burn units would apply to the optional burn areas. Snag and large tree retention standards would also apply.

Slash Removal and Hand piling, Pile burning

Eight units (243 acres) with late structure would have fuel disposal by hand piling of natural fuels and slash after commercial thinning. Four of these units (92 acres) would have slash (newly created fuels greater than 3 inches in diameter) removed during commercial harvest. In these units, hand piling would occur on an as needed basis, and mostly within 300 feet of the forest boundary. Again, design elements would include the retention of snags and large down woody debris greater than 16 inches in diameter to protect wildlife values. Piles would remain on site for a period of time until fuels are sufficiently dry but weather patterns moist enough to burn. No mechanical piling of slash would be employed on LOS units.

Soils in Late Structure Stands

Stand productivity is impacted when soil reaches a growth-limiting strength or density (also called soil compaction). Most of the late structure stands appear to be dominated by ash-cap loams, silt loams and sandy loams. These soils may compact easily, but do not necessarily reach a growth-limiting level. For example, brush and saplings growing in old skid trails are common on the Colville National Forest.

The effects of tractor activities on the soil in late structure stands are not materially different from the effects on other stands. As described in the Detrimental Soils Conditions discussion (page 141), tractor activities would result in compaction on use areas like skid trails and landings. Small equipment (for example a D-3 tractor or 501 harvester) used to create commercial shaded fuelbreaks would cause less compaction than larger equipment. Additionally, late structural stands would typically have thick duff and heavy surface fuels, which would provide some additional protection from compaction from smaller equipment or cut-to-length operations. If a tractor is used, these skid trails may expose more soil to erosion; if a cut-to-length is used erosion is not expected.

Typically existing detrimental soil condition in these stands is low, because they generally have not been managed before. Tractor activities would increase detrimental soil conditions to about 8 to 12 percent of the unit well below the Forest Plan allowable maximum of 20 percent.

The prescribed fires proposed in the MEL project would occur under conditions to yield a low to moderate intensity fire; not wildfire conditions. Fire effects are expected to include erosion, changes in soil pH, and changes in soil biology. Because of the low intensity, the effects on erosion are expected to be slight. Because fire is a natural process in these stands, changes in soil pH and soil biology are expected to be within the naturally occurring conditions.

Because the trees are dense, Late SS 6 (multi-storied) has thicker duff and more down wood then would typically be found under historic conditions. In Late SS 7 (single-storied) the nutrient pool is located in the soil and high canopy, while in Late SS 6 the nutrient pool is found in forest floor and lower canopy trees. This shift in organic matter load makes Late SS 6 stands more prone to severe fires; while the shift in nutrient pool makes these stands more vulnerable to excessive nutrient loss from fire (Harvey et al. 1999).

The goal of these treatments is to move Late SS 6 stands toward Late SS 7. The treatments are designed to ‘open up’ the stand. Opening the stand would warm the soil, increase soil moisture, and increase evapotranspiration. The soil warms in response to increased solar radiation, the more the stand is opened-up, the greater the effect (Hermann 1978; Smith 1986). Warmer, moister soils create conditions favorable to decomposition of organic matter and increased biologic activity, naturally decreasing the duff layer, and moving some of the nutrient pool from the forest floor back to the soil (Grier et al. 1989).

Treatments change soil microbiology through changes in stand density, temperature, moisture, and species. The soil flora and fauna naturally changes as the vegetation changes; microbes are different between SS 6 and SS 7. Changes in types of fungi have been documented in stands that have been thinned, but these stands have had about the same total biomass of fruiting bodies (Waters et al. 1994).

Cumulative Effects

As mentioned previously, the conditions on land surrounding the Malo East Lake planning area is in flux and can not be relied on to provide late structure habitat. Extensive harvest of private, commercial timber company, and the Washington State Department of Natural Resources (DNR) lands occurred in the past 10 years or so. Wildfire and past even-aged management (clear-cutting) on NFS lands has reduced the amount of existing LOS in and adjacent to the planning area. At the watershed scale, the portion of land administered by the Forest Service is small. However, it contains the majority of timbered mid-elevation and upland habitat and contains most of the late structure in the Warm, dry Douglas-fir/shrub biophysical environment. Therefore, treating the Forest Service portion is expected to have a positive effect in protecting LOS forest, and in promoting the growth of long term LOS forest structure.

Due to the proximity of the LOS-containing units proposed for treatment to private lands, converting the stand structure to a more fire resilient and resistant one will reap benefits to adjacent land owners by reducing the risk that a fire would become stand-replacing and spread off NFS lands.

Roads

Introduction

A road analysis was conducted by the IDT wherein all roads in the planning area were assessed and the following information documented: (1) environmental concerns, (2) public safety risks, (3) possible improvements, (4) special sensitivity, and (5) unique resource values. This list was also used to generate the draft list of roads proposed for decommissioning. From the roads analysis, a planning version of Road Management Objectives was created for all system roads in the planning area. These forms document the management objectives and identify the needed long-term road system. They also identify candidate roads for decommissioning, redundant roads (not needed long-term) and roads causing unacceptable resource damage. The following is excerpted from the Road Engineering specialist's report located in the project analysis file (Holt 2008).

For project transportation needs, please refer to Maps H, I, and J located in Chapter 2, pages 38, 39, and 40.

Data Collection

The INFRA-Travel Routes of the mapped transportation layer was queried on July 25, 2007. Existing roads were field reviewed by the Forest Engineering group to determine reconstruction needs. Additional, existing unauthorized and non-system roads were identified from aerial photos and during field reconnaissance. This information was then transferred to digital format and included in the project analysis file road map layer. Where possible, field confirmation was made of unauthorized existing roads.

Framework

The National Forest Management Act of 1976 (US Congress 1976) requires that vegetative cover on new temporary roads will be reestablished on the roadway and associated disturbed areas within 10 years. It also states that constructed roads (either temporary or specified) will be designed to standards appropriate for their intended uses, and will consider safety, costs, and impacts on the land and resources.

The Forest Plan requires that new single purpose service level D roads would be closed after implementation.

Issues, Direction, and Measures

Issues from Public Input

Concern regarding roads and what happens to them after the MEL project is finished (in terms of road maintenance and repair)

- See Road Reconstruction and Road Decommissioning discussions below
- Measure: Miles of road reconstruction

Whether the MEL project will change the unroaded nature of Art Creek area

- See Inventoried Roadless Areas discussion below
- Measure: Road Density

Concern regarding need for new road construction

- See New System Road and Road Decommissioning discussions below
- Measures: Miles of new system road, Miles of road decommissioned

New roads may become ATV trails (which may result in adverse effects regarding soils, water quality, wildlife seclusion, noxious weed invasion, non-motorized recreational users).

- See Temporary Road Construction and Road Decommissioning discussions below
- Measures: Qualitative assessment

Direction from Framework, Purpose, and Need

Return temporary roads to resource production within 10 years after use.

- See Temporary Road Construction discussion below
- Measures: Qualitative assessment

Existing Condition, Direct and Indirect Effects

Washington State Highway 21 provides the main access to the western side of the planning area. County roads 546, 566, 580, 584, and 588 and Forest Service collector roads 2154000, 2156000, 2157000, and 2160000 provide secondary access into this planning area. Numerous Forest Service local roads provide access to the timber stands proposed for fuel reduction treatment. There are approximately 74.7 miles of existing roads in the MEL planning area.

Table 3.9 Roads by jurisdiction in the MEL planning area.

Jurisdiction	Length (miles)	Percent of total
State	0.0	0.0
County	4.2	5.6
Private	0.6	0.8
USFS	69.5	93.0

Not included in table 3.9 are the approximately 2.6 miles of unauthorized existing roads that were identified and mapped during the MEL Road Analysis Process. Unauthorized existing roads are not intended to be part of, and are not managed as part of the Forest transportation system and include unplanned roads, off-road vehicle tracks, and abandoned travelways. There may be more UE roads in the planning area that are not mapped, and may be discovered upon layout. These would be used them in lieu of creating new skid trails or temporary roads if deemed feasible.

New System Road (2.0 miles)

About 1.6 miles of new road would be constructed and 0.4 miles of road reconstructed and added to the Forest road system. All new system road construction would be closed to traffic after harvest, administrative, and firewood removal unless otherwise noted on the Road Management Objectives forms completed by the IDT after implementation. However, to prevent loss of snags and down wood from firewood cutting and spread of

noxious weeds in Management Requirement areas all new system roads would be closed when they are constructed allowing only harvest-related traffic in these areas (see Design Elements Chapter 2 page 41, and Barred Owl, Pileated Woodpecker, Pine Marten, and Northern Three-toed Woodpecker discussion page 178). These are roads deemed needed for long-term management and are intended to serve multiple use needs as a long-term facility. They would be periodically maintained; frequency and degree of maintenance depending on the assigned maintenance level. New system roads are managed and tracked on the corporate database Infra -Travel Routes.

Road design and location would be such that the roads have a "free-flowing" alignment and "rolling" grades. The goal of these strategies is for the road to match existing topography thus minimizing excavation. Rolling drain dips would be used to shed water off the roadbed at regular intervals to minimize erosion. New specified road construction would follow Best Management Practices (BMPs) listed in Appendix B. All planned specified construction would be re-evaluated at time of layout as to its need to be built as "specified" or "temporary". District specialist input would be sought for help in this decision making process. The following table displays the estimated length for each new proposed specified road referenced by the road segment number assigned for mapping purposes in this EA (also see Transportation Maps Chapter 2 pages 38, 39, and 40).

Table 3.10 New system roads created and units accessed in the MEL project.

Road Segment	Length (miles)	Units Accessed
8	0.1	8, 12
15	1.1	34, 37
42	0.4	138, 148
87	0.4	167
Total	**2.0**	

- **Road segment 8** provides access into units 8 and 12 that have structural stages classified as middle. Located in the northern portion of the planning area the units are within 0.5 miles of private structures and have a fire regime condition class rating of 3. Prevailing wind direction from these units is toward the Tonasket Creek RHCA and private land which increases the importance of this WUI treatment. Construction of road segment 8 would require one permanent stream crossing on the non fish-bearing Tonasket Creek. This road was originally proposed as a 0.6 mile system road, but due to presence of a pileated woodpecker/pine marten management requirement area, was redesigned to meet public concerns. This area is also in designated big game winter range, so design elements to minimize effects to big game would apply (see Big Game discussion in Wildlife section page 174).

- **Road segment 15** would provide access to units 34 and 37 near the headwaters of Art Creek. These units have a structural stage of middle and are located within a

half mile of private structures. These units are down slope of the private property and homes and would break the continuity of fuels between Art Creek and homes along Otis Road. Both units are in fire regime condition class 3. Unit 34 has an average surface fuel load of 15 tons per acre; unit 37 has 25 tons per acre. Because this road would end relatively close to old yarding trails near Art Creek (in unit 38) it would be of great tactical use to fire fighters. In an emergency it could be tied into this old road network with a bulldozer.

- **Road segment 42** is located in the southern block of the planning area and provides access to units 138 and 148. These units are in early and middle structure respectively. Treatment of these units is a priority because they are within one mile of private structures along Lambert Creek and are in fire regime condition class 3. This road segments serves two purposes, first to provide fire fighters with a mid-slope location to back fire from in case of extreme fire emergency. Secondly, it would replace road 2154930, an existing road within a RHCA that is causing resource damage and is proposed for decommissioning (see Road Decommissioning discussion page 132).

- **Road segment 87** is located in the western portion of the south block. It is an unauthorized existing road constructed years ago to provide access to a portion of Vaagen Brothers Lumber Inc. land to the north. This road is necessary to access unit 167, a stand that classifies as LOS (late structure), but which has been previously harvested (see Late and Old Unit Descriptions page 113). This unit is about 0.3 miles from private property. The road segment requires moderate reconstruction to bring it up to specified standards.

Temporary Road Construction (2.3miles)

It is assumed that some temporary roads would be constructed under the proposed action. The term “Temporary” is a Forest Service Timber Sale Contract term used to define those roads to be constructed by the timber purchaser for the sole purpose of treating a specific unit. The intent of these roads is to use them for the short-term only, after which they would be closed, effectively obliterated, seeded, and put back into resource production. The Forest Plan requires that this occur within 10 years of contract completion, however public input indicates a concern regarding temporary roads becoming noxious weed and unauthorized use corridors. As a result, all temporary roads would be closed and put to bed as soon as possible after purchaser has completed work (ideally within a year of competition). Their entrances would be camouflaged to the best of the purchaser’s ability, and effective closure devices installed. As per Best Management Practice (BMP) PR-23, effective obliteration is generally achieved through a combination of these measures:

- Temporary culverts and bridges are removed and the natural drainage configuration is reestablished.
- Road surface is ripped below the level of compaction.
- Side-slopes are reshaped and stabilized.
- Road is effectively drained and blocked.
- Road is returned to resource production through revegetation.

Those roads currently planned as temporary construction would be assessed during implementation and its category adjusted as needed. Any roads planned for specified construction may shift to temporary based on field conditions and specialist input provided at time of layout. Approximately 2.3 miles of temporary road is planned for construction in the proposed action. The effects of possible barrier breaches are analyzed under the relevant resource analyses throughout this document.

Unauthorized Existing (UE) roads would be used in some cases to access units. Except for segment 87 mentioned under New System Roads page 126, these UE roads (2.7 miles) identified for use would not be maintained as part of the forest road system and all follow-up activities relating to temporary roads apply. These roads would be put to bed and camouflaged after implementation, a benefit of the proposed action that would otherwise not be done given current transportation maintenance funding levels.

Road Reconstruction (35 miles)

Road Reconstruction is defined as an activity that results in improvement or realignment of an existing classified road. Specific work items for road reconstruction would be determined during the layout or presale phase of implementation of this project. Two types of road reconstruction are proposed in the proposed action; light and moderate. No heavy reconstruction is proposed (table 3.11).

Approximately 25.9 miles of light road reconstruction is proposed in the MEL project. Light reconstruction of a specific road is sometimes referred to as “spot reconstruction” because it may not necessarily occur on the entire length of that road but may occur in “spots” throughout. It is estimated that about 15 percent of the road length listed for light reconstruction will actually have some work completed on it. Light reconstruction includes occasional drain dip construction with associated light blading and brushing, which is beyond the scope of pre-haul maintenance requirements needed to facilitate commercial haul. The objective of the drain dips is to reduce long-term sedimentation by forcing water to be moved off of the roadbed at regular intervals thus minimizing the distance water can travel down the roadway. Also included is the spot rocking of existing drain dips, outslope drains, RHCAs and their contributing areas, and the occasional rocking to improve subgrade strength and sediment control. All native surfaced Forest Service roads, listed as such in Infra-Travel Routes, which are anticipated to receive log haul will be reviewed on the ground for light reconstruction during sale layout.

Approximately 9.0 miles of moderate road reconstruction is proposed in the proposed action. The listed lengths for medium reconstruction reflect an estimate of the road length to actually be impacted by medium reconstruction work activities. Moderate reconstruction may change the traffic service level, expand the capacity, or change the original design function of the road. Medium reconstruction would include “Light reconstruction” plus the occasional clearing of vegetation, including trees 6 inches and greater; excavation of cutbank and roadbed for additional width to accommodate the critical vehicle (yarder, logtruck, or other), embankment construction, and culvert replacement and installation. This total includes the approximately 0.4 miles of

unauthorized existing road that would be moderately reconstructed, and added to the forest road system upon project completion (segment 87).

Table 3.11 Roads requiring reconstruction during MEL project and their current status.

Road no.	Maintenance	Objective	Length	Reconstruction	Current Status
2154000	2	2	4.0	L	Open
2154100	1	1	1.6	M	Closed
2154700	1	1	0.3	L	Closed
2154750	1	1	1.2	M	Closed
2154755	1	1	0.4	M	Closed
2154900	2	1	1.4	L	Open
2156000	3 & 2	3 & 2	2.1	L	Open
2156300	2 & 1	2 & 1	2.2	L	Open
2156320	2 & 1	1 & 1	1.1	L/M	Open
2156325	1	1	0.4	M	Open
2156326	1	1	0.2	M	Open
2157000	2	2	2.2	L	Open
2157010	2 & 1	1 & 1	2.5	L	Closed
2157012	1	1	0.2	L	Closed
2157015	1	1	0.4	L	Closed
2157020	1	1	0.6	L	Closed
2157030	1	1	0.7	L	Closed
2157034	1	1	0.3	L	Closed
2157040	1	1	0.4	L	Closed
2157050	2	2	3.0	L/M	Open
2157055	1	1	0.3	M	Closed
2157060	1	1	0.9	L	Open
2157070	1	1	0.7	L/M	Open
2157200	1	1	0.3	M	Closed
2157205	1	1	0.3	M	Open
2160000	2	2	2.3	L	Open
2160100	2	2	1.1	M	Open
2160180	2 & 1	1 & 1	0.9	M	Open
2160185	2	1	0.6	M	Open
2160250	1	1	0.3	M	Open
2160260	2	1	0.2	M	Open
Seg. 87	N/A	N/A	0.4	M	N/A
C566	N/A	N/A	0.7	L/M	Open
C584	N/A	N/A	0.7	L	Open

*Reconstruction level L= light, M= Medium

Maintenance levels are used to describe the intensity of maintenance effort needed on a road to allow the road to function and be used as it is intended. There are five different levels used by the Forest Service to describe this intensity, with Level 1 being the lowest and Level 5 the highest. Following is a brief description of the maintenance levels for FS roads in tables 3.11 and 3.12 and found in the planning area.

Maintenance Level 1: These roads are assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period is one year or longer. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate." Roads placed in this category may be any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at Level 1, they are generally closed to vehicular traffic, but some may be open and suitable for non-motorized uses. There are 24.3 miles of Level 1 road in the MEL planning area under Forest Service jurisdiction.

Maintenance Level 2: Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either (1) "discourage" or "prohibit" passenger cars or (2) "accept" or "discourage" high clearance vehicles.

There are approximately 44.8 miles of roads with an operational maintenance level of 2 in the MEL planning area under Forest Service jurisdiction. Of these, an estimated 14.1 miles have an objective maintenance level of 1. The strategy on these level 2/1 roads is to allow the roads to close naturally over time through reduced maintenance (brushing and blading), while assuming that vehicle use will decrease accordingly. It can be argued that due to the absence of a physical closure that vehicle use will continue keeping the road open and possibly lead to increased road maintenance and resource damage over time. For this reason alone, consideration should be given to physically blocking and dropping these road miles into the Level 1 category.

The remaining 30.6 miles of Level 2 roads in the planning area have an objective maintenance level of 2, open roads for high clearance vehicles. Maintenance activities planned for accomplishment on roads in this category are intended to allow for the passage of high clearance vehicles and to prevent unacceptable resource damage.

Maintenance Level 3: Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this category are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are either "encourage" or "accept". There is only one road (0.4 mile segment of 2156000), in this category in the planning area under USFS jurisdiction.

According to the CNF document titled "Forest Scale Roads Analysis" dated June 2005 it is estimated that 16 percent of Level 1 roads, 25 percent of Level 2 roads, and 100 percent of Level 3-5 roads are maintained yearly. Declining road maintenance budgets has lead to the situation where the yearly maintenance needs on the estimated 372 miles of Level 3-5 roads (estimated at $272,000) require nearly 100 percent of the current CNF road maintenance budget leaving little funding available for lower priority maintenance needs on Level 1 and 2 roads. This trend is expected to continue. Reconstruction work on proposed haul roads (generally Level 1 and 2 roads) aimed at improving road drainage will help reduce sediment in the long-term and make these roads more self-maintaining. Road maintenance requirements performed prior to, during, and after haul will be as per FT.3 (Stewardship).

Road Decommissioning (5.5 miles)

There are 8 system roads totaling 5.5 miles, all with operational and objective maintenance levels of 1 and 2 that have been identified as priority candidates for decommissioning in this planning area during the MEL Road Analysis Process (RAP). These roads will be considered for decommissioning after the proposed harvest activities and post harvest treatments associated with the MEL project are completed. Decommissioning ranges from physically closing the road, and allowing for natural closure, to ripping and seeding, and put back into resource production. The type of decommissioning is dependent on available funding, resource needs and associated risk, and the public input received for each road. Decommissioned roads will be dropped from the Forest Road Atlas as "existing" but retained as "decommissioned" for future monitoring of the effectiveness of decommissioning efforts.

Following is a table displaying the roads that were identified for decommissioning:

Table 3.12 Maintenance levels, lengths, current status, and proposed use of roads to be decommissioned after project completion.

Road #	Maintenance Level	Objective Level	Length (miles)	Current Status	During Project
2154753	1	1	0.4	Open	Used
2154930	2	1	0.6	Open	Used
2156200	2	1	0.2	Closed	Not Used
2157040	1	1	0.6	Closed	Used from top end
2157050	2	2	1.3	Open	Used
2157100	1	1	1.7	Closed	Not Used
2157295	2	1	0.3	Open	Used
2160255	1	1	0.4	Closed	Used
Total			**5.5**		

These roads have been proposed for decommissioning due to heavy firewood gathering in the RHCAs (Riparian Habitat Conservation Areas), washouts, and redundancy with other more suitable roads (see Riparian Management Objectives discussion page 168). Additionally all of the roads proposed for removal are located in a watershed that is currently at or above the Forest threshold of concern for ECA (Equivalent Clearcut Acres page 161), requiring special consideration. Some of these roads may be used during the project, but they and are not needed for long-term management of the adjacent resources. The reasoning that went into closing these roads follow.

- **2154753** This road segment on a tributary of Lambert Creek contains old log crossings and several fillslope failures. It is not needed for future road access. Access is currently through private land and off FR #2154750 (maintenance Level 1, effectively closed). This road negatively impacts bank stability and sedimentation of a Class III stream. (RHCA stream categories are described on page 165).

- **2154930** This road segment runs up a semi-wet draw (RHCA) above Lambert Creek and will be replaced by another system road on the project. This road is currently open and used probably mostly during hunting season. During wet season use this road negatively impacts sedimentation of a Class IV stream.

- **2156200** This road, located on a tributary to Lambert Creek, is officially closed, but the closure berm has been breached and provides woodcutting access within an RHCA. The RHCA woodcutting along this road has resulted in the construction of additional user created roads to the stream. Wood removal in this RHCA is high and loss of Large Woody Debris from the stream a concern (see

Riparian Management Objectives page168). This road can negatively impact bank stability and sedimentation of a Class III stream.

- **2157040** This road parallels an RHCA along the South Fork of St. Peter Creek and its decommissioning would eliminate two stream crossings. The road is now effectively blocked with earth berms on both ends. This road negatively impacts bank stability and sedimentation of a Class IV stream.

- **2157050** This road is to be decommissioned because it is not needed and has a washout that currently blocks access to the back part of the road system. It is located in the South Fork St. Peter Creek.

- **2157100** This road has a 12 to 15 foot fill slope over the South Fork St. Peter Creek. The road is currently closed and is not needed for future access. If the fill around the culvert crossing the South Fork St. Peter Creek fails it would result in a large pulse of sediment downstream. The risk of failure on this pipe is fairly high since the stream drains a large area above that has been affected by fire. This road can negatively impact bank stability and sedimentation of a Class II stream.

- **2157295** The road parallels FR #2157000 and does not provide any additional access. This road, located in the South Fork of St. Peter Creek watershed can be effectively closed with minimal effort and just needs to be taken off the transportation system.

- **2160255** The farthest out 1/3 of this road parallels an RHCA on a tributary of the North Fork St. Peter Creek and provides access for woodcutting within the RHCA. The berm at the entrance of FR #2160250 has been breached by woodcutters. The road and associated activities (woodcutting) can negatively impact large woody debris recruitment, water temperatures, bank stability and sedimentation of the adjacent Class III stream (see Riparian Management Objectives page168).

Inventoried Roadless Areas

No new roads, temporary roads, or road reconstruction is proposed in Management Area 11, or in existing Inventoried Roadless Areas or proposed Inventoried Roadless areas.

Concern was raised regarding the roadless nature of a portion of the Art Creek drainage. Art Creek watershed covers about 2.4 square miles, approximately half of which is naturally forested. The headwater basin of Art Creek is entirely on NFS lands. Art Creek has the lowest road density (1.9 miles of road per square mile) of all the drainages in the planning area and the least number of road/stream crossings (see Watershed Condition discussion in Hydrology section page151). There are no Forest Service system roads within the upper basin; however there are user created and user maintained unauthorized existing roads throughout the lower portions of the drainage. Logging in the 1950s when some of the basin was in State possession, left a network of low-standard, old yarding

roads in the area (Swartz 2006). Some of these continue to get used. No harvest has occurred on NFS land in Art Creek drainage since the 1950s.

The proposed action would require a total of 1.1 miles of new specified road be built in Art Creek. These roads would be closed following project activities but would remain in the Forest road system. This represents an increase in total road density in the watershed from 1.96 to 2.43 mi/mi², but is still lower in density than any other watershed in the planning area. Three road/stream crossings would also be added, bringing the total permanent crossings to five; again, still fewer than the other watersheds. Temporary road would also be constructed, but closures would be implemented as soon as possible after implementation.

Temporary Access for Log Haul

The FS will not construct roads on private land; however, the Forest is seeking temporary access or permanent road right-of- way on existing private roads. Numerous requests for temporary use of existing private roads are currently being pursued to access fuel reduction treatment units that are located adjacent to private property.

Rock Sources

There is one existing inventoried rock source (Lambert Rip Rap) in the MEL planning area. Lambert Rip Rap is an existing inventoried source located on Forest Road 2154 approximately 0.82 miles west of the junction with the county road. It was developed for the reconstruction of the Lambert Creek crossing during flood repair in 2001. It is an excellent rip rap[7] and pit run aggregate[8] site. Blasting would likely be needed to develop sufficient quantities for current and future needs though it may be feasible to develop small quantities by screening and grid rolling for pit run (4 inch and less). This rock source, if developed further, would be sufficient to serve the existing and proposed road system that is tributary to Forest Roads 2154 and 2156.

Additional new rock sources are desirable in this planning area to minimize aggregate and rip rap costs needed in the short and long-term to accomplish road construction, reconstruction and maintenance activities. Commercial rock sources are available in the Republic and Curlew areas but it is generally more economical to develop new sources or utilize existing sources on NFS land due to the shorter haul distance on agency land as compared to that of commercial sources. Additionally, development of rock sources in the planning area allows greater control over the potential spread of noxious weeds and noxious weed inventories (see Noxious Weed section page 207). Five potential new and one inventoried but undeveloped sources of aggregate, pit run, and rip rap are located in the planning area:

- Herron Creek Source # 1311. This undeveloped potential rock source in Herron Creek that is inventoried and located approximately 0.70 miles north (0.10 miles

[7] Hard, durable, angular (typically 1 to 3 feet) rock placed by hand or machine, depending on size, for bank protection, drainage structures, and stabilization.
[8] Angular, bank-run aggregate (typically 4 inch minus), that is loaded directly from source and placed on road for subgrade strength, erosion control, and other uses.

past 1 mile marker) of the Forest boundary on Forest Road 2154. Records indicate material is comprised of meta-sediments which should be suitable for developing pit run material and rip rap. The approximate excavation limits for this source is estimated at 20 feet wide by 100 feet long.

- Located on Forest Road 2154010 (in unit 67), this existing pit run borrow source may be suitable to produce 4 inch minus pit run material but will need to be investigated further. Should this source be determined suitable, it will probably only provide enough quantity sufficient to serve aggregate needs on roads tributary to Forest Road 2157010.

- This existing un-inventoried pit, suitable for producing rip rap, crushed aggregate, and pit run, is located approximately at milepost 0.10 on Forest Road 2157041 in optional burn unit 66. Further investigation is needed to determine suitability of this pit. Material from this site, if developed further, would likely be used to serve rock needs on roads tributary to Forest Roads 2157 and 2157040.

- This undeveloped potential source is located on Forest Road 2157 just past the 2147050 road junction. Material visible on surface appears capable of producing rip rap, crushed aggregate, and pit run. Since this source would cover rock needs on roads tributary to 2157 and 2157040, as will the source on 2157041, it is likely that only one of these sites would be inventoried and developed for the long-term.

- This excellent potential source of pit run is located on both sides of Forest Road 2160 at milepost 2.97 (from end of County Road 566), just north of the 2160400 road junction. This source may be too fractured and soft to produce suitable rip rap but is an excellent long-term source for pit run that will serve the entire 2160 road system.

- This undeveloped source, suitable for production of rip rap, crushed aggregate, and pit run material, is located at milepost 0.8 (from end of County Road 566) on 2160. This source is needed for the production of rip rap to be keyed into place, prior to embankment placement at the washout at MP 0.07 on Forest Road 2160.

Cumulative Effects

There would be a net loss of approximately 3.5 miles of authorized roads on the Forest Road System. Cumulative effects of roads, as they may affect other resources, are discussed under individual resource sections.

Declining or static road maintenance budgets are not allowing the Forest to maintain all Level 1 and Level 2 maintenance roads to a degree that would bring them up to a self-maintaining level. Light and Moderate reconstruction of open roads would help to mitigate this, and put approximately 27.1 miles of open forest system roads into a more self-maintaining condition. It would also help to reduce sedimentation and erosion from an additional 7.9 miles of currently closed roads that would otherwise not receive maintenance.

Soils

Introduction

The section below summarizes the existing condition information, along with the direct, indirect and cumulative effects from the MEL project, as analyzed in the Malo East Lake Soils Report, by Forest Soil Scientist Nancy Glines in the project analysis file (Glines 2008).

Data Collection

The Soil Survey of North Ferry Area, Washington (USDA Soil Conservation Service 1979), State Soil Survey Report for the Northeast Area Forest Land Management Division (WDNR, undated), Geologic Map of Washington, northeast quadrant (Stoffel et al. 1991), Geologic Map of the Republic 1:100,000 Quadrangle, Washington (Stoffel 1992), field data gathered under my direction by Bill Swartz, Joe Coates, and others, and personal knowledge of this area obtained through numerous field visits (2004 through 2007) provide the underlying information on which this analysis is built. All proposed treatment areas were visited. Field notes were transcribed onto individual unit worksheets (to facilitate sharing info with other team members), which are located in binders at the Newport Ranger District.

Each proposed treatment area was examined for existing detrimental soil conditions. Transects were done in 86 percent of the commercial thin units, 100 percent of the small pole thin units, 80 percent of the shaded fuelbreaks (tractor winched), 50 percent of the other non commercial shaded fuelbreaks, 57 percent of the non-merchantable understory thin fuel treatment units, 12 percent of the precommercial thin units, and 52 percent of the underburn and optional burn units. Transects were done to assist in estimating existing detrimental soil conditions. Ocular estimates were done for all units, including units that did not receive transects.

Erosion and sedimentation from prescribed fire was modeled with the Water Erosion Prediction Project (Elliot 2006). A climate was generated for this area using PRISM (Daly 2004). Climate was generated for a spot located approximately 7 miles north and 9 miles east of Republic Washington, at 4,400 feet elevation. This elevation was selected because, in general, storm severity increases with elevation especially as you approach the Kettle Crest. The climate was generated to portray a reasonably ‘worst case’ situation. WEPP was used to model units 51 and 64. Unit 51 is a sandy soil representing sensitive soils found on terrace escarpments. Unit 64 is a steep unit with silty loam soil representative of the typical burn unit.

Framework

The Multiple-Use Sustained Yield Act of 1960 (US Congress 1960) directs the Forest Service to achieve and maintain outputs of various renewable resources in perpetuity without permanent impairment of the land's productivity.

The National Forest Management Act of 1976 (US Congress 1976) requires the Forest Service to safeguard the land's productivity. Forest Service policy is to limit the extent of detrimental impacts to soil productivity.

The Pacific Northwest Regional policy emphasizes protection of soil productivity (FSM 2500, Watershed and Air Management, R6 Supplement 2500-98-1). This ensures detrimental soil conditions that occur would not exceed 20 percent of the activity area.

Forest Plan standards include:

- Skid trail requirements must be specified in timber sale contracts that require tractor yarding.
- Identify areas of high soil erosion or mass failure potential and evaluate probable impacts of resource development.
- Retain organic matter to maintain site productivity.
- Total acreage of all detrimental soil conditions should not exceed 20 percent of the total acres within the activity area including landings and system roads.

Issues, Direction, and Measures

Issues from Public Input

New roads may become ATV trails (which may result in adverse effects re: soils, water quality, wildlife seclusion, noxious weed invasion, non-motorized recreational users).

- See Detrimental Soil Conditions discussion below
- Measures: Acres detrimental soil conditions

Activities proposed in the MEL project, particularly use of heavy machinery, will negatively affect soils.

- See Detrimental Soil Conditions and Impacts to Sensitive Soils discussions below; also see Soils in Late Structure Stands discussion page 122
- Measures: Acres detrimental soil conditions

Direction from Framework, Purpose, and Need

Limit the extent of detrimental soil conditions to less than 20 percent of the activity area.

- See Detrimental Soil Conditions and Impacts to Sensitive Soils discussions below
- Measures: Acres detrimental soil conditions

Maintain soil productivity.

- See Detrimental Soil Conditions and Impacts to Sensitive Soils discussions below
- Measures: Acres detrimental soil conditions

Existing Conditions, Direct and Indirect Effects

Land Forms

The general area has been divided into 6 landforms; four of which occur on National Forest System lands.

The upper parts of the slopes and ridges are characterized as a scoured glaciated mountain slopes. In these areas, continental glaciers scoured many of the fines leaving scoured bedrock at or near the surface. The soils are typically formed on colluvium and residuum, are shallow or moderately deep to bedrock, and have high rock content. Deep colluvial and glacial deposits occur in low spots, in crevices, and along many streams.

A landform characterized by glaciated mountain slopes occurs in the middle to lower elevations, especially on northern aspects. Deep glacial till deposits are generally found along draws and on northern aspects. Shallow till and residuum is found on ridgetops and many of the steeper slopes. This landtype often is found between the glacial scour landtype and the glacial moraine landtype.

A landform characterized by glacial moraine deposits occurs in the lower slopes, especially on northern aspects and in the northern part of the planning area. This landform is dominated by deep to very deep glacial deposits. The deposits are typically layers and may include till, outwash, and some lacustrine material. Many of the slopes are gentle, but steep slopes are found on terrace escarpments, and where the major streams have downcut through this material. Signs of ancient and recent debris slides were noted along main streams within this landtype.

The planning area has small glacial meltwater coulees. These areas are characterized by very steep sided canyons that today are occupied by modest streams.

Geology and Plant Nutrition

The planning area is on the eastern edge of the Republic graben structure. On the western side of the planning area are found the older Eocene rocks, mostly volcanic and intrusive rocks. Permian rocks dominate the eastern side of the planning area, mostly metamorphic and metasedimentary. Glacial terraces are found west of the planning area and extend up all of the major drainages. Glacial deposits are found on many middle-elevation slopes, especially in the northern part of the planning area. The area is within the Republic Mining District; both lode and placer mining have occurred within the planning area.

Soil nutrients are in part, a function of the parent material (rock or deposit) from which the soil forms. Forest tree nutrition management guidelines by parent material were developed by Mariann Garrison-Johnston and Leonard Johnson (2004). Based on these guidelines, the planning area has a soil expected nutrient status of good or medium on 61 percent of the area. An additional 18 percent of the total acres are considered poor to bad, and 21 percent are variable.

Slope Stability and Landslide Potential

Of particular concern is Lambert Creek where historic landslides and debris flows occurred east of the planning area. These areas have left exposed cutbanks capable of actively delivering sediments directly to the stream. Additionally, the East Fork Aeneas Creek is confined to gorges and at least six landslides have delivered to the channel during the last two decades. Nearly all of its length has been influenced by repeated slides and debris flows. The combination of deep, non-cohesive material and the removal of forest cover by wildfire produced an increased risk of landslides on moderate to steep slopes (Swartz 2006).

Lower Aeneas Creek, on NFS lands, crosses two sloping glacial terraces at about 3000 feet and 3200 feet elevation. The segments of Aeneas Creek just below each of the terraces are confined into steep gorges of relatively unconsolidated glacial outwash. Old debris slides were observed on NFS lands within these confined segments (at about 2,800 feet elevation). The shallow debris slides are formed by the channel undercutting the side slopes.

The East Fork of Aeneas Creek is about 2.0 miles long. About ⅔ of this sub-basin experienced a stand-replacement burn in the 1988 Aeneas Fire. Starting about 1.3 miles above the confluence with the north fork, the channel has been impacted by debris torrents. Four debris torrents were observed originating above about 4,000 feet elevation, all within the burned area. All the debris slides appear to have occurred within 10 years after the Aeneas fire. One debris slide was noted below County Road 566 about 0.5 miles above the confluence; this slide appears to be related to road drainage.

Six landslides have occurred in tributaries of the North Fork St. Peter Creek more than one mile east of the planning area. Five of the six occurred following the 2001 Mt. Mt. Leona fire. The sixth landslide is associated with a spring.

Three debris flows have impacted Lambert Creek within the past 20 years. In 1990 a debris flow initiated about 1 mile east of the planning area, at about 5500 ft. elevation. In 1996 a debris flow initiated in a tributary to Belcher Gulch, about ¾ of a mile south of the planning area at about 4600 ft elevation. In 1998 a debris flow initiated about ¾ of a mile east the planning area at about 4840 ft. elevation (Swartz dates at 1998). These landslides initiated within the 1994 Copper Butte Fire perimeter.

No activities are proposed in areas of high mass failure potential.

Soils

The soil in this planning area was divided into three general groups: wetland or riparian soils, ash-cap soils, and soils without a distinct ash cap.

Soils formed in wetlands, along streams, and in depressions are found in all landforms, but it is more common in the glacial moraine and glaciated mountain slopes landforms. This group makes up about 3 percent of the planning area. These soils are typically wet, at least part of the year, and are not suitable for intensive timber management. While

small areas of these wetland soils are mapped within some proposed timber harvest units, they would be protected by the Riparian Habitat Conservation Areas (RHCAs). Road construction may require special practices because of low soil strength, the presence of water, and poor drainage.

Ash-cap soils are common throughout the planning area, making up about 70 percent of the planning area. The presence of an ash-cap is extremely important to the productivity and management of soils in this area. The volcanic ash is an excellent medium for plant growth. Typically the volcanic ash is medium textured with few rocks or coarse fragments. The volcanic glass provides a very high cation exchange capacity, therefore the ash is able to hold on to many soil nutrients and prevent leaching. The ash also has a high available water holding capacity (AWC), especially when compared to the sandy glacial subsoil. The bulk density of these ash layers is very low, often less than 1 gram per cubic centimeter (gr/cm^3).

The very low bulk density means these soils compact easily, especially when moist. Rock content of about 30 to 50 percent (for example, stony or gravelly phases) may ameliorate the compressibility. The volcanic ash-cap generally has very low strength, especially when moist or wet. Skid trails, landings, and road built within the ash-cap layer may rut easily if they are used during wet conditions.

Soils without a distinct ash-cap (non-ash-cap soils) vary in ash content in the surface horizons. This group of soils makes up about 13% of the planning area. Non-ash-cap soils formed on glacial materials typically occur on outwash terraces and escarpments within the glacial moraine landform. They are more common in the northern part of the planning area. Some, like Donavan, Merkel, Mires, Scar and Wapal have as much as 60 percent volcanic glass in the surface horizons. Those with high ash content behave much like the ash-cap soils. Soil strength is dependent on the overall texture and rock content. Bisbee, Chesaw, Namakin, and Torboy have little ash and are very sandy. Soil strength is high, but cohesion is low. When bared, they are subject to surface erosion and ravel. Therefore, all road-cuts ravel easily and are difficult to vegetate, and steep gradients are prone to erosion. Many of these soils have thin layers of soil development, and the nutrient holding capacity is low; making them sensitive to the loss of nutrients and organic matter from fire.

Detrimental Soil Conditions

Existing soil conditions have been shaped by past logging, grazing, mining, recreation, firewood gathering, and fire exclusion. At a landscape sale, the existing detrimental soil conditions[9] are very low. Most of the detrimental soil conditions that have occurred are limited in extent, intense, but widely scattered and do not occupy a large percentage of the planning area. The average existing detrimental soil condition on this landscape is about 3 percent.

[9] Detrimental soil conditions are defined in the Colville National Forest Plan glossary. Detrimental soil conditions include severe compaction, erosion, and displacement.

Ketcheson, Megahan and King (1999) noted that "Numerous studies have shown that most sediment resulting from timber harvest activities is caused by erosion on forest roads associated with the harvest rather than by erosion on the areas disturbed by tree cutting and skidding." Erosion from roads and landings may move into the fluvial system, impacting water quality and riparian management objectives. Regardless of soil type and site conditions, detrimental soil compaction and displacement always occurs on roads, landings and rock source sites. The construction of roads and landings, and the development of rock sources are considered an 'irreversible effect' on soil productivity as described in 40 CFR 1502.16.

Units where the existing detrimental soil conditions exceeded 10 percent were reviewed on a case-by-case basis. Six units (units 108, 110, 111, 114, 139, and 149) meet this criterion. A more detailed analysis was done of these units. With proposed mitigation, all units are expected to remain below 20 percent detrimental soil conditions.

Continued illegal OHV use of closed roads has no impact on soil productivity. Long-term soil productivity is already essentially destroyed on these roadbeds, and their continued use, whether authorized or not, by street-legal vehicles or OHVs makes very little difference to soil productivity.

Temporary roads and landings are typically scarified and seeded to restore productivity for shallow rooted plants and some tree species. Compaction extends deep into the soil and this deep compaction is not generally ameliorated for many years. This project would impact about 31 acres for temporary roads and landings. OHV use on closed temporary roads has a minimal impact on soil productivity. Continued use would reduce their limited productivity somewhat. OHV use will be illegal on these roads at time of implementation.

Impacts to soil productivity from road reconstruction (compaction, removal of the surface horizons, displacement) occur when the road is initially constructed. Changes in road drainage, addition of surfacing and other activities do not change the basic road 'footprint' nor impact soil productivity. Reconstruction of existing unauthorized roads to make them temporary and system roads may be more extensive. The unauthorized roads proposed for use in this project were reviewed in the field and no additional impacts are expected beyond the existing road 'footprint.'

Table 3.13 Detrimental soil conditions predicted from proposed activities in the Malo East Lake Fuels Reduction Project.

proposed action	**Estimated Acres of potential detrimental soil effects**
Long-terms impacts that are considered essentially irreversible	
New specified road construction	12
Temporary road construction	7
Landing construction	24
Rock source development	2
Road reconstruction	2
Less severe impacts that are expected to recover over time	
Yarding/mechanical piling	200-300
Prescribed fire treatments	0-100

Soil Compaction (Equipment operation)

Compaction is an increase in soil bulk density. Detrimental compaction is defined by the Colville National Forest as an increase in bulk density of 15 to 20 percent over the undisturbed level, and macropore space reduction of 50 percent or more (Forest Plan FEIS Glossary 1988 page 11). Compaction occurs when ground-based equipment crosses the ground, vibrating and compressing the soil. Compaction adversely effects soil productivity and ecosystem processes by a variety of mechanisms including increasing the resistance to root penetration and elongation, changes in air and water movement through the soil, and subsequent changes in soil processes (for example soil microbiology and nutrient cycling).

Ground-based logging and mechanical piling are the most common sources of this impact. Though differences exist between effects of tractor skidding verses cut-to-length logging methods, little difference in compaction rates occur. For tractor yarding, with 130-foot skid trail spacing, this project would detrimentally compact about 10 percent of the activity area, roughly 300 acres. With cut-to-length yarding in areas with sufficient slash or snow, similar compaction rates are expected due to the more extensive coverage of the ground by machinery.

The primary effect of mechanical piling is additional compaction on skid trails. The proposed action proposes about 1,400 acres of machine piling. All units proposed for mechanical piling will first be logged with a ground-based system and mechanical piling equipment is limited to operation on existing skid trails. Additionally, mechanical piling equipment typically has low ground pressure, and only passes over the ground once. Therefore, these activities would not increase the amount of detrimental soil conditions in tractor yarded units. In Cut-to-length (CTL) units however, this additional piece of equipment has the potential to increase the amount of compaction on the CTL trails.

Whether this occurs, and to what extent, depends on the amount of slash on the trail. CTL operations may experience a small increase in detrimental soil conditions due to mechanical fuel treatments.

This project includes precommercial thinning in existing conifer plantations; shaded fuelbreak construction with no commercial tree removal; and non-commercial understory thinning. All of this work is done by hand and does not disturb the soil. Compaction is not expected from prescribed fire.

Soil Erosion

Surface erosion is the detachment and transport of individual soil particles by wind, water, or gravity. The Region 6 Soil Quality Standards define detrimental erosion as visual evidence of surface loss in areas greater than 100 square feet, rills or gullies, and, or water quality degradation from sediment or nutrient enrichment. Surface erosion can occur as the loss of soil in a fairly uniform layer (sheet erosion, dry ravel), or as concentrated erosion (rills and gullies). Severe erosion removes nutrient-rich topsoil, thereby reducing soil productivity.

Tractor skid trails are typically bare, because the tractor drags the logs on the trail[10]; the soil in the skid trails is compacted, and the soil structure destroyed. Because of the slope limitations for tractor logging (35 percent), none of the soils with high surface erosion potential would occur on tractor skid trails. The project includes measures to minimize erosion on skid trails such as water bars and seeding. Because erosion is limited to skid trails, erosion does not contribute to the extent of detrimental soil conditions. The erosion potential for most of the soils proposed for tractor yarding is 'low' or 'moderate' on slopes less than 35 percent. Many proposed units have small inclusions that are too steep for tractor or cut-to-length yarding. The project is designed to exclude these steep areas from tractor operations. Cut-to-length machines that place a mat of slash before them do not bare the soil and subject it to erosion (personal observation). Erosion is rarely observed on CTL trails.

The primary detrimental soil condition resulting from prescribed fire use would be erosion, because the fire would consume some of the duff and forest floor material. These areas are expected to be small and scattered. Overall detrimental soil conditions would be about 1-2 percent from these treatments. Design elements are included to protect sensitive soils (Chapter 2, page 41).

If erosion occurs, it typically occurs in the first year after the fire. Even if the site remains unburned, there is some probability of sediment delivery in any year. In this area erosion and sediment is likely to occur as the result of a high intensity summer thunder storm. After a fire, the probability of sediment delivery increases, and the amount of sediment generated by a similar storm increases. Erosion that occurs from prescribed fires typically does not meet the criteria of detrimental soil conditions as defined by the Forest Plan.

10 Logging over snow does not bare the skid trail.

A small amount of erosion may be generated from firelines, especially tractor firelines. This amount is typically very small (for example, if you put a 5-foot wide fireline around a 40 acre unit, the fireline would increase detrimental soil conditions by about less than 1 percent). Design elements are included to control erosion on firelines (Chapter 2, page 41).

Jackpot burning and pile burning result in more intense soil heating, but the impact occurs in small areas. Because of their small size (less than 100 square feet) these areas are not expected to meet the criteria for detrimental soil conditions. Because of the discontinuous pattern across the landscape, these areas are not expected to contribute sediment to nearby streams.

Impacts to Sensitive Soils

Soil sensitivity to fire is an interpretation from the Natural Resources Conservation Service (NRCS). This interpretation includes both the potential for excessive erosion, and the impact of erosion and organic matter loss on productivity. Ratings are based on texture of the surface layer, content of rock fragments and organic matter in the surface layer, thickness of the surface layer, and slope.

The project proposes prescribed fire on 491 acres of soils sensitive to prescribed fire (optional burn, underburn, jackpot burn). Sensitive soils are Vallan, Torboy and Wapal.

Table 3.14 Acres of proposed prescribed burning on sensitive soils.

Treatments	Soil	Acres
Optional burn	Vallan Wapal	372
Commercial thin with underburn or jackpot burn	Vallan	42
Non-commercial thin with optional burn or underburn	Vallan Wapal	68
Precommercial thin with Jackpot burn	Torboy	9

Vallan (loamy-skeletal, mixed, superactive, frigid Lithic Haploxerept) is the most common sensitive soil within proposed burn areas. Vallan is typically found on south aspects and ridges. The soil is shallow, poorly developed, and rocky. Vegetation is light grass. Because of the light vegetation, fire is expected to be cool at ground level and fast moving – resulting in little consumption of soil organic matter. The grasses present are expected to resprout after burning.

Torboy (sandy, isotic, frigid Vitrandic Haploxerepts), **and Wapal** (sandy-skeletal, isotic, frigid Vitrandic Haploxerepts) are deep to bedrock, poorly developed soils formed on very sandy substrates. Depending of the aspect, they support both forests and brush. They are considered sensitive because they are poorly developed, erode easily, and contain little soil organic matter.

Wapal is found within units 16, 29, 77 and 237. Within units 16 (OB), and 237 (NUT UB) Wapal is on terraces and adjacent escarpments; the vegetation is pine and moderately dense. The prescription would have to be designed to retain soil organic matter; which may be more difficult in this area. In units 29 (OB) and 77 (NUT UB) Wapal is on south aspects with light fuels. Fire is expected to be cool and fast moving in this area.

Design elements are included to minimize the adverse impacts of burning on these soils (Chapter 2, page 41).

Proposed units 17 and 78 include about 28 acres on sandy soils that are easily eroded and susceptible to ravel (Chesaw, and Wapal). On flat slopes, ravel is not much, but on steeper slopes (greater than 30 percent) it becomes more significant. Mitigation is included for these units to limit equipment to flatter slopes (less than 30 percent for tractors and less than 40 percent for CTL), thereby protecting them from erosion.

Monitoring on the Colville NF has seldom found erosion in areas large enough or severe enough to meet the criteria for detrimental surface erosion (Nancy Glines, personal observation). Even on particularly erodible soils, monitoring and reviews of past activities have very seldom found detrimentally eroded areas.

Cumulative Effects

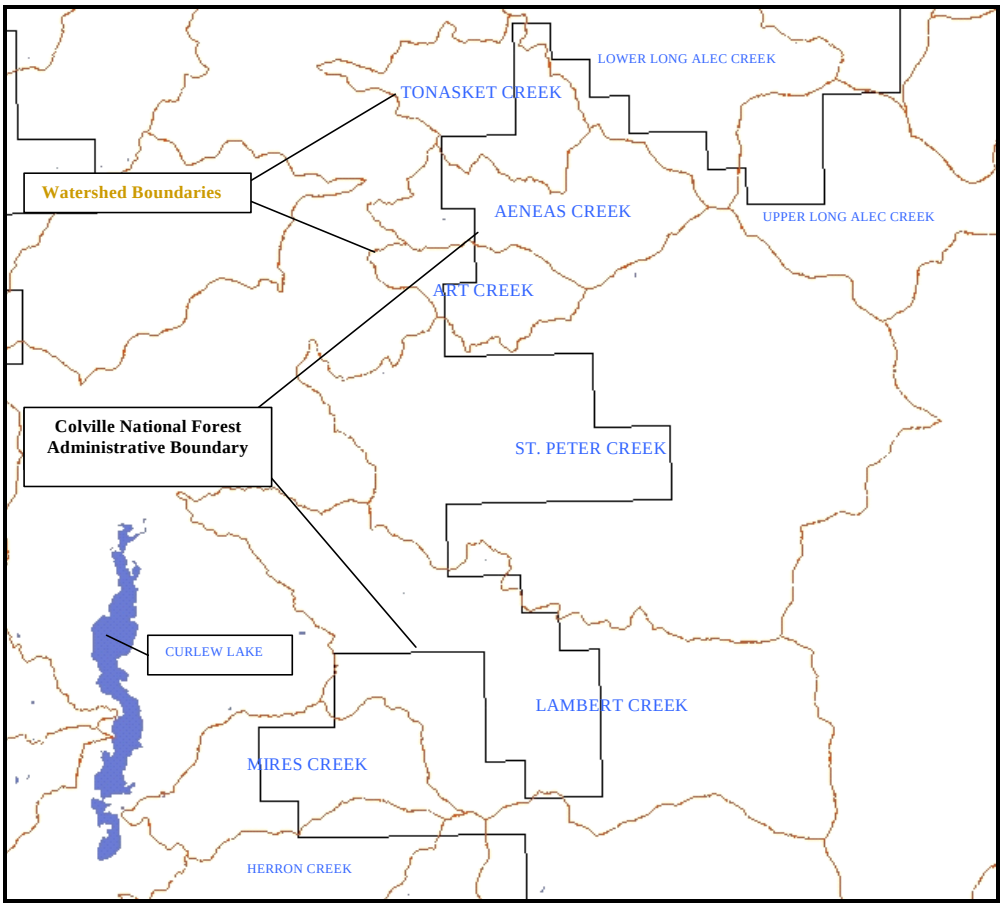
Cumulative effects occur when past, present and on-going activities combine with the proposed action to produce results that are different than the direct effects. Across the landscape, the most common causes of existing detrimental soil conditions are past logging, firewood cutting, and livestock grazing. Within the proposed treatment areas, past logging (roads, skid roads, skid trails and landings) was overwhelmingly the primary cause of detrimental soil conditions. The higher the level of existing detrimental soil conditions, (old skid trails, roads and landings) the more features are generally available to be reused. Where these are reused, total detrimental soil conditions would increase less than 8 to 10 percent.

Hydrology

Introduction

From north to south the planning area includes portions of the following watersheds: Tonasket, Aeneas, Art, Mires, North Fork St. Peter, South Fork St. Peter, Lambert, Herron, and a small portion of the North Fork of the Sanpoil (See map below). The watersheds in the planning area contain similar land ownership patterns. The lower elevations are primarily in private ownership and the upper elevation headwaters managed by the U.S. Forest Service. The Bureau of Land Management and the Washington State Department of Natural Resources also manage lands within some of these watersheds. Current land use within these watersheds includes farming, cattle ranching, and timber management. Some land tracts contain private homes.

Map M. Watersheds of the MEL planning area.



Interpretation of the data for existing conditions, and the analysis below were by Joe Coates, West Zone Hydrologist, updates due to modifications of the proposed action were added by Jennifer Hickenbottom, Forest Hydrologist. The full report and its addendum is available in the project analysis file (Coates 2007, Hickenbottom 2008).

Data Collection

Extensive walk-through and Region 1 Channel Stability surveys (Pfankuch 1975) were conducted in the watersheds contained in the planning area by the Republic RD Hydrology Technician, Bill Swartz (2006). Additional surveys followed the Range Riparian Inventory (Green-line) and U.S. Lentic Wetland Inventory protocols and were conducted in each of the six major watersheds in the planning area. Water quality is currently monitored for coliform bacteria (Lambert Creek) and periodic monitoring has occurred in the past for temperature, total dissolved solids, pH, dissolved oxygen, flows, and turbidity (Lambert, St. Peter, and Mires Creeks). Thermograph data was collected at one site by Washington DOE (T38N, R34E, Sec 30, NWNE) along the South Fork of St. Peter Creek from 2002-2004.

The Region 1 (R-1) Channel Stability procedures are used to evaluate stream channels and their associated banks. The R-1 surveys were conducted on representative non-fish-bearing streams, and, or tributaries in the planning area. These procedures were developed to standardize measurements and evaluations of the resistive capacity of mountain stream channels to the detachment of bed and bank materials and to provide information about the capacity of the stream to adjust and recover from potential changes in flow and, or, increases in sediment production. A rating of excellent, good, fair, and poor is assigned based on a cumulative numerical rating derived from factors such as vegetative cover, bank rock content, and evidence of scour or deposition.

Hankin and Reeves (2006) Stream inventories were conducted on the fish-bearing portions of Lambert and St Peter Creeks within the planning area (see Riparian and Fisheries section page 163). These inventories are used to identify existing stream channel, riparian, and aquatic ecosystem conditions on a watershed scale. As these inventories are completed and repeated over time, the information generated by them can be useful in measuring changes in stream channel conditions and determining the attainment of habitat management objectives.

Framework

The Federal Clean Water Act (1972) contains provisions to restore and maintain the quality of the Nation’s waters. The State of Washington is required under Section 303(d) of the Clean Water Act to periodically assess and prepare a list of waters in which beneficial uses are impaired due to water quality problems.

On October 2006, Washington State Department of Ecology published the Colville National Forest Temperature and Bacteria TMDL, Water Quality Implementation Plan. This implementation plan sets load allocations that identify how much a pollutant needs to be reduced or eliminated to achieve State water quality standards.

In 1995, the Colville Forest Plan was amended by INFISH. Guidelines established by INFISH prohibit water quality degradation as a result of management activities. INFISH also provides direction for establishing riparian protection levels for timber sales and other management activities. This amendment limits the type of activities that may occur along streams, wetlands, ponds, and lakes and establishes monitoring protocols to assess whether protective measures are effective.

The Washington State Forest Practices Act regulates forest practices on all land ownerships in the state of Washington. The Forest Service has agreements with the State to implement Best Management Practices (BMPs) for all management activities (Appendix B). Proposed activities will be in compliance with the guidelines in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22), which outlines BMPs that meet the intent of the water quality protection elements of this act.

Federal Executive Orders 11988 and 11990 as amended, provide for the protection and management of floodplains and wetlands.

Washington State Hydraulic Project Approval (HPA) permit is obtained through the Washington State Department of Fish and Wildlife and is required if the project includes construction or other work that will use, divert, obstruct, or change the natural flow or bed of any fresh or salt water of the state. This includes all construction or other work water-ward, and over the ordinary high water line (including any dry channels). Most routine HPA project work is now covered under a blanket Memorandum of Understanding (MOU) between the Department of Fish and Wildlife and the U.S. Forest Service.

Issues, Direction, and Measures

Issues from Public Input

Activities in RHCA areas of the MEL project will affect water quality and quantity

- See Temperature, Coliform Bacteria, Sediments and Turbidity, and Water Yield discussions below; also see Riparian Management Objectives page 168 and Detrimental Soil Conditions page 141
- Measures: Number of new road/stream crossings, Miles road reconstruction, Equivalent Clearcut Acres

Reducing fuels along "permanent and temporary" (interpreted to mean perennial and seasonal) stream channels will negatively affect sediments in streams, stream channel structure, and riparian habitat.

- See Sediments and Turbidity discussion below; also see Riparian Management Objectives page 168
- Measures: Qualitative assessment, Number of new road/stream crossings

New roads may become ATV trails (which may result in adverse effects re: soils, water quality, wildlife seclusion, noxious weed invasion, non-motorized recreational users).

- See Temperature, Coliform Bacteria, and Sediments discussions below; also see Detrimental Soil Conditions page 141
- Measures: Number new road/stream crossings

The MEL project will provide additional access for cattle to streams

- See Coliform Bacteria discussion below; also see Riparian Management Objectives discussion page 168
- Measures: Number of new stream crossings

Direction from Framework, Purpose, and Need

Conduct additional review if treatments in the planning area raise the Equivalent Clearcut Acres above the Forest Plan threshold of concern.

- See Equivalent Clearcut Acres, and Watershed Condition discussions below
- Measures: Equivalent clearcut acres

Existing Condition, Direct and Indirect Effects

Water quality and quantity (yield) includes physical and chemical characteristics of the water. Commonly measured parameters of water quality include: turbidity, pH, alkalinity, hardness, specific conductance, nutrients, metals, sediment, bacteria, and water temperature. Many of these parameters are affected only slightly or not at all by forest management practices. Water temperature and bacteria levels are the parameters that most commonly exceed state water quality standards on the Forest. Sediment is more difficult to quantify, but is also addressed. Timber harvest, road construction, and other management activities can result in changes to water yield. The relative effect of these changes varies by season, watershed, and weather-related events.

- **Sediments and coliform bacteria:** Cattle and dispersed recreation access to riparian areas can increase due to proposed road improvements and vegetation treatments resulting in elevated levels of sediment and fecal coliform bacteria (referred to as coliform bacteria in this document). Fine sediments deposited over spawning gravels can negatively affect fish populations. Increased levels of coliform bacteria have been correlated to an increased risk of bacterial diseases in humans.
- **Temperature:** Proposed activities may reduce effective levels of riparian shade and increase stream temperatures. Salmonid fish (including trout) eggs and juveniles are sensitive to high stream temperatures.
- **Water yield:** Removal of vegetation and proposed road improvements may increase water yield and result in channel damage due to increased flows. Increased flows can result in unacceptable levels of bank erosion, changes in channel morphology, and reduction in the quality of aquatic habitat.

The following discussion will analyze the direct, indirect, and cumulative effects of the proposed and reasonably foreseeable activities with regard to water resources. This discussion of effects is based on the following indicators: watershed condition, water

quality, and water yield. The analysis of direct and indirect effects is based on how the various components of the project (for example, location and size of treatment units, logging systems, road construction and reconstruction, and reasonably foreseeable actions) are expected to affect each watershed within the Malo East Lake planning area. The Equivalent Clearcut Acre model was used to compare the cumulative effects of the No Action option to the effects of the proposed action.

Watershed Condition

Watershed of the Malo East Lake planning area are being influenced by past and current residential development, cattle ranching, farming, timber harvest, road construction, wildfire, and recent storm or flood events as described in the Other Actions Considered part of this Chapter page 72. Watershed condition helps to gage the effects of these past disturbances. Watershed condition indicators are a series of metrics that are used to index this disturbance level. They are usually expressed as densities or discrete amounts of various disturbances within a watershed. Road density, for example, expressed in miles of road per square mile (mi/mi^2) of watershed area, is a common watershed indicator. Road/stream crossing frequencies, Region 1 channel stability ratings, and acres of past harvest are also used to express the existing watershed condition.

The following table has a summary of measures related to these existing conditions. Note that the rankings of good, fair, poor relate to channel stability only and is assigned based on a cumulative numerical rating derived from factors such as vegetative cover, bank rock content, and evidence of scour or deposition. All conditions are stated on a watershed basis including areas outside of the planning area.

Table 3.15 Summary of existing watershed conditions in the Malo East Lake analysis area

Water-shed	Private Roads (miles)	System Roads (miles)	Total Roads (miles)	Total Road Density (mi/mi^2)	Road/ Stream Crossing (number)	R-1 Channel Stability Survey	Past Harvest (acres)
Tonasket	6.0	4.1	10.1	2.5	12	(Good) *	963
Aeneas	6.7	1.1	17.7	3.5	20	Fair	1881
Art	4.1	0.6	4.7	1.9	2	(Good)	183
St. Peter	27.5	67.3	94.8	3.4	76	Good	10433
Lambert	16.1	33.8	49.8	2.6	47	Poor	7197
Mires	3.1	10.9	14.0	2.8	8	Good	2629
Analysis Area	**63.4**	**127.7**	**191.1**	**3.0**	**165**		**23286**

*Ratings in parentheses are estimates based on walk-through surveys on NFS lands only

The intent of the watershed condition table is not to arrive at an overall rating of good, fair, poor, but rather to try and paint a general picture of each watershed based on these factors. In fact, assignation of a rating to some indicators such as road density and number of road/stream crossings is inappropriate because there are no Forest standards in place.

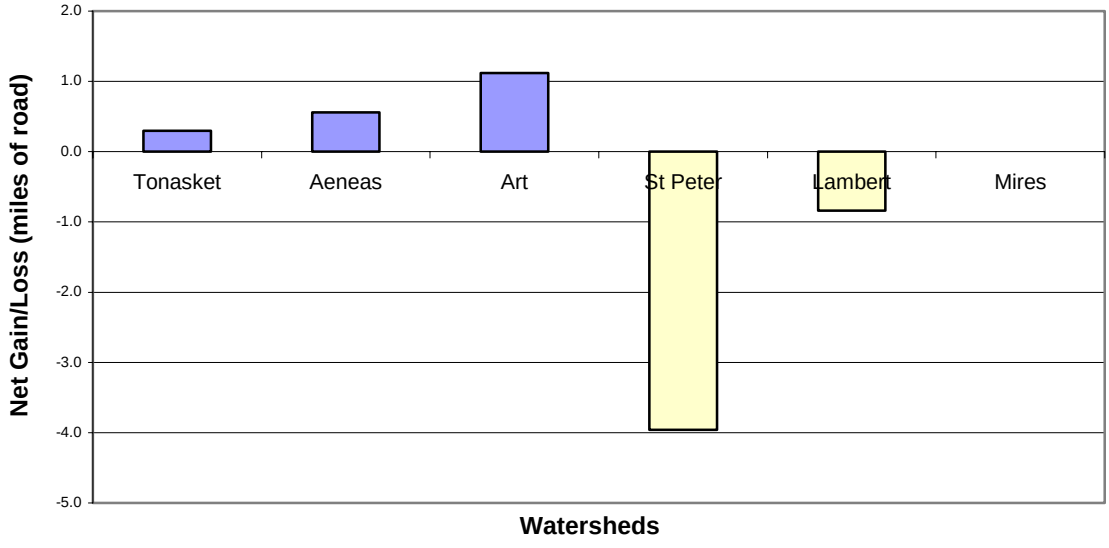
Road Density

Almost 200 miles of state, country, private, and federal agency roads provide motorized vehicle access into the analysis area for logging, mining, agriculture, ranching, and recreating. Road densities vary from 1.9 miles of road per square mile in Art Creek watershed to 3.5 in Aeneas Creek watershed. This is within the normal road density range of other watersheds on the Colville National Forest.

Many of the analysis area roads are located adjacent to streams and contribute sediments either directly at stream crossings or indirectly from upslope cutbanks, fillslopes, ditches, and cross-drain relief culverts. Many of these road/stream crossings provide watering access for cattle and wildlife. Riparian soils and vegetation at these locations have been detrimentally disturbed by roads, motorized vehicles, dispersed recreation, cattle, and wildlife.

Short-term road densities across the planning area would increase slightly over the next 5 years from about 3.0 miles per square mile (mi/mi^2) to about 3.1 mi/mi^2 due to the amount of proposed temporary road construction which would be closed and rehabilitated after all treatments are complete.

Figure 3.2 Malo East Lake Net Long-term Road Changes



Over all, long-term road densities would decrease slightly in the analysis area due to a net decrease of about 3.0 miles of forest system road. By watershed, there would be a net increase of road density in Tonasket, Aeneas, and Art Creek watersheds, and a net decrease in St. Peter and Lambert Creek watersheds. There would be no long-term road change in the Mires Creek watershed. Forest Service temporary roads constructed for the MEL project were not included in this long-term total since they will not become part of the permanent road system. There is very little difference between the short and long-term effects of the proposed action on road densities; however there will be a slight overall benefit after the project is completed due to a small net reduction in roads.

Temperature

Vegetation acts as a parasol for streams; shading them from the sun and keeping water temperatures cool. Stream temperatures can increase when shade canopy is removed through timber harvest, prescribed fire, and road construction within riparian zones. Lambert Creek was identified as a temperature impaired stream in the Forest Total Maximum Daily Load (TMDL). Temperature models indicate that this watershed has 70 percent effective shade and needs an increase of 15 percent to achieve the water quality standard of 16 degrees Centigrade. The timeframe is…"expected to take fifty years to meet the water temperature criteria" (Washington State Dept. of Ecology, October 2006).

Lambert Creek is the only stream in the planning area identified as temperature impaired in the Forest TMDL. Portions of two non-merchantable understory harvest (NUT) units and one non-commercial shaded fuelbreak unit are proposed in units of the Lambert watershed with RHCAs. The streams in the two NUT units (units 121 and 131) are intermittent; they do not usually flow during the mid to late summer season when they could contribute to elevated stream temperatures. Less than 300 feet of perennial stream in a non-commercial shaded fuelbreak; unit 205 would have small trees removed to protect access and egress. Only the understory would be affected in this unit, therefore stream temperatures should not be affected. Any management-related temperature fluctuations from the proposed action in Lambert Creek should be within the natural range of variation and undetectable using current sampling techniques.

Roads and Rock Sources

Road corridors are narrow and the new openings created at these locations would have a minimal effect on shade if they cross riparian corridors at right angles. Light and moderate reconstruction does not usually result in changes to clearing widths and therefore would have no effect on current stream temperatures. Temperature increases from temporary and specified road construction at stream crossings are not expected to occur due to the limited number and size of the affected areas.

Three rock sources were identified for expansion or development within RHCAs of the planning area. Two are located on the north side of their respective streams and pose no risk of elevating stream temperatures. The existing rock source in Lambert Creek (T37N, R34E, Sec 1, NW1/4, NE1/4) is located approximately 250 feet south of the creek along Forest Road 2154. Due to the distance and location on the slope above the creek, this site currently has no influence, and not expected to influence if expanded, on the shade

canopy affecting stream temperatures. The remaining proposed rock sources are all located outside of RHCAs and would have no effect on stream temperatures.

Vegetation Treatments

No commercial treatments would occur and no mechanized equipment would operate within planning area RHCAs. Limited non-commercial vegetation treatments (precommercial thinning, non-merchantable understory thinning and non-commercial shaded fuelbreaks) would occur in some RHCAs using hand methods only. These low-impact treatments would not affect the overstory shade canopy and therefore are not expected to increase stream temperatures above current levels. To prevent the loss of shade to riparian areas and wetlands, as much effective shade would be retained as possible while still achieving treatment objectives, particularly on the south side of the water feature.

Fuel Disposal

Proposed fuel disposal in RHCAs consists of hand piling and burning. No machine piling would be allowed in RHCAs. No prescribed fire ignition would be initiated within an RHCA; however prescribed fires outside the RHCA would be allowed to "back" into these areas. Any prescribed fires that enter riparian zones are expected to be low intensity primarily affecting the understory vegetation. Affected brush and hardwood species should become reestablished within 5 to 10 years. Fuel treatments are not expected to affect stream temperatures since most of the existing overstory riparian shade vegetation would not be affected due to naturally moist riparian site conditions and a strictly controlled environment during burn operations.

Coliform Bacteria

New road segments, timber harvest, and fuels treatments close to streams may increase cattle and dispersed recreation access to riparian areas. Increased access could increase fecal material reaching waterways and so increase coliform bacteria levels, negatively affecting water quality. Because a 15 foot no-treatment buffer would be imposed on all vegetation treatments allowed within RHCAs (non-commercial treatments), there is no increased access for cattle anticipated for most units. Units where access could be increase were identified and design elements require either a barrier be constructed, or that post-treatment monitoring of cattle use be done (Chapter 2, page 41). Should monitoring detect a change in cattle use patterns resulting in damage to the RHCA, appropriate corrective action would take place.

Two streams within the analysis area (St. Peter Creek and Lambert Creek) are currently on the 303(d) list of impaired surface waters maintained by Washington State Department of Ecology (DOE) for coliform bacteria. The DOE will recommend delisting of St. Peter Creek based on recent statistical analysis that indicates the stream currently meets State standards. Lambert Creek has been on the 303(d) list since 1996. Water samples on Lambert Creek have met State water quality criteria for the last two years (2005 and 2006) and compliance continues based on sampling conducted in 2007. No other streams in the analysis area exceed the State coliform bacteria standard. Coliform bacteria

sampling will continue on Lambert Creek according to the Forest TMDL sampling protocol.

Road/Stream Crossings

Locations where roads cross streams (road/stream crossings) are the easiest places for humans, wildlife, and cattle to reach and impact streams. The project would cause both a short-term and long-term increase in the number of stream crossings resulting from proposed new road construction. There would be an initial short-term increase of six new crossings. At the completion of the project, two of the new temporary crossings will be removed and rehabilitated leaving a net increase of four permanent crossings. One of these permanent crossings would be located in Tonasket Creek and three in Art Creek. Later three existing crossings would be removed as proposed road decommissioning is implemented (see Road Decommissioning page 132). This would leave a net long-term increase of one crossing. There are no Forest Plan stream crossing standards that provide management direction for this indicator.

Effective closure of all roads after the project is completed would control most full-sized vehicle use. Off highway vehicles (OHVs) and cattle are more difficult to control and would probably continue to access streams at new crossing locations. During the short period of time the temporary crossings would be available, cattle may not "learn" to use these sites and establish new use patterns. Temporary and decommissioned road/stream crossing rehabilitation that includes slash windrows may discourage cattle until limiting vegetation becomes reestablished. Cattle are already using many of these areas and four additional permanent crossings are unlikely to result in elevated levels of bacteria.

Road decommissioning will also result in the long-term rehabilitation of over 1 mile of riparian road within RHCAs. This decommissioning action should more than offset the net gain of one new crossing since the new crossings would be designed to cross the streams at right angles with minimal impact to RHCAs.

With decommissioning, Lambert Creek would have a net loss of one steam crossing and St. Peters Creek would have a net loss of two. As mentioned above, these creeks are both on the State 303(d) list for impaired waterways due to high coliform bacteria counts.

None of the existing or proposed riparian rock sources would affect natural access barriers and therefore would have no direct or indirect effects on water quality (coliform bacteria) in the planning area.

Fuels Disposal

Fuels disposal treatments are not expected to affect access to riparian areas since most existing riparian vegetation would not be affected (see Fuels Disposal, Riparian and Fish Section page 167). Any backing fires that enter riparian zones are expected to be low intensity and any burned brush and hardwoods species should reestablish quickly (typically within 5 to 10 years). Any decrease in vegetation stocking levels may increase cattle and recreational access and result in elevated levels of fecal bacteria. However

cattle, dispersed campers, and OHV riders are already using these riparian areas and proposed treatments are unlikely to change current distribution patterns.

Sediments and Turbidity

Turbidity is an optical property of the water visually described as cloudiness (McDonald et al. 1991, page 102). Turbidity in streams is usually due to the presence of suspended particles of silt and clay that remain in suspension for relatively long periods of time and so pass down the length of a stream system. Sediment refers to particles that are either suspended in the water (less than 0.1 millimeters in diameter), or bounced along the stream bottom by the force of the water (bed load). Generally both are deposited in areas of slower water. Fine sediments deposited over spawning gravels can negatively affect fish populations.

Based on sediment yields calculated for other CNF watersheds, the existing average annual sediment outputs in the MEL planning area are higher than natural baseline levels due to the influence of existing roads, wildfire, grazing, mining, and historic riparian logging. However, none of the streams within the planning area currently exceed State water quality standards for sediment or turbidities. Based on personal field observations at similar project sites over the last 12 years, direct and indirect sediment effects of the proposed action are not expected to violate State water quality standards.

Vegetation Treatments

Ground based logging systems generally disturb more soils than the other forms of yarding (log removal). RHCA widths vary and effectively protect streams from sediment due to sheet erosion or rilling (non-channelized flow) (INFISH, Salwasser et al. 1995). The area where direct and indirect sediment delivery to streams is most likely to occur is where treatment units extend inside RHCAs. The MEL project would neither permit commercial timber harvest nor mechanized equipment inside RHCAs. Some hand work would occur within RHCAs (precommercial and non-merchantable understory thinning, hand piling, and creation of non-commercial shaded fuelbreaks) but these activities would not appreciably disturb soils and are not expected to affect sediment levels (see Detrimental Soil Conditions discussion page 141). A 15 foot no-treatment buffer would be implemented to insure any management related sediments do not reach planning area streams.

Fuels Disposal

Most of the riparian zones in the planning area show evidence of historic fire activity. The recent fires in the upper watersheds created a mosaic of burn patterns across the landscape (including riparian areas). Proposed prescribed burning (jackpot and under burning) will occur in a strictly controlled environment. Burning will not be initiated in RHCAs, but low intensity prescribed fires may “back down” into riparian zones from upslope locations outside the RHCA. This type of riparian burning is expected to mimic the effects of natural low intensity fires. Such fires on this forest normally do not completely consume the “duff” layer or expose large areas of bare mineral soil. Based on personal monitoring observations, prescribed fires pose a very low risk of delivering sediments to area streams because the moist riparian environment limits the resource

effects of fire. Riparian zones have been effectively used as "unofficial" firelines during spring burns because of their high moisture characteristics. Vegetative regrowth of grasses and brush usually begins the following season. The reestablishment to pre-fire levels of this understory vegetation is usually complete within 3-5 years. Fire can actually stimulate some brush and hardwood species resulting in increased stocking levels as affected areas revegetate.

Hand piling usually results in small concentrations of slash covering small areas. These piles will burn at a higher intensity and over a longer duration than underburn and jackpot burns. However the small size and area occupied by the piles in relation to the size of the RHCA will not result in detrimental soil conditions or excessive mortality to riparian vegetation even if these fires "creep" around in the duff adjacent to the piles.

Machine piling is only proposed outside of RHCAs and there will be no effect from either the machines used to construct the piles or the burning of the piles.

New Road Construction

Roads are normally the primary source of sediment contributions to streams. Most road-related sediments originate at road/stream crossings, and, or where roads are located adjacent to streams. The only sections of new roads proposed in this alternative that would enter RHCAs are in conjunction with six new stream crossings.

New road construction would result in disturbed soils and increased erosion rates. The travelway surface would continue to erode as long as the road is used and maintained. Cutslopes and fillslopes would be seeded, and eventually revegetate (normally within 3 to 5 years) and erosion from these sources would be reduced from construction levels. Best management practices (BMPs) like timing of road work, would be included in the project to minimize these impacts (see Design Elements Chapter 2, page 41, and BMPs Appendix B). The net long-term effect will be a reduction of management related sediments to area streams because over one mile of riparian roads will be rehabilitated which will more than offset the net gain of one new road stream crossing.

Road Reconstruction

The sediment effects of road reconstruction are usually less than new construction since it occurs on existing roads that have already been previously disturbed. Road reconstruction is usually described as light, moderate, and heavy (see Road Reconstruction page129). Light and moderate reconstruction include drain dip construction, spot rocking of existing drain dips, outslope drains, and the occasional rocking to improve subgrade strength and sediment control. The objective of much of this work is to reduce long-term sedimentation by forcing water to be moved off of the roadbed at regular intervals thus minimizing the distance water can travel down the roadway. Approximately 25.9 miles of existing specified roads have been identified for light reconstruction in the planning area. Most of this would be in St. Peter Creek (15.8 miles) and Lambert Creek (8.6 miles). The remainder would be in Aeneas Creek and Mires Creek.

Moderate reconstruction may include excavation of cutbanks and roadbed for additional width to accommodate the critical vehicles (for example yarders and log trucks), embankment construction, and culvert replacement and installation. Approximately 9.0 miles of specified road have been identified for moderate reconstruction in the planning area. This would occur in Aeneas Creek (2.3 miles), St. Peter Creek (2.1 miles), Lambert Creek (2.7 miles), and Mires Creek (1.6 miles).

No heavy reconstruction is planned in this proposed action.

Proposed road reconstruction, maintenance, and increased traffic levels would slightly increase sediment levels over a short period of time. Stream turbidities resulting from these actions will normally clear up within 1 to 2 days after the activity is complete. Bedload sediments would be deposited in the low gradient, downstream reaches of these watersheds. Some filling of sediment traps behind large woody debris would be the most visible change to channel morphology. Sedimentation from road reconstruction and maintenance in RHCAs is expected to be of short duration (3-5 years). Most of these sediments will be flushed downstream during spring peak flows and large storm events. When vegetation becomes reestablished along these travel corridors, sediment levels will drop to a new baseline level. Mitigation measures are expected to be mostly effective in offsetting these impacts (see Design Elements Chapter 2, page 41, and BMPs Appendix B).

Road Decommissioning

Roads are a source of sediment to the streams and the proposed action would decommission 5.5 miles of existing road. All of these roads are located within Lambert and St. Peter Creek watersheds, and many contain problem areas where water resources are being negatively impacted (see Road Decommissioning page 132). Road decommissioning would result in a return to natural vegetation on the road surface, restored drainage patterns, and a corresponding reduction in amount of sedimentation from these roads. In the long term, proposed road decommissioning would help reduce the current amount of sediment reaching creeks.

Rock Sources

One existing and six potential rock sources have been identified for development within the planning area. The existing source and two of the potential sources are located within RHCAs. The existing rock source in Lambert Creek shows no evidence of off-site sediment movement. The two potential rock sources are separated from the creeks by an existing road, so no sediment effects are anticipated from these sites based on their location and the Best Management Practices that will be required for their development. The remaining proposed sites are not located within the contributing areas of streams and wetlands and would have no effect on water resources. No existing or proposed rock sources would affect existing natural riparian vegetation sediment barriers and would therefore have no direct or indirect effect on sediment delivery the in planning area.

Water Yield (Quantity)

Timber harvest removes vegetation, decreases evapotranspiration and interception, and can increase peak flows. If soil disturbance is kept to a minimum, concern over increases in the size of peak flows is appropriate primarily in areas where rain-on-snow events generate the largest flood events (McDonald et al. 1991 page 95). While rain-on-snow events usually generate the largest peak flows in this analysis area, they are uncommon to rare. Therefore increased peak flows resulting from timber harvest are not anticipated to occur with any degree of predictability during the life of this project and will likely have no direct or indirect effects. INFISH RHCAs along larger streams where interaction with the floodplain occurs, may also buffer some of the effects of peak flows.

The effects of forest harvest on water yield are difficult to predict and measure. Road building and yarding operations (especially ground-based) usually result in areas of soil disturbance and compaction. If detrimental soil disturbance from proposed activities meets Forest Plan standards, peak flow concerns can normally be disregarded (see Detrimental Soil Conditions discussion page 141). There will be no detectable change in peak flows from this project based on the slight eventual reduction in system roads and the Best Management Practices (Appendix B) and Design Elements (Chapter 2, page 41) used to control soil disturbance in harvest units.

Expansion, and, or development of existing and proposed rock sources would affect very small areas of these watersheds having no direct surface connection with streams and wetlands. This activity would have no direct or indirect effect on water yield.

Many fire treatments do not utilize ground-based mechanical equipment and would not affect peak flows; however post-harvest grapple piling and mastication can result in large areas of detrimental soils if not properly controlled. This should not be a problem if detrimental soil disturbance from proposed activities meets Forest Plan standards. This is regulated through Best Management Practices and Design Elements that control things like operating seasons and skid trail spacing.

No direct or indirect changes to water yield are likely to occur as a result of the proposed action.

Cumulative Effects

The hydrologic (watershed) boundaries are used to evaluate the cumulative effects of this project since these boundaries determine the majority of the surface and groundwater flow patterns within the planning area. The past and present hydrologic condition of the Malo East Lake planning area watersheds were determined from data in the Interim Activity Database (IADB), the Republic Ranger District GIS activity layer, aerial photo interpretation, DNR (Washington State Department of Natural Resources) Forest Practice Applications, and local knowledge of the area. These past and present actions were added to the reasonably foreseeable future actions on all ownerships in the watershed to determine the possible cumulative effects to water resources.

Watershed Condition

Many areas in these watersheds have been logged in the past. Timber harvest is expected to continue in the future on State, private, and BLM ownerships independent of Forest Service activities.

The addition of new roads for future activities on NFS land is not likely to add appreciably to the existing transportation system since existing roads currently provide access to these many parts of the analysis area. Future residential development in the lower watersheds may add short road segments (driveways) and created openings. This development is likely to be slow based on the current growth rate and economic conditions. Total population of Ferry County grew by an estimated 15 percent over the last decade (State of Washington OFM 2007). New stream crossings will likely be added slowly at the same rate as new roads. The current status of the estimated 63 miles of private roads and road/stream crossings is unknown. Forest Service roads and crossing structures are usually designed and constructed to a higher standard than private roads and crossings (personal observation). Therefore any new private roads, and, or stream crossings may have greater adverse impacts than those described on Forest Service lands.

Cumulatively the MEL project is not expected to result in any appreciable effects to the overall condition of these watersheds since the net change in the number of stream crossings and road density is very small. The project would result in a net loss of 3.0 miles of Forest system road, or approximately 1.5 percent of the total 200 miles of road identified throughout the watersheds of the planning area.

Sediments and Turbidity

Off-site cumulative sediment effects are not anticipated to occur from proposed road construction/reconstruction point sources due to their small size, limited number, and scattered locations within riparian zones. Any elevated downstream turbidity levels at one site will have cleared before work begins at another site in the same or adjacent watersheds.

The effects of timber harvest are expected to be slight (virtually undetectable downstream) since riparian treatments and the operation of mechanized equipment will be restricted within INFISH RHCAs. These units have flat to gentle slopes along the streams. Six new stream crossings will be developed to access these areas and a vegetation buffer will be left intact along the stream channel. Any surface erosion that does originate from these areas will be trapped downstream or diluted during spring runoff. No measurable downstream cumulative effects are anticipated from proposed vegetative treatments within RHCAs due to the limited area proposed for treatment and the effectiveness of design elements (Chapter 2, page 41) and BMPs (Appendix B).

Only St. Peter and Lambert Creeks have a surface connection with Curlew Creek. Existing and proposed management-related sediments will continue to move through the area and into Curlew Creek eventually reaching the Kettle River. Cumulative effects outside the planning area are expected to remain within the existing range of variation, and, or will be masked by other activities occurring outside the planning area. Standard

BMPs should effectively mitigate the effects of proposed federal actions. (See BMPs Appendix B for effectiveness ratings) Stream turbidities are expected to meet state water quality turbidity standards under the proposed action.

Temperature and Coliform Bacteria

Analysis area RHCAs will be designated using INFISH guidelines and remain undisturbed except for riparian treatment units. Implementation of design elements and BMPs will insure that downstream cumulative effects to temperature and bacteria levels will be minimal and undetectable using standard monitoring techniques. No downstream cumulative effects are anticipated to occur under the proposed action. Streams on Federal lands are anticipated to continue to meet state water quality standards for coliform bacteria. The exception may be in Lambert Creek. This is a pre-existing condition which is being regulated and monitored under the Colville National Forest TMDL and will not be affected by the proposed project. Downstream temperatures along the Kettle River will continue to exceed state water quality standards due to conditions not associated with this project.

Water Yield (Equivalent Clearcut Acres)

Vegetative changes within a watershed (from wildfire, timber harvest and other disturbance) may cause changes in peak flow, timing of flows and annual water yield. These changes increase the potential for channel instability and damage. The Forest Plan places a 25 percent threshold of concern for created openings that is intended to be used as a relative indicator of a stable watershed (Schultz 1992). This threshold is used as a red flag for the decision maker to ensure that watersheds at or above this level get extra consideration. Equivalent Clearcut Acres (ECA) is a model used to indicate whether or not a basin exceeds this threshold, or is in a recovered hydrologic state. ECA serves as a basis of comparison between alternatives; it does not quantify the amount of increase in yield, peak flow, soil moisture, or the amount of damage that can result (Alger and Clifton 2005).

The ECA model uses an average future harvest level based on previous logging in these watersheds. Future private harvest levels are difficult to predict since they seem to depend on the landowners' management objectives and current market conditions. There is no reason to believe that private timber harvest levels in these watersheds will change appreciably in the future. Under the proposed action commercial and non-commercial vegetation treatments and road construction would slightly increase the amount of created openings in the analysis area. The probability of peak flows causing stream channel damage increases as the created openings in a watershed exceed 25 percent (USDA Forest Service 1988 page IV-17). Two watersheds (Lambert and St. Peter) currently exceed the 25 percent threshold of concern due to natural events and past management activities. Aeneas watershed is approaching the ECA threshold. Together with known and predicted future management on non-NFS lands, the proposed management action would result in small increases in the current ECA values of these watersheds and delay the hydrologic recovery slightly, three years or less. It should be pointed out that all of these watersheds had large portions of their headwaters denuded by recent wildfires. The

timing of the fires and consequent recovery of those burned areas strongly influences the ECA model.

Currently, planning area unburned timber stands appear to contain more trees than were present historically (pre-fire-suppression). Higher stocking levels result in increased evapotranspiration rates and snow interception resulting in lower levels of available soil moisture. Stream flows may currently be lower in unburned areas than historic reference conditions and therefore capable of withstanding any increased flows that may result from these proposed activities.

The ECA model indicates that St. Peter and Lambert are the only two watersheds in the analysis area where detrimental flows may occur. When averaged across all units, the proposed treatments would remove about 35 percent of the basal area. This level of timber harvest is unlikely to increase the risk of channel-forming flows over the existing condition. If streamflows increase, they are likely to be within the natural range of historical variation.

Weather events (like a rain-on-snow occurrence) usually exert a greater influence on flows than vegetative treatments. The most sensitive areas that could be affected by increased flows are along the lower reaches of Lambert and St. Peter Creeks. Bank erosion and downstream deposition in the low gradient reaches and in storage behind large woody debris are the most likely downstream impacts should such flows occur.

The proposed action would decommission 5.5 miles of existing road. All of these roads are located within Lambert and St. Peter Creek watersheds, and many contain problem areas where water resources are being negatively impacted (see Road Decommissioning page 132). Road decommissioning would result in a return to natural vegetation on the road surface, restored drainage patterns, and a corresponding reduction in amount of sedimentation from these roads. In the long term, roads decommissioning will contribute toward lowering the risk of channel-forming flows over the existing condition.

Based on the ECA model, riparian surveys, and field observations of watersheds displaying similar ECA values, any increase in the average duration of near bankfull flows is not likely to result in detrimental channel conditions resulting from this project. Streambanks are well vegetated and stable in many areas of these watersheds and channels are capable of handling increased flows resulting from these proposed activities.

Riparian Areas and Fisheries

Introduction

INFISH uses the term RHCA (Riparian Habitat Conservation Area) to categorize portions of watersheds where riparian dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines. No commercial thinning (including small pole thinning and commercial shaded fuel break construction), or machine piling of fuels would occur in RHCAs. Non-mechanical treatment of fuels such as precommercial thinning, non-merchantable understory thinning, decomposition, and hand piling and burning piles would be allowed in non-riparian vegetation (defined page167) occurring within RHCAs unless the RHCA is contributing toward the 25 percent required untreated areas in LOS units. A 15-foot no-treatment buffer would be employed around all streams (15 feet both sides) and wetlands.

Prescribed fire in the form of underburns and jackpot burning would be allowed to enter RHCAs but no direct ignitions would occur within them. Fire is a natural part of the biophysical environments found in, and adjacent to, riparian areas. Charcoal is commonly found in riparian soils, and many of the plant species associated with moist conditions demonstrate strong recovery following fire events. Fire would be allowed to enter RHCAs only when effects are predicted not to cause detrimental soil conditions, more than 10 percent overstory mortality, or 20 percent loss of large woody debris. Burning of handpiles would be allowed outside of the no treatment buffer.

More information is available in the project analysis file (Honeycutt 2008).

Data Collection

Surveys to measure the INFISH Riparian Management Objectives were only done on the fish bearing streams of the planning area (Lambert Creek, North Fork of St Peter Creek, and South Fork of St Peter Creek). For non-fish bearing streams, ponds, and wetlands, a qualitative assessment is made by a hydrologist or fish biologist based on informal walk through surveys or the Region 1 Channel Stability procedure (Pfankuch 1975). The proposed riparian units were visited by Bill Swartz in 2006 and his notes are included in the project analysis file. Field observations were made on tributaries following the Mt. Leona fire, and the Copper Butte fire and in subsequent years. No data was collected, but observations were made and photographs taken by the District Fisheries Biologist, Karen Honeycutt.

Framework

In 1995, the Forest Plan amendment INFISH directed the Forest to provide a diversity of high quality aquatic habitats to support viable populations of fish, manage for riparian plant communities, (which maintain a high level of riparian dependent resources), and maintain or restore stream channel dynamic equilibrium and full linkage between

channels and their associated riparian areas. The amendment established four RMOs (Riparian Management Objectives) to assess health of the forested riparian systems and protect the minimum needs of good riparian habitat: water temperature, large woody debris (LWD), bankfull width to depth ratio (BFWD), and pools per mile (PPM). The INFISH applies to all water bodies regardless of whether they support fish.

Section 7 of the Endangered Species Act of 1973, as amended, requires federal agencies to "ensure" that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of endangered (E), threatened (T) or proposed (P) species, or result in the destruction or adverse modification of their critical habitats.

The National Forest Management Act requires that the Forest Service manage for a diversity of fish habitat to support viable fish populations (36 CFR 219.19).

The US Fish and Wildlife Service Bull Trout Biological Opinion (1998) provides required Terms and Conditions for the CNF to follow for all FS authorized activities on NFS lands to avoid jeopardizing bull trout and its habitat.

US Fish and Wildlife Service Fish passage Restoration Biological Opinion provides required Terms and Conditions for the CNF to follow for all FS authorized culvert replacement/removal on NFS lands to avoid jeopardizing bull trout and its habitat.

Wild and Scenic Rivers Act of October 2, 1968 provides direction for determining and managing rivers for scenic or wild characteristics. There are no Wild and Scenic Rivers in the planning area.

Issues, Direction, and Measures

Issues from Public Input

Reducing fuels along "permanent and temporary" (interpreted to mean perennial and seasonal) stream channels will negatively affect sediments in streams, stream channel structure, and riparian habitat.

- See Riparian Management Objectives, Vegetation Treatments, and Fuels Disposal discussions below
- Measures: Temperature, Pieces large woody debris per mile, Stream width to depth ratio, Number pools per mile

Cumulative effects of vegetation removal in the RHCA areas of the MEL project will affect INFISH objectives.

- See Riparian Management Objectives and Cumulative Effects discussions below
- Measures: Temperature, Pieces large woody debris per mile, Stream width to depth ratio, Number pools per mile

The MEL project will provide additional access for cattle to streams.

- See Riparian Management Objectives discussion below; also see Coliform Bacteria discussion page 154
- Measures: Qualitative assessment

The MEL project will reduce habitat and food for wildlife.

- See Fish Populations and Riparian Management Objective discussions below; also see Wildlife section page 172
- Measures: Temperature, Pieces large woody debris per mile, Stream width to depth ratio, Number pools per mile

Direction from Framework, Purpose, and Need

Maintain, and, or restore fish habitat quality for Bull Trout, Westslope Cutthroat Trout, Redband Trout and Management Indicator Species (MIS) such as Eastern Brook Trout.

- See Fish Populations and Riparian Management Objective discussions below
- Measures: Temperature, Pieces large woody debris per mile, Stream width to depth ratio, Number pools per mile

Existing Conditions, Direct and Indirect Effects

Vegetative treatments in RHCAs must achieve riparian management objectives and avoid adverse effects to inland native fish (INFISH). This document incorporates by reference the effects analysis in INFISH for the effects of following the standard and guidelines.

Riparian Habitat Conservation Areas (RHCAs)

The Inland Native Fish Strategy sets the criteria for delineating RHCAs (Riparian Habitat Conservation Areas). RHCAs are buffer areas around all streams, wetlands, ponds, and lakes on NFS land. The INFISH limits the type of activities that may occur along RHCAs and establishes monitoring protocols to assess whether protective measures are effective. Four categories of streams and wetlands and their requirements for RHCAs are delineated as follows:

- **Category 1:** Fish bearing streams: Interim RHCAs consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100 year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site potential trees, or 300 feet slope distance (600 feet, including both sides of the stream channel), whichever is greatest. Lambert Creek, and the North and South Fork of St. Peter Creek are examples of Category 1 streams in the planning area.
- **Category 2:** Permanently flowing non-fish bearing streams: Interim RHCAs consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100 year flood plain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site potential tree, or 150 feet slope distance (300 feet, including both sides of the stream channel), whichever is greatest. Examples of category 2 streams are Tonasket Creek, Aeneas Creek, and Art Creek.

- **Category 3:** Ponds, lakes, reservoirs, and wetlands greater than 1 acre: Interim RHCAs consist of the body of water or wetland and the area to the outer edges of the riparian vegetation, or to the extent of the seasonally saturated soil, or to the extent of moderately and highly unstable areas, or to a distance equal to the height of one site potential tree, or 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond or lake, whichever is greatest.
- **Category 4:** Seasonally flowing or intermittent streams, wetlands less than 1 acre, landslides, and landslide prone areas: This category includes features with high variability in size and site specific characteristics. At a minimum the interim RHCAs must include:

  The extent of landslides and landslide prone areas;
  The intermittent stream channel and the area to the top of the inner gorge;
  The intermittent stream channel or wetland and the area to the outer edges of the riparian vegetation.

  For watersheds in this planning area, the RHCA is composed of the area from the edges of the stream channel, wetland, landslide, or landslide prone area to a distance equal to the height of one half site potential tree, or 50 feet slope distance, whichever is greatest.

Fish Populations

Three fish-bearing streams are within the analysis area: Lambert Creek, the North Fork of St Peter Creek, and the South Fork of St Peter Creek.

A small population of rainbow trout is present in the planning area in North Fork St. Peter Creek. Rainbow trout were not found in Lambert Creek or the South Fork St. Peter. Genetic analysis of these rainbow populations has not been done to determine if they are the native redband trout (inland subspecies of rainbow trout), or progeny from fish previously stocked in Curlew Lake. Brook trout populations are found in Lambert Creek, Curlew Creek, North Fork of the Sanpoil River, and the South and North Forks of St. Peter Creek. The populations are what would be expected for these types of streams. Because brook trout are better adapted to poor (shallow water) habitats, they may out-compete rainbow trout throughout the planning area.

While individual bull trout have been found in the Kettle River, there has not been a population documented in the any of the Kettle River drainages from Cascade Falls to the Canadian Border. The U.S. Fish and Wildlife Service indicated that bull trout in the Kettle River may have been extirpated. The Kettle River is not listed as critical habitat in the Bull Trout Draft Recovery Plan (USFWS 1998).

No westslope cutthroat trout have been found within the planning area. They were stocked in the 1930s in Curlew Lake. However none have been found since. This analysis will focus on rainbow (presumed to be the redband subspecies) trout and eastern brook trout. Habitat for bull trout and westslope cutthroat trout will be protected through implementation of the INFISH Standards and Guidelines.

Effects to the fisheries population from the proposed action would be minimal. Sedimentation is expected to be minimal because the Forest would follow BMPs and design elements (Chapter 2, page 41). There will be a slight improvement over time, but the fisheries in the streams are what would be expected. The Curlew Lake fishery is artificially maintained by the State of Washington. This project would not affect the stocking. The project will have "no impact" to Redband trout and Westslope cutthroat trout. There will be "no effect" to Bull Trout and Pygmy Whitefish, since they are not in the area.

Vegetation Treatments

Commercial Thinning and Mechanical Piling of Fuels

The Malo East Lake proposed action does not propose commercial thinning or mechanical piling of fuels within any RHCA. Therefore, there would be no affect to trout or INFISH RMOs from commercial thinning and machine piling activities within individual unit boundaries, except that the risk of stand-replacing fire would be reduced.

Precommercial and Non-merchantable Understory Treatments

Units 3, 7, 15, 18, 21, 25, 33, 74, 85, 90, 121, 131, 166, 170, 171, 205, and 210 would be treated with precommercial or non-merchantable understory thinning. Based on review of the Copper Butte and Mt. Leona fires, treatment of upland vegetation in RHCAs occurring in dry biophysical environments can preventing total loss of all trees and vegetation in the RHCA should a fire occur. Unit 210 has a large aspen component and the NUT treatment would remove encroaching conifers to benefit aspen (DeSpain 2007). The proposed action would allow non-mechanical treatment of upland vegetation occurring within RHCAs of these units with the exception of unit 166 which supports LOS stands (see Late and Old Forest Structure page 110). Upland vegetation within the RHCA standard width includes species such as Douglas fir, western larch, lodgepole pine, and ponderosa pine. The riparian vegetation (hardwoods, spruce, western red cedar, and subalpine fir) would be excluded from vegetation treatment. A 15 foot no-treatment buffer would be maintained along each water body. The end result would be upland stands of trees spaced 14 to 22 feet apart with the largest trees in the stand remaining and understory ladder fuels reduced. In addition to protecting total loss of riparian vegetation, treatment of the RHCA is desired because of the long term benefits to large woody debris. Thinning treatments reduce inter-tree competition, and therefore encourage the formation of large trees. These trees in turn provide or become large woody debris, a resource subject to INFISH Riparian Management Objectives.

Fuels Disposal

Underburning and Jackpot Burning

One of the major landscape processes in this watershed is fire. Observations of treated (thinned) RHCAs and untreated RHCAs following large fire events led the District Fisheries Biologist to believe that treatments of RHCAs may reduce a tributary's susceptibility to crown fire. However, follow up observations also showed that these same tributaries have a great capacity to recover and revegetate regardless of the fire severity. That said, prescribed burning would only be allowed in RHCAs in a strictly controlled environment. Burning would not be initiated in RHCAs, but low intensity

underburns may be allowed to "back down" into riparian zones from upslope locations. This type of riparian burning mimics the effects of natural low intensity fires. Such fires on this Forest normally do not completely consume the "duff" layer or expose large areas of bare mineral soil. Based on personal observations, prescribed fires pose a very low risk of delivering sediments to area streams (also see Sediments and Turbidity discussion page 156).

For portions of underburn and jackpot burning units located inside of riparian areas, prescribed fire would be designed to meet the INFISH Riparian Management standards and guidelines by using practices and actions that minimizes disturbance of riparian ground cover and vegetation. The design elements included in this project recognize the role of fire in dry biophysical environments as an ecosystem function and apply fire in a manner that does not retard attainment of RMOs (see Design Elements Chapter 2, page 41).

Hand Piling and Pile Burning

There will be no machine piling in RHCAs. Hand piling is desirable in the following units containing RHCAs: 2, 6, 8, 10, 17, 22, 34, 37, 38, 46, 57, 65, 69, 78, 88, 93, 103, 118, 130, 135, 138, 140, 143, 147, 148, 153, , 179, 181, 249, and 250. Wood, and, or brush in the Riparian Habitat Conservation Area (RHCA) could be handpiled where more than a low creeping ground fire is expected due to high fuel loading. Wood may not be removed from the stream channel. Piles would be burned during late fall through early spring while snow is on the ground to limit spreading. An object of retaining 90 percent organic material (duff) on the ground in the RHCA(s) after pile burning would protect soils and minimize potential sediment delivery to streams.

Riparian Management Objectives

Vegetative treatments in RHCAs must achieve riparian management objectives and avoid adverse effects to inland native fish (INFISH). This document incorporates by reference the effects analysis in the INFISH environmental assessment for the effects of following the standard and guidelines. The four RMOs: temperature, large woody debris (LWD), bankfull width to depth (BFWD) ratio, and pools per mile (PPM) are used to assess health of the system and project the minimum needed for good habitat.

Temperature

Salmonid fish (including trout) eggs and juveniles are sensitive to high stream temperatures. The Hydrology section above discusses existing conditions and potential effects to temperature from the proposed action. In summary, only Lambert Creek currently has temperatures that negatively affect trout.

No commercial thinning would be conducted in RHCAs. Non-merchantable and precommercial thinning in the RHCA would be designed to increase the size of the remaining trees. Since the existing shade level would be maintained, no effect to temperature is expected. Fuels disposal in these riparian units would consist of hand piling and burning. Fuel treatments are not expected to affect stream temperatures since most of the existing riparian vegetation would not be affected. Any prescribed fires that

enter riparian zones are expected to be low intensity and affected hardwoods should become reestablished within 5 to 10 years. Very few overstory shade-producing trees would be affected during prescribed burns due to naturally moist riparian site conditions and a strictly controlled burning environment. The existing shade level would be maintained. No measurable effect to temperature is expected.

Large Woody Debris (LWD)

In general, South Fork St. Peter Creek is below the INFISH RMO for large woody debris of 20 pieces of large down wood per mile of stream. Low LWD numbers means reduced stream habitat diversity and therefore, reduced ability to support all ages of trout. Eastern brook trout do better in less complex habitats, and this is seen in the analysis area where the primary populations are eastern brook trout.

Eight roads are proposed for decommissioning, 3.8 miles of which are in the South Fork St. Peter watershed. These roads have been proposed for decommissioning due to heavy firewood gathering in the RHCAs, washouts, and redundancy with other forest system roads (see Road Decommissioning page 132). These roads are not needed for future management. Personal use firewood cutting currently is permitted in the planning area within 200 feet of open transportation system roads. Wood cutting is prohibited within 300 feet of fish bearing streams and within 150 feet of other streams and wetlands. Firewood cutters often mistakenly remove large snags and down wood from within riparian areas adjacent to roads even though it is prohibited. This is particularly an issue in small streams that may not be visible from the road or are not labeled on the firewood cutting and removal map. In general, stream sections next to roads show lower habitat quality than areas without roads. Proposed decommissioning of roads in the MEL project would help reduce this impact, particularly in the St. Peter and Lambert watersheds.

Only creeping ground fires and hand piling and burning of the piles will occur in RHCAs. Large woody debris and large trees (source of LWD) will remain. Riparian tree and shrub species will not be cut. The proposed action follows INFISH standards and guidelines. Commercial harvest activities are outside of RHCAs and will have no effect on LWD. The non-commercial vegetation treatments in the RHCAs are designed to improve stand conditions and promote large trees while reducing the risk of stand-replacing fire. No riparian treatment of wood large enough to fit the Large Woody Debris definition will be cut with the exception of hazard trees and trees in new road templates. These trees will be left on site. There will be no detrimental effects to fisheries or fish habitat.

Sedimentation (pools per mile)

Pools per mile (PPM) is a balance between large woody debris and other natural materials providing structure behind which pools form, and sediments filling pools in. In general, the INFISH pool per mile requirement is not being met in most stream reaches surveyed in the analysis area. Lambert Creek and St. Peter Creek do not meet the objective for PPM. Lack of PPM reduces the ability of the stream to hold large fish. The surveyed reaches have shallow pools. Shallow pools make the streams in the planning

area marginal for large fish above 6 inches. The prevalence of brook trout is likely due to the poor habitat.

Sedimentation is the main effect to pools per mile and loss of habitat diversity. Sediments move from uplands and creek banks down stream to areas of slow water like pools where they are deposited and ultimately fill them in. None of the streams within the planning area currently exceed State water quality standards for sediment. Low amounts of sedimentation is expected from road/stream crossings, but would not be enough to affect pool quality. Over time larger trees will develop, fall, and pools per mile may increase.

Existing roads are a source of sediment to the streams which decreases pool quality. The proposed action would decommission 5.5 miles of existing road. All of these roads are located within Lambert and St. Peter Creek watersheds, and many contain problem areas where water resources are being negatively impacted (see Road Decommissioning page 132). Road decommissioning would result in a return to natural vegetation on the road surface, restored drainage patterns, and a corresponding reduction in amount of sedimentation from these roads. Proposed road decommissioning would help reduce impacts to pools per mile by reducing the amount of sediment reaching creeks.

Road reconstruction and use for haul can cause negative effects. Small amounts of short-term (1 to 2 years) sedimentation is produced from ditch cleaning, cutslope rejuvenation for curve widening, culvert replacement, drainage dip construction, and other maintenance activities. Reconstruction of the roads should result in a moderate beneficial effect over the longer term, as sediment production from road templates decreases due to new armoring, drainage structure placement, and revegetation. The effect is considered moderate because the road, though reconstructed, is still there. The majority of existing roads have portions within 150 feet of a stream channel including road/stream crossings and areas where roads parallel streams. Many of these roads have drainage problems and are eroding into streams and the proposed reconstruction would reduce their contribution of sediments.

Without dust abatement, use of roads adjacent to riparian areas for haul may contribute sediment into the streams. There are major haul routes that run for quite a distance in the riparian area in South Fork St. Peter (FS Road 2157 and County Road 584) and Lambert Creek (FS Road 2156). To prevent a negative impact to trout from the dust created from the haul trucks, dust abatement would be put in place at the discretion of the sale administrator. Coordination with Ferry County regarding dust abatement on County roads will also help mitigate this impact. In some cases, where dust input to creeks is inevitable, design elements are included that would reduce sediment in a known problem area, for example at an area where cattle concentrate along a creek, to mitigate the dust input.

Tonasket Creek (County Road 580) and Aeneas Creek (County Road 566) roads are not along fish bearing streams, and the creeks do not connected to the Kettle River. Sediment from haul on these routes will not impact the fisheries.

One existing and six potential rock sources have been identified for development within the planning area. The existing source and two of the potential sources are located within RHCAs. The existing rock source in Lambert watershed shows no evidence of off-site sediment movement. The two potential rock sources are separated from the creeks by an existing road, so no sediment effects are anticipated from these sites based on their location and the Best Management Practices that will be required for their development. The remaining proposed sites are not located within the contributing areas of streams and wetlands and would have no effect on water resources. No existing or proposed rock sources would affect fisheries in the planning area.

All new roads would be closed after the project in a manner to exclude ATV use. However, some unauthorized use may occur from breaching of barriers. This occurs across the Forest and is dealt with on a case by case basis by law enforcement.

Bank Full Width to Depth Ratio

In previous analysis of Hankin and Reeves data across the Forest, a bank full width to depth (BFWD) ratio below 13 was found to be indicative of good bank and channel stability (Hankin and Reeves 2006). This means that the width of a stream from bank to bank is a maximum of 13 times the depth of the stream. This is being met in all of the surveyed reaches. Cattle trampling is the main management reason for bank destabilization and bank sloughing in the planning area. Adequate vegetative cover on the stream banks prevents this from becoming a problem. Units where treatments have the potential to create additional access for cattle have been identified and modifications were made to the proposed action to limit cattle access.

BFWD ratios would not change due to the MEL fuels reduction project. There would be a no-cut 15 foot buffer on each side of streams in all RHCAs to protect the stream banks.

Cumulative Effects

Only St. Peter and Lambert Creeks have a surface connection with Curlew Creek. Cumulative effects of this action would occur in Curlew Creek from Lambert Creek confluence to the confluence with the Kettle River.

Fine sediment produced from Forest Service activities would add to the already high sediment loading down stream. However, sediment produced would be so small, that it would be hard to measure and is not expect to have an effect on fisheries or fish habitat. The activities in the proposed action would not cumulatively negatively affect aquatic resources within and below the Forest Boundary.

The fish-bearing streams are important for providing spawning and rearing habitat and cool water to Curlew Lake and Curlew Creek. Riparian areas of small first and second order streams are currently at risk of stand replacing fire which could lead to large scale erosion. If such an event occurred, creeks would continue providing fisheries. If habitat becomes too degraded it may not be able to support adult rainbow trout, but may still support adult brook trout.

Wildlife

Introduction

Because the Forest Service (FS) manages habitat and the State of Washington manages wildlife populations, the FS objective is to provide habitat capable of supporting the desired population of each management indicator species or Threatened, Endangered or Sensitive species. Several of these that might occur on the Colville National Forest do not occur in the planning area. There will be no impact to the species listed below from the implementation of this project, and these species will not be further addressed in the document.

- Great blue herons have not been documented in the planning area and no lakes or ponds that they use exist, so no habitat exists for great blue herons;
- Waterfowl generally do not use the Malo East Lake planning area because so little open water, except for steep-gradient streams, exists. Optimal brood habitat for all cavity nesting ducks is within one-half mile of shallow wetlands, and no such habitat exists in the planning area;
- Bald Eagle nesting or roosting habitat does not occur within the planning area;
- Woodland Caribou recovery area is located 65 miles east of the planning area and the area does not contain adequate habitat;
- Northern Leopard Frogs have been documented on the CNF only from one location in the Pend Oreille Valley and amphibian surveys from 2000 to 2004 on the District did not encounter them;
- Common Loons, Clark's Grebes and Eared Grebes nest on large bodies of water, which do not occur in the area;
- Ferruginous Hawks and Sandhill Cranes do not nest in the area;
- The area does not contain large lakes that Pygmy Whitefish occupy.

Wildlife reports for management indicator species and threatened and endangered species are located in the project analysis file (Loggers 2008a; Loggers 2008b).

Data Collection

The information included in this report is based upon the wildlife biologist's knowledge of local site conditions and species/habitat relationships. He obtained this information via personal field reviews of the planning area, and, or from information gathered by resource crews and other trained individuals in the summer and autumn of 2005, 2006 or 2007. During surveys for this project, habitat conditions in every unit were examined.

Framework

Section 7 of the Endangered Species Act of 1973, as amended, requires federal agencies to "ensure" that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of endangered (E), threatened (T) or proposed (P) species, or result in the destruction or adverse modification of their critical habitats.

The Forest Service Manual 2670 establishes direction to guide habitat management for endangered, threatened, proposed and sensitive species to ensure that these species receive full consideration in the decision-making process. That direction establishes the process, objectives, and standards for conducting Biological Assessments (BA) and Biological Evaluations (BE).

The Forest Plan lists habitat capability objectives (p 4-13) for Management Indicator Species (MIS). Because the Forest Service (FS) manages habitat and the State of Washington manages wildlife populations, the FS objective is to provide habitat capable of supporting the desired population of each management indicator species.

Eastside Screens is interim direction for the National Forests in eastern Oregon and eastern Washington to maintain and, or enhance late and old structural stages (LOS) in stands subject to timber harvest. It also requires protection of corridors between Management Requirement areas and MA-1 designated locations.

Neotropical Migratory Bird Conservation Act and Direction Letter for Neotropical Migratory Birds (2000) require the Forest Service to consider the effects of proposed activities on neotropical migratory birds.

Section 4.3.2 of the Environmental Management System for the Colville National Forest requires that applicable legal requirements and other requirements are applied during project analyses. By signature on the biological evaluation included in the project analysis file, the wildlife biologist certifies that this analysis follows the applicable policy direction found in Forest Service Manual 2620, 2630, and 2670.

Issues, Direction, and Measures

Issues from Public Input

New roads may become ATV trails (which may result in adverse effects re: soils, water quality, wildlife seclusion, noxious weed invasion, non-motorized recreational users).

- See Grizzly Bear discussion below
- Measures: Road density in Art Creek drainage

Activities proposed in LOS in the MEL project will affect late and old structure dependent species.

- See Barred owl, Pine Marten, Pileated woodpecker, and Northern three-toed Woodpecker, and Other Woodpecker discussions below; also see Historic Range of Variability discussion in Forested Vegetation section page 101
- Measures: Acres of treatment in Management Requirement areas, Acres by treatment type

The MEL project will reduce habitat and food for wildlife.

- See all discussions this section; also see Riparian Management Objectives discussion page 168
- Measures: Core area/seclusion habitat affected by new roads, Acres of treatment by vegetation type and structural stage

Roads proposed in the MEL project in the Art Creek area will affect wildlife seclusion and diversity in the planning area.

- See Grizzly Bear and Big Game sections below; also see Noxious Weed discussion page 207 and Inventoried Roadless Areas discussion page 134
- Measures: Road density in Art Creek basin

Direction from Framework, Purpose, and Need

Provide habitat capable of supporting the desired population of each management indicator species.

- See Big Game, Barred owl, Pine Marten, Pileated Woodpecker, and Northern Three-toed Woodpecker, Beaver, Blue Grouse, Franklin's Grouse, Other Woodpeckers, Large Raptors and Migratory Land Bird discussions below
- Measures: Various, see individual species accounts

Prevent actions from jeopardizing the continued existence of endangered (E), threatened (T) or proposed (P) species, or resulting in the destruction or adverse modification of their critical habitats.

- See Peregrine Falcon, Great Gray Owl, Grizzly Bear, Gray Wolf, Canada Lynx, Wolverine, Fisher and Pacific Western Big-eared Bat discussions below
- Measures: Various, see individual species accounts

Existing Condition, Direct and Indirect Effects (by species)

The following discussion includes species listed in the Forest Plan and its amendments as Management Indicator Species, species listed by the Regional Forester as sensitive, and species that are federally listed as threatened, endangered or sensitive.

Big Game (primarily mule deer)

Winter range is the most limiting habitat for deer. About 26 percent of the NFS land in the Malo East Lake planning area (3,680 acres of Management Areas 6 and 8) was designated as big game winter range during development of the Forest Plan (see maps E, F, and G, Chapter 1, pages 11, 12, and 13). The planning area contains additional winter range in other management areas, on private land and on land managed by the USDI Bureau of Land Management. Field inventories were not conducted on non-NFS land.

Existing Conditions, Direct and Indirect Effects

In the planning area mule deer are more common than white-tailed deer. The population of mule deer is smaller than in the 1960s and 1970s (S. Zender 2005-2006), but recent Washington Department of Fish and Wildlife (WDFW) data indicate that the herd size has stabilized or increased slightly. NFS lands in the planning area and in the surrounding watersheds contain year round habitat including fawning areas, and summer and winter range. Since big game are prey for wolves, grizzly bear, and wolverine this means there is a year round food source for these species (see these species discussions below).

The maintenance of adequate quality and quantity of food and cover resources is an essential part of providing useable winter range habitat for deer and elk on the Colville National Forest. Equally important is the maintenance of adequate levels of habitat security during the winter months, when human-caused disturbances can cause deer or elk to use their stored nutrient reserves at higher-than-normal rates, with potential adverse effects on winter survival rates and fawn/calf survival. Additionally, a recently concluded study on mule deer females (does) in the Vulcan area, about 9 miles to the northwest, identified that does are not in good condition in early spring, an indication that they probably are not entering winter in prime condition, which reflects the relatively poor condition of summer range (W. Meyers March 2006). Therefore, the analysis of effects of management activities focuses primarily on winter range and security, and secondarily on summer range conditions.

Winter Range Cover

The relative amounts and distribution of forage and cover areas are key factors in determining the usefulness of winter range (MA-6 and MA-8) to deer and other ungulates. About 2,290 acres, or 62 percent, of the winter range does not provide overhead cover (which does not meet the 50 percent directed by the Forest Plan pages 4-98 and 4-106) and within geological history will not grow into cover because they are too dry to support dense forested habitats. Of the remaining 1,400 acres that might be able to support cover, more than 80 percent does.

Nearly 70 percent of the winter range is proposed for some sort of management-related activity including about 1,060 acres of commercial thinning, and 210 acres of precommercial thinning. The commercial thinning treatments within winter range areas will retain older and larger trees, open the stands, reduce competition from young trees, and promote forage. Several of the stands that do not support dense cover do provide some cover in small, scattered stands of trees. Many of these stands could benefit from removal of some of the smaller understory trees through precommercial thinning.

The proposed action includes 41 units of prescribed fire covering about 1,365 acres. Many of the stands that do support trees contain a good overstory but have become very overgrown and dense because fire has not visited them in decades to regenerate the brush and kill the small trees. Prescribed fire will open the understory and regenerate forage species. This process will begin to move the area towards more historic conditions, which suited mule deer better than current conditions.

None of the treatments are designed to remove the larger overstory trees that create good cover in winter and which help intercept snow and keep the areas around the boles snow-free, so though the proposed action will result in some loss of cover, it will not create large openings in winter range. Design elements are included in the decision to maintain escape cover distributed throughout the unit (Chapter 2, page 41).

Winter Seclusion Habitat

On the deer winter ranges in the planning area, deer have sufficient winter seclusion habitat because snowmobile use is low and most of the roads are not plowed. Because of this, the road density comes close to meeting the Forest Plan requirements for winter range in Ferry County of 0.4 mi/mi^2 (Forest Plan page 4-108). Some areas do not meet Forest Plan requirements because county roads, over which the FS does not have jurisdiction, wind through the winter range. Field surveys discovered that many of the roads closures were not effective. Most of the trespass occurs during summer and autumn, before mule deer occupy their winter range. Deer winter range habitat security during winter in the planning area is not expected to change as a result of the proposed action.

Summer Range Cover and Forage

The conditions in the planning area probably are similar to those encountered in the Vulcan doe research previously mentioned (W. Meyers March 2006). The entire watershed can be considered summer range and is composed of forage and cover areas; much of it in moderate to poor condition. Cover and forage are fairly well interspersed in the planning area. Of the stands that are capable of providing cover, about half currently do. The remaining half does not because it was either harvested (60 percent) or burned since 1988 (40 percent).

Much of the summer forage exists in moderate to poor condition because the flush of woody browse caused by earlier disturbances (mainly fire in the first quarter of the 20th century) has grown out of reach of big game, and because dense coniferous stands limit light reaching the ground and thus herb productivity. Noxious weeds also have reduced the quality of big game habitat, especially on the lower-elevation, more open, drier slopes in the planning area (see Noxious Weed section page 207).

Current forage conditions of summer (and autumn) habitat in the Malo East Lake planning area would improve by managing noxious weeds, opening some of the more closed canopy areas, stimulating browse through mechanical treatment or fire, and managing livestock grazing utilization. Managing livestock grazing utilization is beyond the scope of this project.

Commercial and precommercial thinning would result in the loss of some cover in the short-term, but improve cover quality in the long-term due to reducing tree competition and allowing remaining trees to grow faster and retain wider crowns. It will also decrease the probability that a stand-replacing fire in the area would eliminate all cover.

Better future forage conditions would be set up by removing smaller trees, opening the understory, and allowing more light to penetrate to the forest floor.

After harvest, nearly all commercial thinning units and all small pole removal units would be followed by some form of prescribed fire, which would enhance forage for big game. Low-intensity underburning proposed in optional burn units would not affect cover, though would create a single-season decrease in forage that would be offset by a long-term improvement in forage conditions. However, underburning has the potential to decrease forage through providing seed beds for noxious weeds which displace big game forage species. Prescribed fire would be accompanied by noxious weed management that would decrease this potential loss of forage.

Noxious Weeds

One concern for big game is spread of noxious weeds, particularly knapweeds and plumed-seeded weeds capable of rapidly spreading, into uninfested areas, which would reduce forage quantity and quality.

Noxious weeds are most likely to colonize newly disturbed areas, especially along roads. As road density increases, it is more likely that noxious weeds would become established in sparsely roaded areas. Most of the planning area is near a road and a variety of noxious weed species are present. The only area outside a network of roads lies in the Art Creek area. A series of temporary and system roads are proposed to access units 34, 37, 38, 39, 47, 249, 250, and 252. Though the roads will be closed or obliterated at the end of the proposed activities, the disturbed ground would provide a good seedbed for noxious weeds to move into the area. The temporary roads would be returned as-close-as-possible to pre-road conditions after harvest activities. The system roads would be closed and the area monitored for noxious weeds. Considering the above, though the system roads probably would allow introduction of new noxious weeds into the immediate area, the gains from treating the stands slightly outweighs the costs of potential loss of habitat from noxious weeds.

Cumulative Effects

Much of what is currently managed on the CNF as winter range is a remnant of historical winter range, and, or lands that served as secondary winter range areas prior to settlement and land conversions. Large fires that burned across this landscape also altered forage and cover availability. Past road construction affected habitat security as well as the introduction of several noxious weed species that affect forage availability. Fire suppression over this same time period has contributed to adverse changes in the amount and distribution of both forage and cover, especially for mule deer, which seem to require more open conditions that white-tailed deer.

The long-term results of timber management on NFS land would be an improvement in cover in winter range, though treatments to reduce effects of insects/disease may decrease cover in the short term. The extent of the loss of cover would not be detrimental. Treatments would function to improve forage. With the recent implementation of HFRA, projects such as this one will continue this positive trend.

Forage quantity has increased as a result of opening the canopy in projects throughout the cumulative effects area. Noxious weeds have severely impacted winter ranges throughout the West, whether or not harvest activity has taken place, which decreases and in many cases offsets the improved forage conditions that result from opening the canopy. An active noxious weed control program in the county has used a combination of chemical and biological controls in an attempt to manage noxious weeds, with variable success. Along road corridors, the FS will treat for noxious weeds, which might limit but would not entirely prevent their spread. The level of forage reduction and consequent impact on big game populations is not known.

New roads constructed for harvest on NFS lands would be closed after the projects are completed, so open road densities would increase only during the life of a particular project. Some habitat improvement projects have closed open roads to increase wildlife seclusion habitat. Because budgets related to roads continue to decline, more roads not necessary for long-term forest management will likely be closed. Especially in wildland/urban interface areas, most of which also provide winter range, roads have been and will continue to be constructed. New road construction effects are primarily indirect (disturbance, poaching, weed spread, etc.) rather than direct (habitat conversion), but still reduce winter range habitat quality.

None of the road decommissioning proposed in the project would affect the availability of seclusion areas or create additional areas.

Across the cumulative effects area, fires in the 1920s and 1930s initiated large tracts of dense stands that have matured and whose value as summer cover has peaked and will decrease as the stands age. Proposed harvest in this and other projects would harvest those stands, decrease this marginal cover, increase forage, and move the cover to forage ratio closer to the optimum level, thus improving summer range conditions. On summer range on non-NFS land, harvest decreases summer cover, though the consequences are not negative.

Changes in cover and forage distribution are within the historical range of variation for the area, though patch sizes created by harvest are smaller than they have been historically.

Barred Owl, Pileated Woodpecker, Pine Marten, and Northern Three-toed Woodpecker

The analysis of effects of proposed management activities on barred owls, pileated woodpeckers, pine marten and northern three-toed woodpeckers is based primarily on the expected effects on habitat conditions within the MA-1 (Old growth management emphasis area), pileated woodpecker MR (Management Requirement) areas, and pine marten/northern three-toed woodpecker MRs. Although it is recognized that these species may occur in suitable habitat outside the designated MA-1 and MR areas, the establishment and maintenance of desired conditions within MA-1 and MR areas was considered sufficient to provide for these species across the Forest and the established

standards and guidelines for managing these areas provides an effective baseline for evaluation of the existing conditions and expected effects of alternatives on these species across a broad landscape.

Existing Conditions, Direct and Indirect Effects

Effects of proposed actions on barred owls and pileated woodpeckers are assessed primarily by addressing the effects of proposed actions on the habitat conditions within MA-1 areas and MR areas.

Management Area 1

Each Management Area 1 (MA-1) is expected to provide habitat that meet the breeding requirements of a pair of barred owls. Scheduled timber harvest is not permitted in core areas. Foraging areas can be defined and associated with the MA-1 but lie in other Management Areas. Timber harvest is allowed provided it meets the objectives for the foraging area. The MEL planning area contains one MA-1 area. It meets the minimum Forest Plan core size requirement (300 contiguous acres or more) and contains mostly larger trees that barred owls use for nesting, either in cavities or nests built by other large birds. Nearly the entire MA-1 lies in warm, dry habitats and though it is located primarily on northerly aspects that have more moisture, these drier habitats provide relatively mediocre barred owl habitat. The best habitat probably lies along the stream that bisects the MA-1.

About 250 acres of foraging habitat lie in 2 blocks, east and west of the MA-1. The western block of about 100 acres consists primarily of fairly closed, dry habitat supporting larger trees on a westerly exposure, so mediocre habitat because of the dry site. Of the eastern block of about 160 acres, nearly 35 acres lies in the planning area. In this segment, about a third consists of good habitat and lies along the stream in the valley bottom. The other two-thirds are relatively open and dry.

No activities are proposed for the MA-1 or the MA-1 foraging areas.

Pileated Woodpecker Management Requirement Areas

Intended to meet the habitat needs of a pair of pileated woodpeckers, each pileated woodpecker MR area consists of at least 300 acres of older conifer habitat, with minimum specified snag densities. Timber harvest and other activities are allowed (but often deferred) in these MR areas as long as Forest Plan Standards and Guidelines for pileated woodpeckers are followed.

The Malo East Lake planning area contains 1 pileated woodpecker MR area in the northwest part of the planning area. Nearly the entire MR contains fairly good, suitable habitat, though no concentrations of snags or down wood were noted during field surveys. A grove of aspen grows in the northeast corner of the MR, along Tonasket Creek (DeSpain 2006). No sign or records of harvest have been recorded from this MR.

Pileated woodpecker habitat exists throughout the planning area, and during surveys for this project we either found pileated woodpecker sign or saw pileated woodpeckers in several areas.

About two-thirds of the sole pileated woodpecker MR (PW 34) is proposed for harvest in units 4, 8, 10 and 12. The unit is tractor ground, which allows the retention of more snags than helicopter or other aerial-based yarding methods but will probably still result in the loss of some standing snags due to safety issues. All non-merchantable trees greater than 16 inches DBH felled for safety reasons would remain on the ground, thus contribute to down wood material important for pileated woodpecker foraging sites. Removal of trees less than 16 inches DBH would occur to meet fuels reduction objectives. The felling of some snags in this unit would not result in a decrease in the woodpecker populations because the loss should be relatively minor. Losses would be mitigated by creating snags if necessary.

There would be a small short-term loss but long-term improvement of pileated woodpecker habitat, and an immediate improvement of white-headed woodpecker habitat. Unlike that area, no additional habitat exists on NFS land adjacent to this MR in which to move or supplement the existing habitat.

Pine Marten and Northern Three-toed Woodpecker Management Requirement Areas

These MR areas were intended to ensure that pine marten and three-toed woodpecker habitat needs were addressed across the landscape. Because the planning area consists primarily of warm, dry habitats, it does not serve as pine marten habitat, thus the MR areas will not be managed for pine marten but for other wildlife that depends on large trees. Each of these MR areas is to consist of 160 acres of mature or older coniferous forest. These MR designations do not change the underlying management area established in the Forest Plan, and management activities are permitted as long as other Forest Plan Standards and Guidelines are followed. MR areas were mapped as dedicated units in the planning area because of the broken terrain, with patches of cover interspersed with patches of dry, very open habitats.

Subsequent to the signing of the Forest Plan, the Eastside Screens amendment was developed which established additional direction to ensure that connectivity was maintained between these mature and old growth habitat areas (MA-1s and MR areas) to facilitate species movements across the larger landscape of the Colville National Forest.

The planning area contains all or portions of 9 pine marten/northern three-toed woodpecker MR areas. Seven of these support large tree open or closed canopy condition on 95 percent of their areas. Two contain about 90 percent of this canopy condition.

There will be no environmental consequences to pine marten or northern three-toed woodpeckers because nearly the entire planning area consists of warmer, drier environments that do not support habitat for these species. The MR areas that support biophysical environments used by pine marten or northern three-toed woodpeckers (PM37 and PM47) would not be treated.

Management in the remaining MRs (considered not suitable habitat for pine marten or northern three-toed woodpecker) targets other species that depend on late-successional habitat, particularly pileated and white-headed woodpeckers. Harvest is proposed in 4 pine marten/northern three-toed woodpecker MRs (table 3.16).

Table 3.16 Units and aces of proposed harvest in Management Requirement areas and available adjacent habitat not proposed for harvest *

MR Area	Units in MR Area	Acres proposed for treatment in MR	Acres of additional habitat adjacent to MR
PM 31	61, 62, 63, 213, 214	140	0
PM 32	69, 84	45	95
PM 33	37, 211, 249, 250	150	175
PM 46	181	25	65
Total		**340**	**345**

*Does not include habitat outside an MR that is proposed for harvest.

The prescription, design elements, and consequences combine to produce a small short-term loss but long-term improvement of pileated woodpecker habitat, and an immediate improvement of white-headed woodpecker habitat. Additionally, depending on the MR, considerable habitat exists outside the MR, some of which is proposed for harvest and some which is not (table 3.16).

All proposed prescribed fire units would improve habitat by creating an estimated 2 new snags per acre and by removing small trees. Understory trees that shade a snag often keep the microclimate around the snag moister, thus increasing the rate of decay of snags and thereby reducing the total time that a snag remains standing and available for wildlife use.

We identified and mapped potential corridors between MRs, MA-1 and late structure habitat during project planning. Though some commercial thinning units would narrow an identified corridor, sufficient cover remains on the north sides of slopes and in riparian areas to allow animals to move between MRs and the MA-1. Pileated woodpeckers are more mobile than pine marten and readily cross large, open areas, so corridor widths between MR areas are not as great a concern in this project as they would be in projects with marten habitat.

Cumulative Effects

The Forest Plan established a network of areas across the Forest designed to retain and promote the development of late and old forest habitat conditions that would provide habitat for barred owls, pileated woodpeckers, pine marten and northern three-toed woodpeckers. It recognized that these habitat conditions could not be provided or maintained everywhere within a managed forest landscape and that some suitable and existing habitat areas could be impacted by management activities. This network was designed to insure the retention of suitable amounts of habitat, well distributed across the Forest, to provide for these species over the long term.

Under the current Forest Plan, the Forest has been quite successful in protecting and managing these MA-1 and MR areas across a broad landscape. Implementation of the direction contained in the Eastside Screens is also helping insure that these habitat areas remain interconnected to facilitate species movement across the landscape. All these measures are designed to reduce any cumulative negative effect of management activities on barred owls, pileated woodpeckers, pine marten and northern three-toed woodpeckers and their habitat Forest-wide.

Existing direction under the Eastside Screens also directs most timber harvest activities on the Forest toward retention and establishment of LOS (late structure) stands and enhancement of younger stands toward LOS conditions. The proposed action also proposes to retain at least 25 percent (acres) of each unit depicted in the EA as containing LOS in untreated (but not unburned) condition. The combination of the two strategies helps insure the persistence of other suitable habitat across the landscape for barred owls, pileated woodpeckers, pine marten and northern three-toed woodpeckers.

New concentration on managing areas within the wildland/urban interface will challenge managers to maintain habitat for those wildlife species that depend on late structure as well as protect private property from wildfire. In warm, dry habitats, judicious timber harvest consisting of thinning smaller diameter trees while leaving the larger, older canopy can lead to either maintenance or improvement of habitat conditions for pileated and white-headed woodpeckers in the long-term though could have a slightly negative effect in the short-term to pileated woodpeckers due to loss of standing snags (assuming that those felled for safety during harvest would be left on site to provide foraging habitat).

Beaver

Existing Conditions, Direct and Indirect Effects

Throughout the area, beaver habitat is poor along most streams. Only Tonasket Creek contains a large enough stand of riparian hardwoods to maintain a beaver population for more than a few years. Transitory beaver might periodically occupy some of the streams, but crews surveying the larger streams (Tonasket, Aeneas, St. Peter, and Lambert Creeks) did not find any recent beaver activity.

Hydrology surveys that included the smaller streams identified one beaver dam, inactive, on the North Fork of Aeneas Creek (T. 39 N., R. 34 E., Sec. 32). Based on the amount of alder growing on it, the dam appears to have been last used about a decade ago, and most of the signs of beaver in the area appear to be about the same age, indicating only temporary occupation. The dam created a series of ponds that span about 900 feet and which cross from NFS to private land. The low gradient of the stream and the location of the dam in the upper reaches of a smaller stream seem to have allowed the series of dams to retain their integrity: the greater volume and velocity of water in larger streams would have resulted in breached dams.

There will be no consequences to beaver because beaver do not permanently inhabit the streams on NFS land.

Cumulative Effects

This project will not contribute to cumulative effects to beaver because it does not affect beaver.

Blue Grouse

Existing Conditions, Direct and Indirect Effects

The USFS selected blue grouse as a management indicator species due to its dependence on winter roost habitat and nesting habitat. Blue grouse habitat should be managed by providing a minimum of eight mature, “limby” Douglas-fir or subalpine fir trees per acre on or near ridge-tops in park-like or open timber stands. It also states that hiding cover around at least 50 percent of the perimeter of springs or other water sources should be maintained with no break in cover exceeding 600 lineal feet along the waters edge.

Table 3.17 Existing and potential blue grouse nesting and brood-rearing habitat in the MEL planning area.

	NFS	Non-NFS	Total
Existing nesting habitat	4,565	1,720	6,290
Potential nesting habitat	2,810	565	3,370
All nesting habitat	7,375	2,285	9,660

More than 90 percent of the planning area (includes all ownerships) provides or has the potential to provide either summer nesting or winter range blue grouse habitat (table 3.17). Nesting and brood rearing habitat have been reduced to about 65 percent of potential by conversion of habitat to fields, by timber harvest, and by lack of fire (the greatest factor in reducing nesting habitat in the planning area). Based on aerial photos, a 40 percent reduction in winter range habitat is largely due to stand-replacing fires. The area’s blue grouse population has, along with those throughout northeast Washington, declined in the past 2 decades.

Summer Nesting Habitat

The partial harvest of trees on more open, dry sites that occur in the proposed action would improve blue grouse nesting and brood habitat by opening the overstory and understory because the harvest prescriptions for nearly all units are some form of commercial thin that will remove smaller trees and retain the larger overstory trees. No commercial thinning will occur in or near wetlands, though some non-commercial treatment may occur within the riparian habitat conservation area (if not within a LOS retention area). The objective of these units is to either remove smaller understory trees or, as in unit 210, to remove conifers that are encroaching into aspen stands. These actions are consistent with INFISH guidelines as described in the Riparian Unit Treatments section in Hydrology Discussion.

Noxious weed spread into unaffected habitat probably constitutes the greatest long-term threat to blue grouse. New system and temporary roads are proposed for this project. Most lie in areas that already have a high road density and concomitant noxious weed component. The road segments proposed to access units 37, 38, 39, 47, 249, 250 and 252 will affect an area that currently does not have roads and probably will allow noxious weeds to encroach further into this area. The conundrum is that the proposed harvest in these units would improve blue grouse habitat.

Areas proposed for prescribed fire to reduce fuel loading will improve blue grouse habitat by opening stands and stimulating forage. Spring fires usually are conducted before onset of nesting. Those that are not might temporarily reduce blue grouse numbers: nesting females would escape the flames but the clutch could be lost. This loss would not dramatically affect the blue grouse population by causing an increase above normal mortality rates. Though prescribed fire generally improves habitat conditions for blue grouse, it can also set the stage for the spread of noxious weeds. The extent and potential spread of weeds after prescribed fires has not been well documented on the CNF weeds (Scherer et al. 2000). The extent and potential spread of weeds after cooler prescribed fires is considerably lower than the spread of noxious weeds after hotter wildfire (Freeman et al. 2007).

Winter Roosting Habitat

Using aerial photos, topographical maps and field surveys, we identified about 5,300 acres of blue grouse winter habitat, nearly all of which lies on NFS land. More than 60 percent of this area currently contains trees of the size and distribution used by blue grouse as winter roosts. The majority of potential habitat currently in an unsuitable condition became so as a result of stand-replacing fires since 1988.

In the proposed action, treatments in portions of 16 units could affect winter roost habitat because they contain larger trees. None of the proposed prescriptions would remove larger trees therefore; none of the action alternatives will negatively affect roost trees. Removing the understory and smaller trees that compete with the larger, older ones for nutrient, space and light will decrease stress to the older trees and probably result in a longer-lived stand. Concomitant with harvest, about half of the stands will be

underburned after harvest, which would also improve conditions by further opening the stands. Precommercial thinning would not affect roost trees. Prescribed fire could negatively affect some roost trees, but the intent of the prescribed fire is to keep it to an underburn, not a stand-replacement event.

Cumulative Effects

The area considered for cumulative effects analysis consists of the entire District. Little blue grouse habitat exists on non-NFS land in the area, though that which does has lost much of its potential roost habitat due to harvest. Planned and completed projects would have minimal effect to blue grouse because roost trees will be retained and wetlands buffered. Past regeneration harvest on all land ownerships in the Malo East Lake planning area severely reduced blue grouse habitat by removing large ponderosa pine or Douglas-fir, especially mistletoe-infested Douglas-fir, on open, dry, south-facing slopes. The extent of this loss and the impact to blue grouse are not known. Fire suppression also resulted in a loss of habitat by allowing more open habitats preferred by blue grouse to grow closed and thus little used by blue grouse.

Roads built into blue grouse habitat would increase the amount of noxious weeds decreasing forage for blue grouse.

Prescribed fires would enhance blue grouse habitat but has the potential to spread noxious weeds.

The proposed action positively affects blue grouse habitat. All treatments would open the understory and enhance the existing stands for blue grouse. No treatment would remove live trees larger than 21 inches DBH, so larger roost and forage trees are not affected. None of the alternatives would cause an area-wide decrease to blue grouse habitat.

Franklin's Grouse

Existing Conditions, Direct and Indirect Effects

Franklin's grouse habitat is described as large stands of young lodgepole pine, often the result of stand-replacement fires. The Forest Plan (page 4-40) directs that large areas dominated by lodgepole pine stands be managed to maintain 20 percent in young age classes.

In the Malo East Lake planning area, Franklin’s grouse habitat occurs on the mid to higher elevations within the planning area and is contiguous with more habitat at higher elevations east of the planning area. About 4,350 acres of potential habitat exist in the planning area, primarily as stringers on northerly, more mesic aspects at mid elevations and grading to larger blocks of habitat as the elevations increase.

Nearly all Franklin’s grouse habitat in the planning area lies on NFS land (99 percent). About 13 percent of the potential habitat is somewhat adequate. No large stands of young lodgepole pine exist because, prior to 1988, stand-replacing fires had not burned

through the area since 1934. About 40 percent of the potential habitat supports stands of larger trees that are not used by Franklin's grouse.

Commercial harvest affects about 26 acres of existing Franklin's grouse habitat in 2 units (Units 45 and 110). Most of the commercial harvest is proposed for areas that have trees that are too large to provide good Franklin's grouse habitat. Harvest will not greatly improve conditions for Franklin's grouse because the commercial thinning is not designed to regenerate tracts of lodgepole pine thickets.

Prescribed fire units generally have a negative effect to Franklin's grouse habitat because they create open stands that favor blue grouse rather than Franklin's grouse. However, in this project the proposed fires occur on warmer, drier sites that normally provide poor Franklin's grouse habitat, and currently the stands are too old to provide Franklin's grouse habitat, so the negative effects would be minimal or nonexistent. Precommercial thinning would decrease habitat quality for future Franklin's grouse habitat, but the retention of 10 percent of the units in an unthinned condition will somewhat mitigate that loss. No new specified roads are planned in Franklin's grouse habitat.

Cumulative Effects

Several fires swept through the mid and upper elevations of the planning area since 1988. The areas of intense, stand-replacing burns along with past regeneration harvest in other areas cover nearly half the potential habitat and have initiated stands that could grow into Franklin's grouse habitat in the next few decades if they are not thinned.

Franklin's grouse habitat is distributed widely across the area. Intense harvest on non-NFS system lands enhances grouse habitat until it is precommercially thinned, at which time it becomes poor habitat. Prescribed fire will continue to favor blue grouse habitat to the detriment of Franklin's grouse habitat, but the extent of the affected areas are limited. Several hundreds of thousands of acres of dense Franklin's grouse habitat remain on the Forest, the MEL project affects a small fraction of it and the area's population of Franklin's grouse would not dramatically increase or decrease as a result of this project.

Other Woodpeckers

Under the Forest Plan, woodpeckers, as a group, were selected as Management Indicator Species to represent snags and the species that depend on them. Snags and cavity trees were recognized as a special habitat component that could be dramatically influenced by planned management programs. The Eastside Screens amendment further identified the white-headed woodpecker to represent the effects of management activities on cavity nesting wildlife of open, park-like stands. White-headed woodpeckers are primarily associated with more open stands of mature and old ponderosa pine trees and mixed conifers including the dry Douglas-fir biophysical environment. White-headed woodpeckers are relatively sensitive to habitat manipulation.

Existing Conditions, Direct and Indirect Effects

The effects of management activities on most woodpeckers are directly related to management induced changes in the density and distribution of snags. General

observations compiled from field surveys indicate that snag and down wood levels overall on NFS lands in the planning area are similar to levels found in other areas: sufficient small snags and down wood and infrequent large snags and down wood. Most ponderosa pine/Douglas-fir stands affected by fires in the 1910s and 1930s follow a similar pattern with few or no snags greater than 20 inches in diameter.

We found 4 areas where mortality from Douglas-fir bark beetle, blowdown from wind events and to a lesser extent root rot increased the number of large snags and down wood. Three large fires, including stand-replacing fires, have swept through the mid and upper elevations in the planning area since 1988. Much of the burned area within the planning area had been subsequently salvage harvested, with snags remaining either singly or in scattered small patches. Uncontrolled wood cutting, especially via breaching closed roads, continues to suppress snag numbers. Snags in the colder habitats at higher elevations above the planning area, mostly created by fire, have not been harvested and large acreages of snags remain. However, for the warmer, drier habitats found in the planning areas, snag levels remain low.

The effects to existing snags are measured by a combination of harvest prescriptions that regenerate a stand, harvest systems that result in the fewest snags, and total acres proposed for harvest. Prescriptions that retain the greatest number of trees and that use conventional, ground-based yarding operations will generally retain the greatest number of large snags. Given OSHA regulations for maintaining workers' safety, retaining standing large snags in harvest units can be problematic, and commercial harvest can decrease the number of standing snags. Commercial thinning or less intensive harvest usually retains more snags than harvest prescriptions that remove more trees or regenerate a stand. Cut-to-length equipment or more mechanized harvest where workers are protected by their equipment generally result in more snags left standing than harvest that requires fallers or other unprotected labor. Additionally, work on flatter ground that allows ground-based machines usually results in the retention of far more snags than work with aerial yarding such as skyline or helicopter.

The proposed action proposes only one form of harvest prescription in all units: commercial thinning. Harvest in the structural stage Late 6 stands, if loss of snags can be minimized, would enhance habitat for those species that require more open grown, larger trees. In harvested areas longevity of existing snags would improve because smaller trees would be cleared from around the larger snags. The smaller trees shade the snags, keeping the snags cooler and retaining moisture which causes the snag to decay more rapidly. Because the loss of some snags is inevitable during harvest operations, the number of large snags throughout the harvest units would decrease in the short-term, but this decrease will be consistent with the landscape numbers obtained from unharvested plots throughout the area: scattered large snags but no or few concentrations of large snags.

The proposed harvest activities under the proposed action are designed to meet requirements in the INFISH guidelines and remaining snag levels are expected to usually be consistent with the Forest Plan requirements in most units unless sufficient existing

trees and snags do not currently meet the requirements or if safety standards require removal.

Maintaining large down wood on site is less of a problem than retaining snags. Contracts for this project would not allow removal of large non-sawtimber, thus if a large snag is felled for safety reasons, it would remain as down wood and contribute to woodpecker foraging habitat. Proposed underburns in the units and on the larger landscape would result in the consumption of smaller fuels. These stands would be underburned when the risk of a stand-replacing fire is very low, so the intensity of the prescribed fire will be low. These lower-intensity fires reduce the amount of small down wood but rarely result in the complete consumption of large down wood. The low intensity of the underburns does not case-harden much of the larger down wood, thus retaining the quality of the down wood as habitat for ants, primary prey of several woodpeckers. The proposed prescribed fire is also anticipated to cause the creation of about 2 snags per acre, generally of smaller trees.

Cumulative Effects

The area considered for cumulative effects analysis consists of the Republic Ranger District. Existing snags throughout the cumulative effects area were created primarily through fire and post-fire mortality, most recently through insects and disease and windstorms, and reduced by timber harvest. Many of the forested stands at mid and higher elevations were initiated during fires in the 1920s and 1930s. In areas of very densely stocked trees, snag numbers might be high but standing snags of large diameter are rare or absent. At high elevations, four large fires have occurred since 1985 and all have created expansive areas of dense snag habitat. At lower elevations, many of the areas have been partially harvested, no fires have occurred, and snag levels probably are lower than historically.

Throughout the area, snags have developed and continue to develop primarily through root rot diseases, insect outbreaks and fire and post-fire mortality and reduced by timber harvest. The tree damage created during the winter storms of 1996/1997 created a great number of standing, broken, live trees. These trees will become extremely valuable as time passes because they will begin to decay and to attract insects, yet will remain standing. Additionally, because they are not considered snags under OSHA guidelines, many more of these can remain in a stand during salvage logging activities. In the past few years, outbreaks of Douglas-fir bark beetle have created patches of snags in Douglas-fir habitats, especially on the east side of the District as well as in the Malo East Lake planning area (see Forest Insects and Diseases page 106).

Planned and completed projects have reduced or will reduce standing snag densities. Past harvest has eliminated or reduced snags, especially large snags. Past road building and the firewood policy of allowing snags to be harvested within 200 feet of open roads eliminated or continues to suppress snag levels. The proposed project would add little to the cumulative negative effects of reduced snag levels because non-sawtimber would remain on site, new roads would be closed after harvest activities (so though many of the snags within 200 feet of the roads will probably be removed by the public for firewood

while the roads are open, the suppression of snag levels will not be continual because the roads will be closed), green trees would remain on site to develop into snags in the future, and snags would be created in units that fall below Forest Plan standards.

Large Raptors

The accipiter hawks (sharp-shinned, Cooper's and goshawk) are considered to be the raptor species most likely to be affected by proposed management activities within the Malo East Lake planning area. This analysis focuses on effects to nesting habitat and protection of known nests.

Existing Conditions, Direct and Indirect Effects

Although closely related, each accipiter species tends to prefer specific stand types. Goshawks most often nest in mature tree stands, whereas Cooper's and sharp-shinned hawks prefer to nest in dense sapling, pole and small tree stands. Most, but not all, goshawk nests are also found below 4,000 feet in elevation. The large blocks of dry, open habitat within the planning area do not provide habitat for any of these species. About 7,800 acres of the planning area could support accipiter habitat, about 90 percent of which is on NFS land. Both past harvest and wildfire reduced habitat for accipiters, and currently about 80 percent of the potential habitat serves as accipiter habitat. Most of this habitat supports larger trees and conditions more suitable for goshawks than sharp-shinned or Cooper’s hawks.

Goshawks were sighted on 4 occasions in 2 areas, though we did not locate any nests. The nearest known nest lies about 2 ½ miles west of the planning area. In the proposed action, prescribed fire and commercial thinning are proposed in 1 of the 2 areas in which survey crews saw a goshawk: units 29, 31 and 32. Monitoring will continue of the area to determine if nesting occurs and if a nest is found appropriate buffers and post-fledging areas will be established.

Commercial thinning in the proposed action will not result in the loss of many if any nest trees. In the structural stage Late 6 stands, the resulting more open understory and canopy conditions probably will improve habitat for goshawk. Commercial thinning in the earlier structure stands would not improve the habitat in these stands for either Cooper’s or sharp-shinned hawk, though sufficient habitat remains in the planning area to support both these species.

Neither precommercial thinning units nor prescribed fire units would affect accipiter habitat.

Cumulative Effects

The Forest Plan established a habitat capability objective for raptors (and great blue heron) which recognized that raptor habitat conditions change over time and that 100 percent protection and maintenance of all existing raptor habitat is not possible across a managed landscape. The dense, overstocked stands preferred by Cooper’s and sharp-shinned hawks are subject to insect and disease outbreaks and wildfires that can radically alter available nesting habitat.

Under the current Forest Plan, the Forest has been quite successful in finding and protecting goshawk nests. Known nest sites for goshawks and other raptors have been and continue to be protected during timber harvest and other activities to minimize adverse impacts. In accordance with the Eastside Screens, goshawk nests are further protected by no harvest buffer zones, establishment of post-fledging areas, and temporal restrictions on activities when necessary. All these measures are designed to reduce any cumulative negative effect of management activities on raptor habitat Forest-wide.

The Eastside Screens also directs most timber harvest activities on the Forest toward retention and establishment of LOS (late/old structure) stands and enhancement of younger stands toward LOS conditions. This helps insure the persistence of suitable nesting habitat across the landscape for some raptors, especially goshawks, but this direction negatively affects potential sharp-shinned and Cooper's hawk nest habitats because it emphasizes treatments in the types of habitat preferred by those species.

Across the Forest, surveys are conducted to locate other raptor nests and protection measures are employed whenever they may be affected by an activity. Many raptor nests are probably not found, but the surveying and nest protection does reduce the overall potential for negative effects to raptors.

Within the Malo East Lake planning area, attempts have been made to locate raptor nests. Timber harvest prescriptions under the action alternatives have been designed to promote healthier, more resilient timber stand conditions that will continue to provide raptor nesting opportunities. Cumulatively, these actions contribute favorably to actions occurring on other parts of the Forest and contribute toward meeting Forest Plan direction.

The proposed action will contribute to cumulative improvements in goshawk habitat and will contribute to a slight decrease in dense, mid-structural-stage stands that Cooper's and sharp-shinned hawks inhabit. However, this dense habitat covers a good portion of the cumulative effects analysis area.

Migratory Land Birds

Although migratory land birds were not selected as Management Indicator Species in the development of the Forest Plan, subsequent legislation and regulations require the assessment of the effects of proposed management activities on them. Impacts to migratory birds will be assessed on an alternative's effect on overall habitat conditions within the MEL planning area.

Existing Conditions, Direct and Indirect Effects

Migratory birds utilize a variety of habitats, including upland coniferous forests (in all stages of development), openings, and riparian zones. Of greatest concern from a management perspective are those habitats that, when compared to the rest of the Forest, that contain unique characteristics, are naturally limited in abundance or distribution, or have experienced the greatest declines or changes over time. In general, bird species

requiring these habitats have undergone greater population declines over time than other species that primarily use general coniferous forest habitats. Within the MEL planning area, these areas of concern would include riparian areas and areas with deciduous trees. Within coniferous forest habitats, areas classified as structural stage Late SS7 are also important because this condition is more limited than other coniferous forest habitats see Structural Stage definitions page 99.

Outside of riparian areas in the MEL planning area, no wetland areas that exceed about an acre in size exist. Several small, seasonal wetlands do occur. The planning area does contain patches of aspen, though none are much more than 50 acres. Small stands of aspen or cottonwood are located along more moist habitats and stringers throughout the planning area.

Nearly all the commercial harvest units in the proposed action are thinnings to remove understory trees and would result in fairly large tracts of stands moving from Late SS6 stands to towards Late SS7 conditions. The concomitant underburning would enhance the movement of these stands towards Late SS7, manage the area to stand conditions more in line with historic ranges of variability in stand structure and would enhance habitat for species that depend on open stands of large trees.

Prescribed fire in the proposed action would, aside from destroying a few nests during the spring underburning season, improve habitat conditions for those species that occupy more open sites.

Precommercial thinning would occur in the proposed action. In the units, habitat for those species that prefer dense, younger stands would decrease, though suitable and sufficient habitat remains on the landscape so that these species would not exhibit a population decline.

Riparian habitats are probably the most sensitive source habitats for migratory birds, and the habitat type that is in least supply. No commercial thinning units are proposed in the riparian areas of the larger streams. Retention of hardwoods and riparian vegetation would occur in RHCAs where hand treatment of fuels is allowed.

Cumulative Effects

Within the MEL planning area, migratory land bird habitat conditions have been affected by a wide variety of management activities including conversion to farming or pasture. Because the majority of the forested area is public land, the areas have not been converted to pasture. Fire suppression has reduced much of the habitat diversity that occurred across the MEL planning area when fires actively burned, especially on the western, lower elevations of the planning area. Livestock grazing occurs on both private and public lands though except for private lands in the valley bottoms, most of the forested riparian conditions remain fairly good.

The cumulative effects of these activities have been proportionally greater in those habitat that historically have been transitory in nature, and, or in limited supply such as

openings, shrubfields, riparian habitat, early successional forests, and single stratum forest types than in the general coniferous forest environment. Current and future management activities that maintain or improve these types of habitats contribute cumulatively to the perpetuation of bird species that require these conditions and the maintenance of the area's bird species diversity. Activities that do not maintain or improves these habitats do not contribute cumulatively to maintenance of existing habitat and species diversity.

The proposed action provides positive opportunities to restore under-represented habitat (especially Late SS7) via commercial thinning, maintain openings and shrubfields via prescribed fire, and promote healthier, more resilient forest conditions across the planning area.

Peregrine Falcon (Region 6 Sensitive Species)

Forest Service maintains Peregrine Falcon as a sensitive species and uses it to analyze habitat with the following elements: nesting habitat requirements as cliffs over 150 feet in height, and foraging areas associated with the nesting territory usually includes wooded areas, grasslands, and marshes or open water.

Existing Conditions, Direct and Indirect Effects

No nesting habitat occurs in or nearby but one nesting pair was found in Metaline Falls, well east of the planning area, so the projects would not affect nesting habitat. The agricultural areas along the Curlew River valley to the west of the watershed provide open foraging habitat. Patches of open foraging habitat also exists on NFS land.

The prescribed fire and harvest units in the proposed action would create more open habitat, though prescriptions would not create large openings through which peregrine falcons could hunt, so there would be only a minor increase in foraging habitat. The prescriptions would not affect populations of birds on which peregrine falcon prey. Associated activities like road construction and reconstruction in the proposed action would not affect peregrine falcon because none of them affect either nesting or foraging habitat.

Cumulative Effects

Because this project does not affect peregrine falcons, it does not contribute to cumulative effects for this species.

Great Gray Owl (Region 6 Sensitive Species)

Existing Conditions, Direct and Indirect Effects

The planning area contains potential great gray owl habitat including numerous natural openings that could provide foraging habitat. Great gray owls nest in many types of forested habitats. Young great gray owls, after they leave the nest, utilize leaning trees or snags to climb back into the canopy and escape ground-based predators.

No known nests have been documented in the planning area. Specific surveys for great gray owls were not conducted. During surveys for this project, habitat conditions in every unit were examined. No great gray owls or their sign were observed during several hundreds of person-days during the spring, summer and autumn of 2005, 2006 or 2007. The nearest sighting of an individual great gray owl occurred in the early 1990s about 2.3 miles west of the planning area. Better great gray owl habitat lies at higher elevations upslope and east of the MEL area.

The proposed action has the potential to negatively affect great gray owl habitat by altering nest site availability, and, or affecting unknown nests. Due to the extensive surveys during planning for the project that resulted in no owls and that most of the great gray owl habitat is not being affected by the project, the probability of directly negatively affecting an unknown nest is very low. Some of the harvest units could affect nest site availability. Commercial harvest units 26, 31, 37, 45, 108, 143, 148, 160 all fall within great gray owl habitat.

There would be no impact to potential nesting habitat in structural stage Late 6 stands because though harvest would occur in them, it targets smaller trees in the understory and not the nest trees. Some of the proposed harvest may enhance forage opportunities by creating small openings in dense stands. The intent of nearly all the stands in potential great gray owl habitat is to manage towards the historic range of variability in stand conditions, which would mean maintaining a mix of successional stages, especially well-distributed mature and older forest stands that contain platforms for nests, and dense canopy cover and escape perches for young. The prescribed fire treatments would enhance habitat for small mammals, thus for great gray owls. Precommercial thinning would temporarily create openings in which great gray owls could forage. Leaning trees will be left in stands listed above to enhance habitat for young owls.

Cumulative Effects

The cumulative effects area for great gray owls consists of Ferry County. Across this area, nesting stands at lower elevations have been reduced or eliminated when large trees were harvested, though across the cumulative effects area sufficient parcels of larger trees remain scattered to maintain great gray owl nesting and brood-rearing habitat. The known nests are all on private land. The proposed harvest combined with past harvest in the county will not reduce nesting habitat to the level where it would negatively affect great gray owls.

Outside of the valley bottoms, most of the non-forested areas in the county are open because of harsh environmental conditions rather than human activity, so activities proposed in the MEL project, which would only create small openings, combined with past harvest and fire would only slightly increase the amount of foraging habitat, and that will only be temporarily.

Exotic plant and animal species have successfully invaded the county and probably have shifted prey species availability, though the extent and effects are not known. An active

noxious weed control program in the county has used a combination of chemical and biological controls in an attempt to manage noxious weeds.

The proposed action provides opportunities to maintain and improve existing habitat conditions and restore under-represented habitat such as large trees and late and old stand structures as well as promote healthier, more resilient forest conditions across the watershed. The proposed action contains measures that are expected to perpetuate the type of habitat conditions reported as suitable for great gray owl foraging and nesting. In the scope of the cumulative effects area, the action alternative would slightly improve great gray owl habitat, though the amount is negligible.

Grizzly Bear (Threatened Species)

The planning area lies within a Management Situation #5 which is not managed primarily as grizzly bear habitat (USDI FWS 1993). Components of grizzly bear habitat for which the FS analyzes are those parameters that could threaten bears via human conflict or reduction in secure habitat:

- densities of motorized routes: provides a measure of seclusion or core area habitat;
- travel corridors and hiding cover: allow bears to move across landscapes;
- forage: big game populations, eaten mainly as carrion, and berry fields.

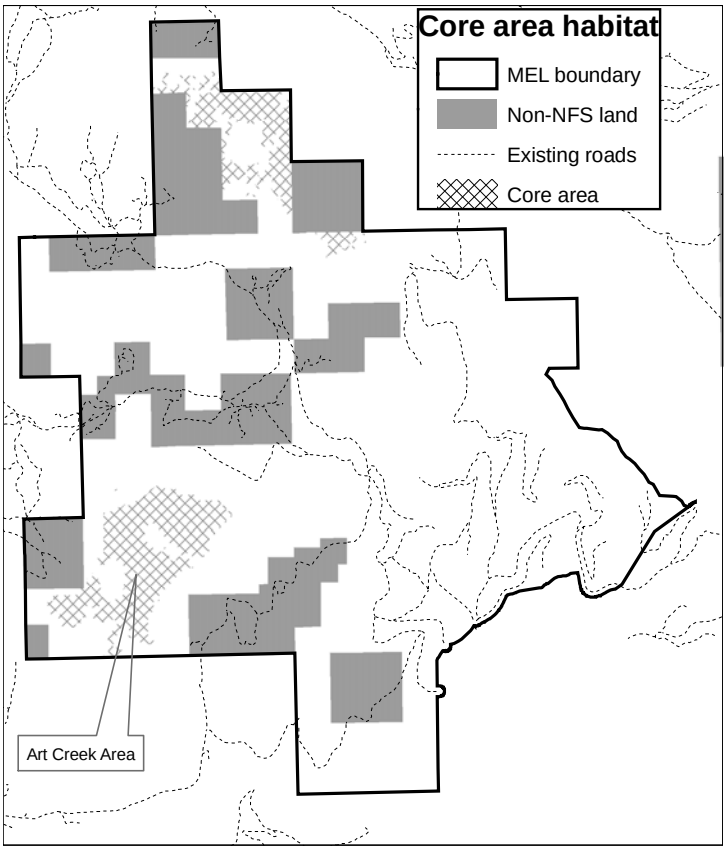
Existing Conditions, Direct and Indirect Effects

Transient grizzly bears have not been recorded from the planning area, and The Natural Heritage Program Database lists no verified grizzly sightings in or near the planning area.

Seclusion/Core Area Habitat

Many studies have found that grizzly bears generally select against areas with open road densities of greater than 1 mile of road per square mile (mi/mi²) of land (Mace and Manley 1993; Wielgus et al. 2002). Grizzly bears usually adjust their movements to avoid these areas, which reduces the amount of habitat available to them. Road building from past harvest activities has reduced the amount of seclusion habitat in the analysis area. On NFS land in the planning area, about 1.5 square miles (6 percent) has a road density of less than 1 mile per square mile and is considered core area habitat. More than half of this consists of dry, open habitat: only about 0.9 square miles, in two widely separated, equal-sized blocks, contain somewhat dense overstories which provide good cover. However, these blocks are too small to provide adequate seclusion to grizzly bears. Many roads in the watershed receive little use during most of the year and several closed roads probably receive no traffic at any time, so the amount of core area habitat is likely slightly greater than this. The two core areas are (1) the southern slope above Art Creek, and (2) the ridgeline area between Tonasket and Long Alec creeks (map N).

Map N. Core area habitat on NFS land in the North block of the Malo East Lake planning area. The other sections of the planning area do not contain any core area habitat. Core area that consists of very open grassland is not shown.



Portions of commercial thin units 34, 37, 38, 39, 47, 49, 249 and 250 and roads to access the units will affect the small amount of core area that remains. After sale activities have ended these roads would be closed, and, or obliterated, so the amount of open roads would return to near pre-project levels. However, because of past activities, the existing amount of core area habitat currently does not provide enough habitat for a grizzly bear, so the further loss of this small amount of core area, especially considering the location near private land, will not negatively affect grizzly bears. None of the road decommissioning proposed in the project would affect the availability of these core areas or create additional core areas.

Travel Corridors and Hiding Cover

Travel corridors consist of vegetation and physical features that bears use to move across a landscape. These areas provide for either ease of travel or secure habitat or both. Examples of physical travel corridors are ridges, saddles and, most importantly, riparian

areas (Moss and LeFrance 1987). Vegetation on travel corridors ranges from open subalpine meadows to dense forests. Timber harvest can negatively or positively affect cover, causing bears to modify their use of that area.

Hiding cover consists of areas that an animal uses for security or to escape from danger. We frequently define it as habitat capable of hiding most of an animal at some distance from an observer (for example habitat that can hide 80 percent of a bear at 200 feet). Therefore, areas that probably do not provide hiding cover are past regeneration harvest units less than about 10 years old, and natural and other created openings like pasture.

The planning area consists of lower-elevation, drier habitat within a few miles of the Forest boundary. Travel corridors along east-west trending streams and ridges originate on the Kettle Crest and decrease in elevation to the west, where they merge with the Curlew Valley. Not surprisingly, hiding cover lies mainly on the northerly aspects where moisture is higher and conditions shadier. The south-facing, dry slopes generally do not provide any hiding cover. Large fires in the upper elevations of the planning area and timber harvest in the lower elevations have severely reduced hiding cover along all the travel corridors and eliminated it along some. Many of these areas will, within the next 15 years, again support hiding cover. However, because of the harsh growing conditions, some about 1,500 acres harvested in the 1960s and 1970s still have not grown back into sufficient grizzly bear hiding cover.

Proposed roads do not follow riparian areas or ridges and do not eliminate much cover, therefore would not negatively affect potential corridors or grizzly bear movement.

Little hiding cover would be completely lost due to harvest because no prescription calls for regeneration harvest. No commercial harvest would occur in riparian habitat conservation areas, and noncommercial treatments would retain sufficient cover in the riparian corridor to allow grizzly bears to use these areas.

About 10% of precommercial thinning units will not be thinned to retain sufficient cover to allow movement through those units. Precommercial thinning that occurs along open roads will retain a no-thin strip of green vegetation at least 10 feet wide, where sufficient trees exist, to disrupt view into the unit from the road.

Prescribed fire units outside of commercial harvest units would open the stands to more historic conditions, conditions in which bears evolved, so would not negatively affect the ability of bears to move through the area.

Patches of hiding cover remain scattered throughout the planning area, though most areas do not provide continuous cover because of the broken aspects and dry habitats interspersed throughout the planning area. On NFS land past timber harvest has negatively affected riparian corridors only along a portion of South Fork of St. Peter Creek. For bears and other large carnivores, these patches of hiding cover probably do not provide adequate forested links between areas to the north and south, and better habitat for this exists outside (upslope) of the planning area.

Forage

Diets of grizzly bears shift seasonally as different food sources become available. When they emerge from their dens, bears tend to search for food in lower elevations, drainage bottoms, avalanche chutes (none in the MEL planning area), and for carrion on ungulate winter ranges (USDI 1993). Timber harvest in riparian zones in spring has the potential to disrupt foraging bears. In late spring and early summer they move towards higher elevations as berry patches and other food becomes available.

Some studies have documented that grizzly bears avoid logged areas while other studies indicate no changes in grizzly populations as logging pressure increased. Despite conflicting results as to whether grizzly bear numbers are affected by logging, it appears that their behavior is modified. Timber harvest can positively affect the quality of grizzly bear food and negatively affect the area's value as cover (discussed above under Travel Corridors and Hiding Cover).

Past management in the planning area did not target the creation of shrub fields to produce berry crops. Though this might have happened inadvertently during harvest and subsequent prescribed fire, few areas would have benefited because most of the area is too dry to support berry fields, particularly of huckleberries (*Vaccinium* sp.). Within the planning area, past fires at mid and higher elevations created, enhanced or extended some dispersed, minor patches of huckleberries.

No units in the proposed action were designed to improve forage for bears, though all harvest would stimulate some forage. Underburning in the lower elevation, dry, open slopes probably will not improve shrub production much because these harsh growing sites support little berry-producing shrubs. Prescribed fire and post-harvest underburning in several of the harvest units might improve berry fields and would improve spring emergence habitat. Precommercial thinning, especially in the more moist habitats in units in the eastern part of the planning area, has the potential to increase forage by reducing tree competition with berry-producing shrubs.

Grizzly bear also utilize big game carrion as a food source. Existing condition and effect of the proposed alternative for big game are detailed in the Big Game discussion page174. Forest roads segment the watershed but few if any deer are killed by vehicles on these roads, so the vehicles on the roads serve as neither a source of carrion for bears and other large carnivores nor a factor that reduces the size of the deer population. The proposed action of harvest in existing poor bear cover would improve long-term winter cover for deer as well as open the area to improve summer forage habitat conditions. Prescribed fire would open the understory, regenerate big game forage species, and maintain large tree component that provides important overstory cover.

The planning area does not contain any avalanche chutes that would provide early forage habitat for bears.

Cumulative Effects

The area considered for cumulative effects analysis consists of the Republic Ranger District and non-NFS surrounding it. Grizzly bears have not been documented in the area within the last 50 years. The main threat to bears comes not from timber harvest or activities associated with it but from humans. Timber harvest can be compatible with grizzly bear management because it increases forage for bears, primarily berries, and forage for ungulates. Road construction can be compatible if roads are effectively closed to vehicles.

Trout complex, Herron, and Vulcan are planned, uncompleted Forest Service timber sale projects in the cumulative effects analysis area, but many others have occurred in the recent past. There are also treatments on other ownerships within the Forest boundary, especially on Washington Department of Natural Resources land within the watersheds in the area.

Travel corridors and hiding cover

Hiding cover throughout the District would probably not decrease dramatically because recent trends in the Forest Service indicate that our projects propose few large regeneration units and instead move to create pockets of smaller openings. Additionally, many regeneration harvest units cut in the 1980s and early 1990s have nearly grown into hiding cover and, depending on the level of precommercial thinning in these units, can provide good hiding cover adjacent to foraging patches. Harvest on non-NFS land continues to create openings that reduce hiding cover, though the extent would not preclude bears from using portions of the cumulative effects area.

The Forest Service adopted guidelines to maintain travel corridors. All current and future projects retain at least 400-foot widths for corridors. Though decreasing corridor width might affect grizzly bear movement patterns in the short-term, sufficient corridor habitat should remain to allow bears to move through an area, especially on the Kettle Crest. On non-NFS land corridors remain, though harvest according to Washington Forest Practices would not retain sufficient cover to retain a continuous travel corridor, and east-west movement through agricultural valleys could be impeded. Analysis by Singleton, Gaines and Lehmkuhl (2002) showed landscape permeability was good to moderate over most of the area, though was poor along highway 3 just north in Canada. The proposed action would negatively affect travel corridors, thus none would contribute to decreasing travel corridors in the cumulative effects area.

Forage

No units were designed to improve forage for bears, though all harvests would increase available forage. Continued encroachment of noxious weeds would reduce palatable vegetation. An active noxious weed control program in the county has used a combination of chemical and biological controls in an attempt to manage noxious weeds, with variable success. Management of wildland/urban interface areas, usually at lower elevations and rarely in riparian areas, would have a minor positive effect to forage conditions.

Seclusion/Core Area Habitat

Reductions in core area habitat decrease habitat suitability for grizzly bears, mainly because the greatest threat to bears is that of being shot by a poacher. Little core area exists on non-NFS land. Current and future projects that construct or reopen roads would reduce core area habitat.

New roads would be closed at the end of treatment activities, so the most severe negative impacts would be limited to the time during which the roads remain open to vehicle traffic, usually a 3-to-6 year period. While restricting some vehicles, closed but not obliterated roads without CFR orders still allow access by humans riding ATVs, so nearly all closed roads reduce the amount of core area habitat until the road becomes too grown-over for vehicles to pass. Considering bears have not been recorded from the District for more than half a century, the scattered level of harvest and post-harvest activity, and the reduced level of road building than in the past, future projects probably would not result in a loss of core area habitat negatively affecting grizzly bears.

Gray Wolf (Threatened Species)

Components of wolf habitat listed in the Northern Rocky Mountain Wolf Recovery Plan (USDI 1987) include providing:

- a sufficient, year-long prey base of big game and alternative prey;
- suitable and somewhat secluded denning and rendezvous sites;
- and sufficient space with minimal interaction with humans (core area habitat).

Existing Conditions, Direct and Indirect Effects

Washington State does not contain any wolf recovery areas (USDI FWS 1987). Any wolves found outside recovery areas receive federal protection, though the areas they inhabit are not managed to provide wolf habitat. The Forest Plan calls for wolf monitoring by recording location and determining validity of reported sightings.

Records of wolf sightings on the CNF date from 1914 (Hansen 1986), and confirmed and unconfirmed sightings have occurred since then. No confirmed sightings have come from in or near the planning area. The closest and most recent (2007) documented wolf presence comes from about 23 miles northeast of the planning area, just east of the Kettle River. Wolf packs have not been located on the Republic RD.

Year-Long Big Game Prey Base

Within the northern Rocky Mountains, wolves depend on big game (deer, elk, and moose) as a year-round food source. On a biomass basis, they comprise more than 90 percent of wolves' diets. We examined current conditions within the NFS lands in the planning area and cumulatively on all lands within several watersheds. Both contain fawning areas and summer and winter range for big game, thus provide prey for wolves the entire year. Effects to big game are described more explicitly in the Big Game discussion above on page 174. The proposed action improves habitat conditions for big game, the primary prey of wolves, via commercial thinning, prescribed fire and precommercial thinning.

Minimal Exposure to Humans

Grizzly bears seem to be more negatively affected by disturbance than wolves are (though a main cause of adult mortality for both is being shot), so we use the evaluation criteria for grizzly bears to examine the potential effects to wolves: if a proposed activity does not negatively affect grizzly bear seclusion habitat, it probably will not negatively affect seclusion habitat for wolves. See Seclusion/Core Area Habitat discussion within the Grizzly Bear section page 194. In summary, the road entering the Art Creek area would decrease the amount of seclusion habitat, but the block is sufficiently small and disjunct from large blocks of seclusion habitat on the Kettle Crest and probably serves little if any biological function to large mammals that require considerable seclusion habitat. The proposed action would not negatively affect a travel corridor.

Denning and Rendezvous Sites

No sites were found during nearly 3 years of field reconnaissance. Because wolves den in a variety of habitats, we did not speculate about their location, thus did not attempt to identify potential denning and rendezvous sites during the analysis of this project. This project would have no effect to opportunities for wolves to den or maintain rendezvous sites.

Cumulative Effects

The area considered for cumulative effects consists of the Republic Ranger District and non-NFS surrounding it. Trout complex, Herron, and Vulcan are the only planned, uncompleted Forest Service timber sale projects on NFS land but many others have occurred in the recent past. There are also treatments on other ownerships within the Forest boundary, especially on Washington Department of Natural Resources and Bureau of Land Management areas. Planned and completed projects have both positively and negatively affected wolf habitat. Habitat enhancement came via harvest that improved deer habitat. Habitat quality reduction resulted from road building and concomitant activities that introduced or spread noxious weeds, and fire suppression that reduced forage for big game.

Year-long Big Game Prey Base

All recently planned projects on NFS land contain projects that would improve conditions for big game, thus wolves. This trend will continue. On non-NFS land timber harvest has improved forage to the detriment of cover. Considering that mule deer, the species of management interest in Ferry County, uses more open habitat than white-tailed deer, those harvests did not decrease habitat quality considerably. The proposed action would move the landscape towards improved cover to forage ratios and proposes underburning that will improve forage. These projects would benefit big game, thus wolves.

Denning and Rendezvous Sites

In the early 1990s we conducted howling surveys throughout the district to identify denning activity. No wolves responded. Because wolves den in a variety of habitats, we did not speculate about their location, thus do not attempt to identify potential denning and rendezvous sites during the analysis for a project. Current projects on NFS land and

timber harvest on non-NFS land do not preclude wolves from denning or maintaining rendezvous sites.

Minimal Exposure to Humans (core areas)

Reductions in core area habitat decrease habitat suitability for gray wolves. All current projects on NFS land construct, reconstruct, or reopen roads but not all reduce core area habitat. Little core area exists on non-NFS land. Current and future projects that construct or reopen roads would reduce core area habitat. See discussion of the cumulative effects to Seclusion/Core Area Habitat within the Grizzly Bear section page 199.

New roads would be closed at the end of treatment activities, so the most severe negative impacts would be limited to the time during which the roads remain open to vehicle traffic, usually 3-to-6 years. While restricting some vehicles, closed but not obliterated roads without CFR orders still allow access by humans riding ATVs, so nearly all closed roads reduce the amount of core area habitat until the road becomes too grown-over for vehicles to pass. Considering wolves have not been recorded from the District for more than half a century, the scattered level of treatment and post-treatment activity, and the reduced level of road building than in the past, future projects probably would not result in a loss of core area habitat negatively affecting wolves.

Canada Lynx (Threatened Species)

Existing Conditions, Direct and Indirect Effects

The planning area contains portions of 2 LAUs (Lynx Analysis Units), a segment of the Long Alec LAU in the Long Alec watershed and several portions of the Lambert Creek LAU, which encompasses portions of Aeneas, St. Peter and Lambert Creeks. These contiguous LAUs form part of the LAU chain that lies on the western side of the Kettle Crest. No lynx have been reported from either of these LAUs in the last 15 years.

Both LAUs contain considerable non-lynx habitat along the western, lower-elevation boundaries. Though several units fall partially or fully within the boundary of an LAU, they all lie in warm, dry habitat and thus are not lynx habitat.

Because none of the proposed units are in lynx habitat, the project would not affect lynx or lynx habitat.

Wolverine (Region 6 Sensitive Species)

The Forest Plan provides no specific standards and guidelines or management direction applicable to wolverines.

Existing Conditions, Direct and Indirect Effects

Wolverines are rare in northeastern Washington, but both confirmed and unconfirmed sightings have been reported from several areas on or near the CNF. Because of the wolverine's large territorial requirements, the MEL planning area provides wolverine habitat. Wolverine move through and occupy a wide variety of habitat types, from wet

and heavily forested to dry and very open. The requirements for habitat include travel corridors, seclusion habitat, particularly at denning sites, prey availability, and a diversity of structural stages.

Travel Corridors

The broken nature of the terrain, past fires and harvest history do not lend themselves to the retention of wide, unbroken, forested corridors along ridges and saddles. However, on NFS land most corridors along the creeks remain forested, except for a break along South Fork of St. Peter Creek due to past harvest. Considering their sighting distribution in Washington (Johnson 1977), these open stretches would not keep a wolverine from moving through the area.

The proposed action would not negatively affect travel corridors. Proposed new temporary roads would not preclude wolverine from using areas. Existing unauthorized nonsystem roads already have vehicle traffic on them, and the effects of new roads would be reduced by closing them with the most practicable method, along with a CFR closure order to enhance enforcement. In much of the area, closing any road would not eliminate OHV traffic because they can move through most relatively open terrain, though barriers will generally stop highway vehicle traffic. Therefore, none of the roads would negatively affect potential corridors. Thinning would not restrict any riparian corridor to a level where wolverines would not use it.

Prey Availability

Wolverines are primarily carnivores rather than omnivores, so big game carrion provides a large portion of their diet. See the Big Game discussion page 174 for effects to big game species. The proposed action improves habitat conditions for big game via commercial thinning, prescribed fire and precommercial thinning.

Seclusion Habitat

Because nearly no seclusion habitat or high-elevation habitat exists within the planning area, the area provides fairly poor wolverine seclusion habitat. See Seclusion/Core Area Habitat discussion within the Grizzly Bear section page 194.

Denning Sites

The planning area does not contain high mountain cirques or talus slopes that wolverine use for denning.

Structural Stage Diversity

The planning area contains a diversity of tree sizes and ages (see Stand Structure discussion page 99). The mid and higher elevations have burned on several occasions, including stand-replacement fires between 1988 and 2001, which eliminated many of the larger trees. Subsequent timber harvest has eliminated larger trees from several parts of the planning area.

Most proposed treatments are designed to allow trees in stands to more quickly grow to larger sizes, thus move blocks of habitat more closely in line with historical conditions, or

to open canopies to a condition similar to what would have been on the landscape had fire not been excluded from the area. The other prescriptions would thin the understory in stands that contain a good overstory, which reduces plant competition for light and moisture. This should benefit wolverine by providing a variety of habitat types and amounts similar to historic conditions.

Cumulative Effects

The area considered for cumulative effects analysis consists of the MEL planning area and the Kettle Crest. Several projects have occurred on NFS and non-NFS land in this area in the past 2 decades, most of which have included timber harvest. Four large fires have swept through some of the higher elevation areas since 1988. Planned and completed projects will affect or have affected wolverine habitat. Activities have modified habitat (timber harvest, prescribed fire) and increased both road densities and human presence. Given the amount of human manipulation at low and moderate elevations, wolverines still seem to use the area. The most recent substantive evidence comes from hair collected along the Kettle River south of Danville in December, 2005 and analyzed at the University of Montana/USFS Forest Sciences Lab in Missoula.

Successional Stage Diversity

All recent sales on NFS land at mid and higher elevations were planned using the concept of managing towards historical ranges of variability for different structural stages, which should maintain successional patterns and processes similar to those with which wolverine evolved. Management along the wildland/urban interface attempts to use a similar concept, but depending on the proximity to homes, human safety could trump management for wolverines. Continued management under this scenario should benefit wolverine, which mainly occupy mid and upper elevations. Management on non-NFS lands usually must be done in accordance with Washington Forest Practices rules, which allows for heavy harvest. In many of these areas, successional stages are skewed towards younger stands. Young stands provide forage for large game, one of the primary prey items of wolverine. None of the proposed projects, when added to harvest that has already occurred, would dramatically change the percentages of different successional stages across the cumulative effects analysis area, thus would not negatively affect wolverines.

Travel Corridors

Because wolverines move through a large landscape, we have recent records of wolverine moving through the area, and most of the better-quality wolverine habitat lies on NFS lands at higher elevations, sufficient habitat probably remains in the cumulative effects analysis area to allow wolverine to move through the area. None of the proposed alternatives would negatively affect travel corridors in the cumulative effects analysis area.

Prey Availability

All recently planned projects on NFS land contain elements that improve conditions for big game and thus wolverine. This trend will continue. (See Big Game discussion page 174).

Seclusion Habitat

Many projects on both NFS and non-NFS land have reduced seclusion habitat, thus decreased habitat quality for wolverine (see Grizzly Bear seclusion habitat discussion page 199). The planned project would not contribute to loss of core area habitat to the extent that wolverine will not use the area.

Denning Sites

Few potential natal denning areas occur, and those that do lie in MA11 on the Kettle Crest, east and upslope of the planning area boundary, and do not allow motorized vehicle traffic. One of these areas, Sherman Peak, receives considerable use by back-country skiers during the spring. Because this project does not affect denning habitat, it will not contribute to cumulative effects to potential denning areas.

Fisher (Region 6 Sensitive Species)

The CNF Plan does not contain specific standards and guidelines or management direction pertaining to the fisher. Fisher populations are extremely low in Washington (Jones and Stinson 1998) and their current population status on the CNF is unknown but presumed at or near zero. Specific fisher surveys were not conducted for this project.

Existing Conditions, Direct and Indirect Effects

Areas meeting the broad description of fisher habitat are present in small amounts in the eastern side of the planning area, contiguous with large blocks of habitat on the Kettle Crest upslope and east of the planning area.

Fisher prey on small mammals and spend most of their time in mature and older forests. They require denning sites sheltered from harsh weather conditions and safe from predators with an adequate prey base nearby. Because most of the MEL planning area consists of warm, dry habitats it does not currently provide much habitat for fisher, let alone high-quality habitat. The few more mesic sites were impacted by past fires, timber harvest, and fire suppression which resulted in either open ground or densely stocked timber stands and smaller-diameter trees. These stands of small-diameter trees are not developing into the larger tree, multi-stratum habitat preferred by fisher.

Unit 112 is the only unit in existing fisher habitat affected in the proposed action, and the prescription calls for commercially thinning the understory trees. Harvest can result in the loss of large snags. The proposed action only uses ground-based techniques, in this case tractor yarding, which usually result in more snags left on the landscape than either cable or helicopter yarding methods. Non-merchantable trees greater than 16 inches DBH would not be removed from the stand, so snags felled for safety purposes would remain to provide habitat. Units 108 and 114 will provide fisher habitat though currently in early structure, having been harvested in the past. The harvest prescription of understory thinning in these units would move the overstory more quickly to a larger tree size than without treatment. Precommercial thinning units 7, 21, 55 and 95 would affect habitat that could some day, support fisher. Precommercial thinning would not affect large trees and would allow remaining trees to grow more quickly. No prescribed fire

units would affect fisher habitat because all occur on warm, dry areas that do not provide habitat for fishers.

Riparian areas and other corridors within potential fisher habitat are would not be affected by thinning and would allow for fishers to move about on the part of the landscape that provides fisher habitat.

Cumulative Effects

The cumulative effects analysis area consists of cooler, more mesic plant associations on the Colville National Forest that are capable of providing fisher habitat. Most of this habitat lies on the eastern side of the Forest. The west side of the Kettle Crest generally consists of warmer, drier habitats, so potential fisher habitat here consists of small, isolated habitat fragments. Timber harvest prescriptions and identified connectivity corridors under the action alternatives would protect or enhance existing fisher habitat conditions, and promote healthier, more resilient timber stand conditions that continue to provide for this species in the future. Cumulatively, these actions contribute favorably to actions occurring on other parts of the Forest.

The Forest Plan established a network of areas across the Forest designed to retain and promote the development of late and old forest habitat conditions to provide habitat for barred owls, pileated woodpeckers, pine marten and northern three-toed woodpeckers. Some of these areas also provide potential fisher habitat. This habitat network will also benefit fisher.

Existing direction under the Eastside Screens directs most timber harvest activities on the Forest toward retention of LOS stands and enhancement of younger stands toward LOS conditions. This helps insure the persistence of other suitable habitat across the landscape for fisher.

Pacific Western (Townsend's) Big-eared Bat (Region 6 Sensitive Species)

The Forest Plan does not contain specific standards and guidelines or management direction pertaining to Pacific western (Townsend's) big-eared bats. The objectives are to protect internal microclimate conditions of mines, caves and structures associated with roosting, hibernating, and, or reproducing bats and to protect roosting, hibernating, and, or reproducing bats from human disturbance. Current management suggestions outline a suite of buffer options around mines or buildings that support roosts, hibernating areas, or maternity colonies in order to retain the microclimate characteristics of an occupied site. Management intent is to minimize or eliminate disturbance at hibernating areas (from December to March) and maternity colonies (approximately May through August). To determine effects to Pacific western big-eared bats, we examine effects to sites that support hibernacula and maternal colonies (caves, mines, old buildings).

Existing Conditions, Direct and Indirect Effects

Though many miners constructed prospecting pits throughout the MEL area, only one mine occurs. This mine was closed with a bat-friendly gate in 2004. Subsequent monitoring during winter discovered that a few Townsend's big-eared bats use the mine as a hibernaculum. No human-built structures occur in the planning area that Townsend's big-eared bats might use as maternity sites.

No proposed commercial or precommercial thinning would occur within 1/8 mile of the mine. Treatments would open stands and presumably improve foraging conditions for Townsend's big-eared bats. In the closest units, prescribed fire would be timed for between April 15 and October 15 to avoid hibernating bats.

Cumulative Effects

The area considered for cumulative effects analysis consists of the Republic Ranger District. Planned projects and treatments on other ownerships within the Forest boundary could contribute to cumulative effects to Townsend's big-eared bats because private landowners are not required to manage for these bats and old buildings can be modified or destroyed.

Forest Service timber treatments in this and other projects will not negatively contribute to cumulative effects to either hibernacula or maternity sites because the Forest buffers mines known to be occupied, no prescribed fire and few timber projects occur during winter, and because of their historical value, old structures are not destroyed. Recreational and commercial use of mines and illegal use of historical structures that support Townsend's big-eared bats potentially will cause disturbance of summer roost sites and maternity sites, and hibernacula during late autumn, but few recreationists or miners explore mines during winter.

Noxious Weeds

Introduction

The Malo East Lake Fuels Reduction Project EA addresses the prevention of weed spread, and, or the compounding of weed problems that could result from proposed activities. It does not address the treatment of existing weeds or the spread of weeds that would occur independently of the proposed action. Treatment of existing weeds is addressed by the Regional Forester's Forest Plan Amendment, *Preventing and Managing Invasive Plants Environmental Impact Statement* (USDA Forest Service 2005a).

Ferry County Noxious Weed Control Board and the Forest Service work together to control noxious weeds on Forest Service lands in Ferry County. There are currently too many weeds to control all populations occurring, so the above agencies have agreed on a strategy to focus control efforts on new invaders that pose the greatest risk, and those that are the most aggressive invaders. More information is available from the specialist report in the project analysis file (Fletcher 2008a).

Data Collection

Noxious weeds surveys were completed most recently in June of 2007 by Washington State University Extension and the Forest. The surveys showed that much of the road systems within the MEL planning area have noxious weeds currently present. Some of the noxious weeds commonly observed were hoary alyssum, houndstongue, hawkweed, diffuse knapweed, and Dalmatian toadflax. Many of the existing noxious weed populations seem to be contained to disturbed areas on existing roads, but hoary alyssum and diffuse knapweed have been observed moving away from disturbed areas and into open forested areas on dry, south facing slopes.

Framework

The Colville National Forest Weed Prevention Guidelines include:

Education: Ensure public and employee knowledge of noxious weeds to help reduce both the spread rate of existing weeds and the risk of infestation by new noxious weeds.

Project Need: Weigh the need of the proposed project against the risk of weed infestation.

Minimize Transportation of Weed Seed: Reduce the spread of existing weeds across the Forest and the risk of introducing new weed species to project sites and other areas of the Forest.

Incorporate Weed Prevention Measures into project planning and design, and special use permit administration: Ensure that the risks of weed introduction, and, or spread, and the mitigation required to minimize that risk are properly considered before ground disturbing activities begin.

Pre-activity, Inventory and Analysis: Minimize the spread of existing weeds into new project areas.
Minimize ground disturbance and the exposure of mineral soil during project activities: Reduce the potential for weeds to become established on new sites and the need to conduct re-vegetation activities.
Re-vegetate disturbed areas: Re-establish desirable vegetation on exposed mineral soil due to project activity and unplanned events such as fire, flood, or other disturbances to minimize the introduction, and, or spread of noxious weeds.
Monitor: Conduct project follow-up and review to determine success of weed treatments sand re-vegetation efforts to detect new weed sites requiring treatment and make corrections as necessary. Monitoring is a part of every project and as such, needs to be covered in NEPA discussions, and planned for as a part of implementation.

Colville National Forest Seeding and Planting Guide specifies appropriate seed mixes and rates of application for various ecosystems.

The Pacific Northwest Invasive Plants Program Final Environmental Impact Statement and Record of Decision require cleaning of all heavy equipment prior to entering NFS lands. It requires inspection of rock sources for noxious weeds and pretreatment of them prior to use. It also places restrictions on herbicide use and handling.

Issues, Direction, and Measures

Issues from Public Input

Activities proposed in the MEL project will cause spread of noxious weeds

- See Disturbed Ground, Roads, Rock Sources, and Fuels Disposal discussions below
- Measures: Acres of disturbed ground

New roads may become ATV trails (which may result in adverse effects regarding soils, water quality, wildlife seclusion, noxious weed invasion, non-motorized recreational users).

- See Roads discussion below
- Measures: Qualitative assessment

Direction from Framework, Purpose, and Need

Minimize the spread of existing weeds into new project areas.

- See Disturbed Ground, Roads, Rock Sources, and Fuels Disposal discussions below
- Measures: Acres of disturbed ground

Existing Condition, Direct and Indirect Effects

Priority Weed Species

The highest priority weeds for treatment are labeled by the Washington State Noxious Weed Control Board as "Class A" weeds and control is required and enforced. There have not been any "Class A" weeds found or reported in the MEL planning area. Treatment priority is next focused on "Class B designate" species where control is also required and enforced. Then would be "Class B non-designate" species, which are weeds that must be controlled if found in vehicle corridors, buffer strips, and areas of limited distribution. Control of "Class B non-designate" species is also encouraged in areas of large infestations.

It is the class B and B designate species that pose the greatest risk to National Forest lands in the planning area. Class B and B designate species have realistic potential to invade newly disturbed areas because they occur in the planning area now, but with limited distribution. In order to minimize the risk of noxious weeds becoming established on these areas, it is critical that the planning area have noxious weed treatment prior to ground disturbing activities, seeding of disturbed sites as soon as possible after the activity is complete, and post-disturbance noxious weed control treatments to prevent new infestations from establishing.

The least focused on species for control are "Class C" species. There is little that can be done to prevent some weeds, such as common mullein and St. John's-wort, from establishing in areas of disturbance. Invasive species such as these, which are widely distributed and fairly common, pose little risk to the landscape if they are present. Class C species of noxious weeds, such as these, typically will be some of the first species to colonize a disturbed area, but are soon out competed by desirable vegetation if seeding occurs. What follows is a list of known class B noxious weed species from the planning area.

Canada Thistle exists in areas of disturbance and sub-irrigated meadows, which tend to provide suitable habitat.

Plumeless Thistle have been identified in the lower elevations of the Lambert Creek drainage and due to the plant's wind blown seed and the prevailing winds in the area, would likely spread to the east where suitable habitat exists. This thistle has the ability to move away from areas of disturbance, such as road corridors, and establish in semi-open forested areas which are more difficult to treat.

Houndstongue occurs throughout the planning area. The sticky seeds of this plant attach themselves to passing livestock, wildlife, horses and people and establish in new areas where they fall off. This plant has the ability to establish in open meadows and open canopy forests in the area. There is a slight potential to see a decrease in the amount of houndstongue in the planning area due to a

biological agent that is being promoted in Canada, and which has been observed by Ferry County Noxious Weed Control Board employees to be in northern Ferry County.

Hoary Alyssum is established on roads leading into, and within the planning area. This plant is becoming more established in Ferry County each year due to its high quantity of seed production and ability to thrive in dry habitats. It tends to prefer open areas and is currently established in the lower elevations of the planning area in areas of past disturbance such as roads and old log landings and dry, open south facing slopes. Since this plant is a type of mustard, picloram is not effective for control. Therefore, the Forest Service must treat this plant with triclopyr which does not provide extended weed control with a single treatment.

Scotch Thistle has been observed in the lower elevations of Lambert Creek. The infested area has remained about the same, but the density of plants in that area is increasing slightly.

Yellow Hawkweed infestations would likely increase slightly within the project area, but with a limited distribution control is achievable. Yellow hawkweed typically invades deep soils in forest openings such as meadows. Usually the plants establish in disturbed areas, but once established can spread to dominate entire openings and move into the forested environment.

Diffuse Knapweed, Dalmatian Toadflax, St. John's-wort, and Musk Thistle are found in the planning area. There are currently effective biological agents for these species present in the local area.

Disturbed Ground

Based on current trends and the Colville National Forest's ability to treat noxious weeds it is expected that most noxious weed species would likely increase slightly within the planning area regardless of implementation of the MEL project. For example, hoary alyssum seems to have a much larger potential to increase in distribution because it is a fairly new plant on Forest Service lands, produces an abundance of seed, establishes in undisturbed areas such as open south facing slopes, and is difficult to control given the Colville National Forest's currently available control methods.

Disturbed soil appears to be important early in the noxious weed invasion process because it creates vacant niches that alien plants can occupy (Masters and Sheley 2001). For the effects analysis on the proposed action, the estimated maximum area of disturbance follows the *Method for Evaluating Soil Disturbance for Various Timber Harvest Alternatives*, by Duane Dipert, Soil Scientist, Colville National Forest 1990. Estimated acres of disturbance are displayed in table 3.18 by activity type. Note acres of disturbed soils for noxious weeds are not calculated the same way as acres of detrimental soil conditions. The latter considers soil compaction and erosion rather than solely potential creation of bare ground. For example, where hand piles have been burned, the

exposed soil may be in no danger of erosion because it is small and isolated, but be at risk of noxious weed invasion.

Table 3.18 Estimated maximum area of soil disturbance from the proposed action.

Activity Type	Approximate Amount of Disturbance	Maximum Acres of Disturbed Soil
Tractor Harvest	3,000 acres	150
Road Construction & Reconstruction	41 miles	120
Road Decommissioning	5.5 miles	16
Prescribed Fire*	3130 acres	94
Rock sources	31 acres	31
Total		**412**

*Includes Hand piling, Underburning, Jackpot burning and 15 percent of Optional Burn areas.

Commercial thinning, small pole thinning, and shaded fuel breaks that utilize heavy equipment have the most elevated risk for noxious weed establishment because there is the greatest likelihood of ground disturbance. The types of activities associated with harvesting trees, conveying them to a landing and decking them create areas where mineral soil could be exposed. Within commercially thinned units noxious weed establishment typically first occurs on skid trails and log landing sites because of the exposed mineral soil and adequate sun light. If left untreated, infestations that began in these locations may soon spread throughout the unit. Winter treatment for these types of units would reduce the amount of disturbed soil since the snow would act as a buffer between the earth and the equipment.

Treatment objectives are to create a timber stand that is more open with less biomass in the understory. Creating more open stands where sunlight reaches the ground provides a more favorable environment for noxious weeds to become established and spread. Many noxious weeds are out competed by native vegetation in shaded environments, but it is anticipated that the thinning treatments would not provide enough shade to deter noxious weed establishment. Disturbed areas would likely be at moderate risk for noxious weed infestation if seed sources are present and readily available. Timely implementation of design elements could likely reduce this risk to acceptable levels (Chapter 2, page 41).

Design elements included in the proposed action would require planting desirable vegetation following the *Seeding and Planting Guide for the Colville National Forest* (Ortegon 2000) after soil disturbance. This is important because removing invasive plant species with chemical or biological control measures may only open niches for other undesirable species or allow reinfestation by the same species (Masters and Sheley 2001) if desirable replacement plants are not on hand to take over the site.

Vegetation and fuels treatments on south facing slopes within the planning area have the potential to create a desirable habitat for hoary alyssum to establish. This plant has been observed in the Tonasket Creek, Aeneas Creek, North Fork St. Peter Creek, South Fork

St. Peter Creek, Lambert Creek, Art Creek, and Mires Creek Drainages. The densest populations seem to occur in the lower elevations near the boundary between the Forest and private property. In the South Fork St. Peter Creek drainage, hoary alyssum is no longer confined to the road corridor and has begun moving up into the fairly open timber stands to the north in units 60, 66, 74, and 79. Treatment of noxious weeds in units where hoary alyssum is migrating into the forested environment prior to any activity will reduce the risk of invasion.

Roads

Road systems are the primary vectors for noxious weed spread because they have bare soil, continued disturbance and concentrated use from vehicles that have the ability to transport noxious weed seeds. If drivers travel through noxious weed infested areas, seeds can be transported to sites where new infestations begin.

Areas produced by new road construction, reconstruction, and decommissioning have the greatest risk for noxious weed establishment. Within the MEL planning area, there would be approximately 49 miles of road construction, reconstruction or decommissioning which has the potential to become infested with noxious weeds.

The Art Creek basin is an area where there could be long-term effects from the MEL project because of the new road construction that would be needed to access units in that area. This area currently has little road development and, therefore fewer noxious weeds. The proposed road construction would create disturbed soil conditions that could be potential areas for noxious weeds to establish. Monitoring and design elements would be implemented to rapidly respond to newly established noxious weeds in this area. Effective road closures are particularly important in the Art Creek Drainage since the project proposes the first system road to be constructed in this drainage. If road are constructed in this drainage, it will have a much greater potential to become infested with noxious weeds than it does currently, in part because road closures are not always effective and new recreation and cattle use patterns could establish into this area.

By adhering to management practices under management objectives of the *Noxious Weed Prevention Guidelines for the Colville National Forest* (USDA Forest Service 1999a) and standards listed in the Region 6 *Preventing and Managing Invasive Plants* (USDA Forest Service 2005b), and employing the design elements in Chapter 2 of this document, noxious weed populations would not spread greatly and could decrease because of the input of effort to control noxious weeds which would result from the project (see Design Elements Chapter 2 page 41).

Since noxious weeds are often spread by motorized vehicles, effective road closure, and, or decommissioning are very important in limiting the extent of noxious weed infestations. Temporary roads and those scheduled to be decommissioned, and, or closed would need to have effective closure methods employed to ensure that vehicle traffic cannot access these areas. This is especially true when off-road vehicles are able to breach barriers and transport noxious weed seed to the areas behind closure devices. Areas such as this are often difficult to treat because truck mounted boom-type sprayers

cannot go beyond earthen berm closures; however ATV type sprayers which carry much less herbicide, may be substituted. Follow-up monitoring and re-treatment of areas behind road closures, and, or decommissioned roads would be conducted, at a minimum, once a year for the first two years after treatment or until such time as it can be verified that weed infestations have been effectively treated.

Treating noxious weed infestations along Forest system roads within, and leading to, the project area will also greatly reduce the amount of noxious weed seed that would be available to germinate in areas of soil disturbance. Treating noxious weeds prior to ground disturbing activities would reduce the risk of transporting them by vehicles and equipment involved in road construction and vegetative treatments. Including in documents such as this, a reminder to the public to check for, and remove noxious weeds attached to their vehicles after driving through infested areas will also help.

Monitoring and post-project treatments would help to prevent noxious weeds from becoming established in the project area as a result of the project. This should occur until revegetation efforts have been determined to be successful.

Rock Sources

There is one existing aggregate/rip rap source and 6 potential new aggregate/rip rap sources within the MEL planning area. Since the material from these sources would be removed and relocated to many of the Forest system roads in the planning area, there is potential risk to spread noxious weed seeds to areas that are currently free of noxious weeds. The pit sites have been reviewed for presence of noxious weeds and 5 of the new proposed rock sources (all except the inventoried source in Herron Creek and the existing Lambert Rip-rap source) currently have hoary alyssum, diffuse knapweed and houndstongue present. Compliance with the Pacific Northwest Invasive Plants Program standards requires inventory of rock sources and treatment of noxious weed infestations prior to use. This would keep viable noxious weed seeds mixed with the surface aggregate within the existing infested area and not allow it to be placed in areas of road construction or reconstruction. The Colville EMS requires noxious weed monitoring of areas on which the pit material is used.

Environmental Management System requires that the noxious weed coordinator monitor and inventory at least 110 miles of level 2-5 roads across the forest for noxious weed occurrence. All road surfaces within the planning area that receive borrow or pit material would be included in the 110 miles to be surveyed for three years following surfacing and appropriately treated

Fuels Disposal

Fuels treatments that utilize fire to achieve management goals pose a slight risk to noxious weed establishment. Given the types of fuel treatments proposed for this project it is expected that exposure of mineral soil due to fire would be widely scattered, the areas of bare soil would be small in size, and that re-colonization by native plants would occur rapidly. Satisfactory recovery of native vegetation following prescribed fire is likely to occur within one growing season of treatment for underburn and optional

underburn units. Fuel treatment methods that would use prescribed fire to eliminate piled vegetation would generate more heat in the localized areas that are burnt. Because of the greater heat involved in burning these areas, recovery of native vegetation is expected to be slower than that anticipated in underburns.

The extent and potential spread of weeds after prescribed fires has not been well documented on the CNF weeds (Scherer et al. 2000). The extent and potential spread of weeds after cooler prescribed fires is considerably lower than the spread of noxious weeds after hotter wildfire (Freeman et al. 2007). Disturbed ground and roads within proposed burn areas would be monitored following prescribed fire to assess for the presence of noxious weeds and treated as necessary.

Cumulative Effects

Noxious weeds have occurred within the project area for many decades and the Forest has been treating noxious weed populations in the area since approximately 1992. New noxious weed threats continue to advance onto Forest Service lands as they have for many decades and the Forest continues to treat these areas based on priority. Noxious weed populations are continually evolving because of species that are new invaders becoming established and the transporting of noxious weed reproductive parts which allows for the infestation of other areas. It can be expected that some noxious weeds will naturalize and become ubiquitous across the landscape.

The history and nature of the noxious weeds on CNF suggests that noxious weeds would continue to exist on the landscape within the MEL planning area after completion of the project as they did prior to the project. Noxious weeds would be treated and monitored within the planning area, but they will not likely be eliminated as a result of the activities and efforts proposed for the MEL project. Noxious weed monitoring and treatment efforts required by the project would likely act to reduce the level of noxious weed infestations that currently exist within the project area, but would not eliminate them because of the continuing threat of noxious weed establishment resulting from seed transportation on the level 2 and 3 roads open to travel and the infestations on adjoining private property.

Noxious weeds on the Forest are rather small when viewing them in conjunction with much of the adjoining private property. Private property near the Forest appears to have a much greater area infested with noxious weeds. This is partly due to the amount of open, un-forested, areas on private property. It is also partly due to the Forest Service having an ongoing noxious weed treatment and prevention strategy, which appears to be somewhat effective. The activities in the proposed action would not cumulatively negatively affect noxious weeds within or outside the Forest Boundary.

Range

Introduction

Information provided in this Environmental Assessment about rangeland grazing is excerpted from the Malo East Lake Fuel Reduction Project Range Effects Report by Travis Fletcher, Range Specialist. The full text of this report is incorporated by reference and in available in the project analysis file (Fletcher 2007).

Data Collection

Grazing use occurs in accordance with Allotment Management Plans which are developed fir each allotment. The grazing permit defines the authorized number of livestock, pasture rotation and use periods, and discuss range improvements. The following discussion is based on these documents, field surveys, and on aerial photo interpretation.

Framework

Direction in the Forest Plan includes:

- Management of grazing by domestic livestock will be guided by project level allotment plans. The development of these plans will be integrated with the needs associated with use and values present in the area. All associated uses and values will be considered, with special consideration given to: (1) fish and wildlife habitat needs; (2) timber harvest and cultural activities; (3) riparian values; (4) recreation use; and (5) threatened, endangered and sensitive species. Further considerations are contained as other resource standards and guidelines in this section of the plan.

- Coordination requirements….will include: (1) timing of the timber harvest and associated activities and grazing schedules; (2) protection of livestock barriers or mitigation of these values where desirable; (3) reducing the spread of noxious weeds where present; (4) seeding of livestock and wildlife forage species, considering desirability of seeding palatable and non-palatable forage species and species competitive with tree production; and (5) livestock-wildlife conflicts.

Allotment specific management direction for the affected grazing allotment is contained in the following individual allotment management plans: (1) North Fork St. Peter Creek C&H Allotment Management Plan 1976, (2) South Fork St. Peter Creek C&H Allotment Management Plan 1976, (3) Lambert Allotment Range Management Plan 1979, and (4) Copper-Mires Cattle Allotment Management Plan 1976.

Issues, Direction, and Measures

Issues from Public Input

The MEL project will provide additional access for cattle to streams.

- See Natural Barriers discussion below; also see Coliform Bacteria section page 154 and Riparian Management Objectives page 168
- Measures: Qualitative assessment

The MEL project will affect grazing permittees

- See Transitory Range, Primary Range, and Range Improvements discussions below
- Measures: Acres transitory range created, Acres primary range improved

Concerned about natural livestock barriers being removed by prescribed fire

- See Natural Barriers, and Range Improvements discussions below
- Measures: Qualitative assessment

Direction from Framework, Purpose, and Need

Protect range improvements and cattle barriers during project activities.

- See Natural Barriers, and Range Improvements discussions below
- Measures: Qualitative assessment

Existing Condition, Direct and Indirect Effects

Allotments

The planning area has portions of four Forest Service administered grazing allotments within its boundary: Copper-Mires, Lambert, North Fork St. Peter Creek, and South Fork St. Peter Creek. All of these allotments have been divided into smaller sub-units or pastures, which support a combined number of 554 livestock annually. The grazing season generally begins on June 1 each year and extends into fall with seasons ending between September 30 and October 15. According to past monitoring information grazing use is occurring at acceptable levels and within specifications.

Transitory Range

Transitory rangelands are areas that supply grazing forage for livestock for a period of time, but are not permanent, like natural grasslands. Transitory range is created where thinning and other fuel treatments open dense forests allowing light to reach the forest floor and herbaceous vegetation to grow. Logged forests can produce approximately twice the herbage as primary range (natural grassland) and ten times more forage than un-logged forests (Miller and Krueger 1976). Transitory range may also be created along roads and skid trails where reseeding takes place to reduce noxious weed invasion. Typically these rangelands exist for approximately 10 to 30 years depending on when canopy closure is reached. Most of the transitory rangeland created by the MEL project would be in the uplands and therefore attract livestock away from riparian areas. An estimated 3,100 acres of transitory rangeland would be created in the four allotments.

Because these allotments extend upslope toward the Kettle Crest, the gain in transitory range would be mostly in pastures at lower elevations.

Primary Range

Primary rangelands are areas considered to be naturally un-forested where vegetation is comprised primarily of grasses, secondarily of shrubs, and few trees. There are approximately 13,596 acres of primary range in all four allotments combined, much of which is outside the planning area. Primary rangelands are characterized by having deep rooted, cool season, perennial grasses. Many of the traditional open grasslands and park like stands that haven't been influenced by recent wildfires are being lost due to the encroachment of Douglas-fir trees. Approximately two-thirds of the proposed optional burn areas (1100 acres) are on primary rangeland.

If burning is to occur in primary rangeland it is preferable to do it in the fall to favor the dominant cool season perennial plants (Wright 1974). Burning in spring or early summer would result in higher rates of perennial grass mortality since these plants would be actively growing and attempting to produce seed at these times. To protect grass roots and cause the least disruption to plant reproduction, fall or spring burning would be coordinated with pasture rotation schedules and should only take place when soils are damp or wet. Burning in areas where shrubs or small trees are intermixed with grasses is expected to improve forage quality and quantity.

Implementation of the proposed action is not expected to require unscheduled grazing deferral or adjustment of grazing rotation systems because forage grasses are expected to be adequately recovered by the time grazing season begins. Because treatments create additional forage and improve the quality and quantity of existing forage, this should improve livestock condition and therefore increase the economic returns to permittees. This in turn would indirectly help maintain the local grazing industry, the ranching lifestyle and support the local economy.

Range Improvements

Livestock management is accomplished in part by management of range improvements (for example fences and water developments) existing within or around the grazing allotment. These improvements are critical for the implementation of sound livestock management because they encourage livestock use in some areas while preventing use in others, like riparian areas where they may cause stream degradation. Another example is if water developments are damaged; livestock distribution could be affected because the cattle have to rely more on undeveloped springs and streams for water. All range improvements located within the planning area would be protected from damage that may occur from the proposed action. All potentially affected range improvement projects would be documented on timber sale maps and specified for protection. The following is a table that describes the type and name of the range improvement, and the allotment and unit in which it resides.

Table 3.19 Known range improvements in the MEL project units.

Allotment	Type of improvement	Improvement name (blank indicates unnamed)	Treatment Unit #
North Fork St. Peter	Developed Spring	Cecil D Spring	12
North Fork St. Peter	Developed Spring	McCann Spring	10
North Fork St. Peter	Fence	Figure B	1, 21, 25
North Fork St. Peter	Developed Spring	Unknown	249
North Fork St. Peter	Developed Spring	Rocklick Spring	45
North Fork St. Peter	Developed Spring	Roadside Spring	41
North Fork St. Peter	Fence	Figure A	41, 46, 51
South Fork St. Peter	Fence	Figure G	69, 84, 85, 90,
South Fork St. Peter	Fence	Figure E	64, 57, 56, 54
South Fork St. Peter	Developed Spring	Lucy Spring	90
South Fork St. Peter	Developed Spring	Squirrel Spring	60
South Fork St. Peter	Fence	Figure B	103,104
Lambert	Developed Spring	Strong	108
Lambert	Fence	Figure 2	199
Copper-Mires	Fence	Figure I	204, 128, 127, 126, 125, 185,
Copper-Mires	Fence	Figure B	155, 150, 156, 152, 153, 148, 171
Copper-Mires	Fence	Unknown	169, 227, 174, 179, 181
Copper-Mires	Developed Spring	Mires Creek Spring	229

Road decommissioning is to occur on 5.5 miles of Forest system roads within the planning area. Road decommissioning would result in less harassment of livestock by the general public driving on Forest roads, but add time to the inspection of livestock, grazing use and range improvements. Road decommissioning from this project is not expected to result in negative impacts to range management.

Natural Barriers

Natural barriers consist of areas that are too steep, and, or rocky for livestock to cross. They may also be dense forests without any forage in the understory. Natural barriers contain livestock in desired areas without the need for a continuously fenced perimeter. The vegetation and fuels treatments in the proposed alternative have the potential to compromise some natural barriers. The proposed action may result in a need for additional fencing due to the removal of natural livestock barriers that act as allotment and pasture boundaries in the vicinity of units 25, 29, 34, 37, 38, 39, 45, 46, 47, 49, 90, 106, 108, 109, 249, 250 and 252. For example, Art Creek may require as much as 2 miles of new fencing to manage cattle along the western boundary of the North Fork St. Peter Allotment. There may be additional locations along the Forest boundary that could give cattle access from NFS land onto private and vice versa.

Intact or undisturbed natural vegetation also provides the best barrier for preventing livestock access and impacts to riparian areas. Due to the design elements surrounding fuel treatments in RHCAs there is very little risk of removing the existing natural barriers with mechanical or hand treatments. Design elements include monitoring of cattle use in units 60, 101, 138, and 196. Barriers would be constructed if cattle access to creeks was increased in these units due to treatments. During underburning or jackpot burning fire would be allowed to creep into some RHCAs, but because efforts would be made to only allow for low intensity fires in these areas; there is small risk if removing riparian vegetation. Riparian area impacts from livestock are not expected to increase following treatment providing that prescribed fire is implemented so that fire intensity is low (see Coliform Bacteria discussion page 154 and Riparian Management Objectives discussion page 168).

Cumulative Effects

The cumulative effects analysis for range management extends to the allotment boundaries of the four allotments that overlap the planning area. Between approximately 1975 and 1995 there was a dramatic increase in the amount of roads and timber harvest units which provided livestock access to riparian areas. In the past, many of these activities also prescribed the use of palatable forage species when seeding for erosion control. This created an environment that attracted livestock into riparian areas and provided desirable forage encouraging them to stay in these areas rather than moving on to native upland foraging areas. The proposed action may increase cattle access to some riparian areas at road/stream crossings, but the creation of transitory range is expected to help attract them into the uplands, and the implementation of design elements (Chapter 2, page 41) and BMPs (Appendix B) would help minimize any additional impacts.

Wildfire has played a major role in the current landscape of the grazing allotments within the project boundary. There have been three wildfires that have burned large portions of the affected grazing allotments between 1988 and 2001. These fires and subsequent salvage harvest have produced large acreages of transitory rangelands, primarily at higher elevations in the allotments. The MEL project would create additional transitory range at

lower elevations thus providing more evenly distributed grazing opportunities. It would also allow livestock to disburse over a larger area resulting in less concentrated use.

The proposed treatments within this planning area have the potential to remove natural barriers which limit livestock movement on the forest and allow for pasture rotations and deferment. Design elements have been identified to address the potential effects of natural barrier removal, but constructing new fencing produces additional maintenance requirements that are likely to continue far into the future.

The activities in the proposed action combined with past, ongoing and reasonably foreseeable future actions would not cumulatively negatively affect range management within the affected Forest Service grazing allotments.

Sensitive Plants

Introduction

No federally listed threatened or endangered plants or plants proposed for federal listing are known to occur in the analysis area (USDI Fish and Wildlife Service 1999 and USDI Fish and Wildlife Service 2001). Forty-five plant species listed on the Regional Forester's Sensitive Species List (UDSA Forest Service 2004) are documented or suspected for the Colville National Forest. None are known from the planning area or within two miles of the planning area. Potential habitat exists in the analysis area for 37 suspected sensitive plant species. For a detailed analysis please refer to the Biological Evaluation for Sensitive Plants located in the MEL project analysis file (Ahlenslager 2007).

Data Collection

Field reconnaissance is limited to areas within, adjacent or near the planning area where proposed ground disturbing activities may affect sensitive plant species. Sensitive plant surveys for the project were conducted in 2006 on June 14 and 21, July 17, August 7-9, 22, 28-30, and September 6. In 2007 surveys were conducted May 14, June 29, and July 2 and 10.

Framework

Forest Service regulations direct the agency to ensure that management activities do not contribute towards listing or cause a loss of viability of species identified as "sensitive" by the Regional Forester. "A sensitive plant is one thought to be vulnerable to becoming threatened or endangered due to low population levels or significant threats to its habitat" (FSH 2670.22).

The Forest Service Handbook (FSH 2670.3) directs sensitive plant management on NFS lands: "All actions are taken to assure that management activities do not jeopardize the continued existence of sensitive species or result in an adverse modification of their essential habitat." In addition, "…biological evaluations, biological assessments and consultations with the U.S. Fish and Wildlife Service will be done, as appropriate, to ensure that no activity permitted, funded, or carried out by the Forest Service jeopardizes the continued existence of a threaten or endangered species or adversely modifies the essential habitat of such species."

Direction for the management of sensitive plants is also found in the standards and guidelines for the Forest Plan, "No actions that are likely to jeopardize the continued existence of any plant or animal species or cause the need for listing any species threatened or endangered will be authorized, funded, or carried out by the Colville National Forest. When evaluating the potential effects of an activity on any species, the

species status, its dependency on the affected habitat, and the extent or limitation of the habitat, will be evaluated as they influence the viability of populations within the Forest or the range of the species."

The Colville National Forest is mandated to protect species viability for plants listed on the 2004 Sensitive Species Plant List for Region 6 (Washington and Oregon) of the Forest Service. Botanical surveys on NFS lands are conducted for sensitive species documented or suspected to occur in planning areas with suitable habitat.

Issues, Direction, and Measures

Issues from Public Input

Activities proposed in LOS in the MEL project will affect late and old structure dependent species.

- See Late and Old Dependent Plant Species below; also see Late and Old Forest Structure section page 110 and Barred Owl, Pileated Woodpecker, Pine Marten, and Northern Three-toed Woodpecker discussion page 178
- Measures: Qualitative assessment

Direction from Framework, Purpose, and Need

Assure that management activities do not jeopardize the continued existence of sensitive species or result in an adverse modification of their essential habitat.

- See Sensitive Plant Species discussion below
- Measures: Qualitative assessment

Existing Condition, Direct and Indirect Effects

Sensitive Plant Species

During the pre-field review, species that normally occur well below the elevation range of the planning area or those where typical habitat is not present were omitted from further analysis. No sensitive plants were found.

If the Sensitive Plants design element is implemented, the Likelihood of Adverse Effects is "Low" (1) and the Consequence of Adverse Effects is "Low" (1). The resulting Risk Assessment value is 1; proceed as planned.

Late and Old Structure Dependent Plant Species

No sensitive plants have been found in the planning area including areas of late and old structure.

Cumulative Effects

If design elements (Chapter 2, page 41) are implemented, the MEL project may have an impact on individual plants, but is not likely to cause a trend to Federal listing or loss of viability. Adherence to Forest Plan standards and guidelines will prevent adverse effects to sensitive plants.

Recreation

Introduction

Proposed actions are reviewed to assure that the recreation attributes that facilitate the desired recreation opportunity class for the analysis area are being protected. Recreation Opportunity Spectrum (ROS) is one of the tools that the Forest Service uses to frame the setting when describing the potential for the recreation experience. The Recreation Opportunity Spectrum provides a framework allowing administrators to manage and users to enjoy a variety of outdoor environments. The following report is excerpted from the Recreation report located in the project analysis file (Bodie 2008a).

Data Collection

The Recreation Opportunity Spectrum is a method of describing and providing a mix of recreation opportunities; it is not to be confused with a land classification system. Based on specific attributes, all National Forest System lands are categorized into one of seven different ROS classes; Primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural-Appearing, Roaded Modified, Rural, and Urban.

Framework

The Forest Plan requires that provision is made for a broad range of ROS settings and recreational opportunities such as hunting, fishing, gathering forest products, viewing scenery, camping, hiking, and floating.

Issues, Direction, and Measures

Issues from Public Input

The MEL project will disturb the aesthetics (visual and spiritual) of the planning area.

- See Recreation Opportunity Spectrum Discussion; also see Scenery section page 227
- Measure: Qualitative assessment

New roads may become ATV trails (which may result in adverse effects re: soils, water quality, wildlife seclusion, noxious weed invasion, non-motorized recreational users)

- See below; also see Inventoried Roadless Area discussion page 134
- Measure: Miles of road decommissioning

Direction from Framework, Purpose, and Need

Provide a broad range of Recreation Opportunity Spectrum settings in the planning area.

- See Recreation Opportunity Spectrum discussion below
- Measure: Miles of road decommissioning, Qualitative assessment temporary road and trail closures

Existing Conditions Direct and Indirect Effects

Recreation Opportunity Spectrum

The MEL planning area can be characterized by the Roaded Modified, Roaded Natural-Appearing, and Semi-Primitive Non-Motorized ROS (Recreation Opportunity Spectrum) classes.

Trails and Dispersed Camping

The Colville National Forest manages the trails within and adjacent to the planning area for Semi-Primitive Non-Motorized recreation use. These trails meander through beautiful conifer stands and open slopes. Several of the trails were impacted by fire, and, or flood events. Throughout the planning area non-motorized recreation trails lead from various trailheads to the Kettle Crest National Recreation Trail (NRT). All of these trails provide a multi-user recreation experience that is nationally recognized. Types of use includes mountain biking, back country hiking and skiing, snow shoeing, horseback riding, hunting, bird watching, and photography. None of these trails would be used for vegetation treatments with heavy machinery, so it is not anticipated that activities would increase their use by OHV.

Trails potential affected by activities within the planning area would include:

Trail Number 1 - Old Stage, 5.6 miles
Trail Number 13 - Kettle Crest National Recreation Trail, a central portion
Trail Number 30 - Big Lick, 5.0 miles
Trail Number 32 - Profanity, 1.5 miles
Trail Number 41 - Midnight, 4.1 miles
Trail Number 47 - Lambert, 1.7 miles
Trail Number 49 - Leona, 1.6 miles
Trail Number 49a - Leona Loop, 6.0 miles
The trailheads for Trail numbers 1, 30, 41, 47, 49 fall within the Project boundary.

A primitive horse camp has been established by the Forest Service on Lambert Creek. This facility provides users with access to a trail system that connects with the Kettle Crest Trail between Midnight Mountain and Copper Butte. The camp contains one vault toilet and several campsites along the main stem of Lambert Creek. A design element to mitigate possible sediment reaching creeks would include fencing and creating an off stream watering location for pack stock and allotment cattle. Trail Number 1 leaves Lambert Creek Trailhead, crosses over the Kettle Crest, and then descends the east slopes along Trail Number 75. No developed campsites are within the planning area.

The proposed activities, while not directly impacting the system trails within the project boundary, would have an impact on public access to those trails. During operations there will be temporary closures of trails affected by those activities. Design elements ensure proper signing of temporary trail closures on all ingress and egress locations to the affected trails during treatments (Chapter 2, page 41).

In the short term the reduced quality of the recreation experience would result from noise, dust and smoke. The presence of mechanized equipment and log trucks should be expected to last through 3 to 5 seasons, though use on any single road is likely to be less. The activity would be expected to result in displacement of visitors wishing to visit a quiet forest setting. Users of dispersed recreation sites may be disturbed or displaced, however, thinning of stands may create new opportunities.

Off-highway Vehicle use

The Colville National Forest has designated routes for Off Highway Vehicle use within the planning area. Currently these routes follow roads open to all vehicles (refer to the 2007 Interim Motor Vehicle Use Map, West Side, Colville National Forest).

The proposed action would close approximately 5.5 miles of existing Forest system road, all of which are either open or have had their barriers breached. It would create an additional 2.0 miles of new system road (which would be closed). This is expected to create some change in recreation use patterns. However, the use of access management as a tool to reduce impact on resources should not create an important loss of quality dispersed recreation opportunities. The road closures do not alter the present designated routes for Off Highway Vehicle use within the planning area (Interim Motor Vehicle Use Map, Colville National Forest, 2007).

Currently, the Interim Motor Vehicle Use Maps (Interim Motor Vehicle Use Map, Colville National Forest, 2007) designate routes available for motorized use; however the designation does not supersede vehicle size or weight limits imposed through State traffic law. Also, the Washington State laws regarding motor vehicle use such as age, safety equipment, and licensing requirements apply on National Forest System lands. Effectively addressing illegal off-highway vehicle use is an on-going process that includes physical barriers and law enforcement efforts. This project is not proposing any new OHV routes.

For that portion of the area where harvest activities are proposed, effects would be limited to the immediate area of these activities, and therefore there would be no long term adverse effects to recreation by the activities proposed in the planning area. Long term, there should be an increase in visual variety within the planning area as there will be an increase in large trees, variation in tree size, and more visible shrubs and grass.

The proposed action is consistent with the Forest Plan management area prescriptions for recreation and trails, and proposed activities would meet Forest Plan standards for recreation and trails. Activities adjacent to dispersed sites and roads will follow Forest Plan guidelines. The planning area would continue to provide a spectrum of recreation

experiences compatible with the Roaded Modified, Roaded Natural-Appearing and Semi-Primitive Non-Motorized ROS classes. Harvest activities and fuels treatments are mitigated to limit the exposure of the forest visitor and provide for an appropriate experience particularly during times of expected high use.

Cumulative Effects

Past logging activities have generally created opportunities for greater access to the area for recreational use. There have been short term impacts to visual quality during logging and thinning operations, which has been offset by the long term health of the timber stands viewed by the recreating public. Forest Service roads created during past activities have increased road densities allowing the recreating public greater access to the forest for hunting, dispersed camping, access to trail heads, winter recreation, and driving for pleasure. This area is popular among recreationists from the local communities and the increased road access has increased their enjoyment of the forest. Though 5.5 miles of existing Forest system roads are proposed for decommissioning; the proposed action is not anticipated to alter the overall recreation use of the planning area. There will be a net decrease of 3.5 miles of Forest system roads in the planning area. This represents an approximate 2 percent decrease in total Forest system roads in the planning area watersheds.

Scenery

Introduction

The Colville National Forest manages visual resources according to Visual Quality Objectives developed through the Visual Management System (USDA Forest Service 1974), and further specified in the Forest Plan, which allocates management areas that guide resource management activities on National Forest System Lands. The Visual Management System has been updated by Landscape Aesthetics, A Handbook for Scenery Management (USDA Forest Service 1995c), and otherwise known as the Scenery Management System (SMS).

The following report is excerpted from the Scenery report located in the project analysis file (Bodie 2008b).

Data Collection

Photo analysis was used for describing the valued landscape character from applicable Concern Level 1 and 2 Travel Routes and User Areas. For each of the Concern Level 1 and 2 roads, the effects to visual quality were evaluated with a computer-based Geographic Information System. Potential viewing points along the Concern Level 1 and 2 travel ways were distributed at a pre-determined distance along the roadway in the computer image. Then, using a digital elevation model to simulate topography, the computer cumulatively determined and mapped the "seen area" from all of the potential viewing points for a given travel way. This seen area was then broken into foreground, middle ground, and background viewing distances.

Project activities (timber cutting, road construction, and prescribed burning) were laid over each "seen area" map. The result was a depiction of what activities could potentially be seen at each viewing distance, for each travel way of concern. In addition the Kettle Crest Trail was analyzed using the above procedure with the exception of mapping foreground, middle ground and back ground.

Framework

Visual Quality Objectives were used in the Forest Plan to describe a desired level of scenic quality, and diversity of natural features, based on physical and sociological characteristics of a specific Management Area. The objective for each Management Area refers to the degree of acceptable alteration of its characteristic landscape (Forest Plan pages 4-69 to 4-119).

Issues, Direction, and Measures

Issues from Public Input

The MEL project will disturb the aesthetics (visual and spiritual) of the planning area.

- See Visual Quality Objectives discussion below
- Measure: Qualitative assessment

Direction from Framework, Purpose, and Need

Maintain visual quality objectives during project implementation.

- See Visual Quality Objectives discussion below
- Measure: Qualitative assessment

Existing Conditions, Direct and Indirect Effects

Visual Quality Objectives and Concern Levels

The Existing Visual Condition of the MEL planning area ranges from a landscape where changes are not visually evident to the average person unless pointed out, to landscapes where changes are easily noticed and may attract some attention. The changes appear to be disturbances, but they resemble natural patterns.

The Visual Quality Objectives relating to proposed activities within the MEL planning area are defined:

> **Partial Retention:** Human activity may be evident, but must remain visually subordinate to the characteristic landscape.
>
> **Modification:** Human activity may dominate the characteristic landscape but must at the same time utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in middle ground or background.

Concern Levels are a measure of the degree of public importance placed on landscapes viewed from travelways and use areas. The critical viewing locations affecting this planning area, and documented through Forest Planning:

- Washington State Highway 21, County Routes 270, 501, 602, and the Kettle Crest National Recreation Trail (Forest Service Trail 13). These travel routes are designated as a Level One Primary Travelways.
- The Curlew Lake area is also designated as a Level One Primary Use Area.

Other routes considered as visually sensitive, but to a Concern Level Two as secondary routes:

- Ferry County Routes 201, 546, and Forest Service Trails 1, 30, 32, 41, 47, and 49
- The Lambert Creek Trailhead is also designated as a Level Two Secondary Use Area.

Viewing Distance determines the sensitivity of the landscape character to visual modification and is described as; Immediate Foreground (0 to 500 feet from observer), Foreground (500 feet to ½ mile from observer), Middle ground (1/2 mile to 4 miles from observer), and Background (from 4 miles to horizon from observer). Details within the landscape become more important in a foreground viewing situation; middle ground is considered the most critical viewing distance zone, especially steep slopes, because the viewer is able to see human activities in context with the overall landscape; and at the background viewing distance, large patterns are visible.

For this planning area, project activities would be viewed as follows:

- Washington State Highway 21; short duration views of the proposed project due to driving speed; some middle ground with mostly background views.
- Ferry County Routes 201, 270, 501, 602 and the Curlew Lake area; only background views.
- Ferry County Route 546 to the Lambert Creek Trailhead; foreground and middle ground views.
- Kettle Crest National Recreation Trail; middle ground and background views.
- Trails that feed to the Kettle Crest National Recreation Trail from the western slopes; foreground and middle ground views.

Fuel Disposal and Vegetation Treatments

The MEL planning area is primarily seen in middle ground and background from multiple viewing locations. From many of the travel routes and use areas views are screened by terrain and current vegetation. The following activities will meet their respective Partial Retention and Modification VQOs (as seen from the critical viewing locations discussed above):

Fuel disposal;
Small pole thinning; and
Precommercial and non-merchantable thinning.

These activities retain the mature forest canopy as seen in middle ground or background with only textural changes in the canopy, thus allowing them to meet respective VQOs. Prescribed Fire areas will meet VQOs as overstory trees screen middleground views of blackened ground surfaces; green-up will occur the following spring.

At the foreground viewing distance, the visual effects of prescribed underburning include blackened tree trunks, low branches, and the ground. The effect can be highly visible immediately following a burn, but the effect would become less as scorched foliage drops and understory vegetation reestablishes. The visual effects of underburning are usually minimal to the casual observer in five years or less. As the viewing distance increases, the visual effects become less evident. At the middle ground viewing distance, one if likely to see only widely scattered black or orange tree crowns; the result of killed during the burn. At the background viewing distance, little if any visual effect should be discernable. While there would be short term noticeable changes, the long term appearance will be a healthier, more open, and natural appearing landscape.

Design elements for ground based commercial thinning units identified as being within Concern Level 1 or 2 foreground and middle ground would be conducted while leaving groups of reserve trees. Where these grouping are placed in such a way as to break-up the contrasting line between private and Forest Service lands, the long-term effect will be positive. The commercial thinning activities would remove enough of the forest canopy to create textural changes, but usually not exposing ground surface to viewers due to foreground screening, topography, and retained overstory.

Roads and Rock Sources

A portion of the proposed 1.1 mile of newly constructed road segment 15 (basically an extension of existing Road 2160600) has the potential to be seen from State Highway 21 in the middle ground and background viewing distances, and in background from County Route 501. These would be short duration views as people travel along these routes.

The proposed 0.4 mile of newly constructed road segment 42 (taking off of existing Road 2154900) has the potential to be seen from County Route 546 in the middle ground viewing distance. These would be short duration views as people travel the route and will likely continue to be screened by riparian vegetation on Forest Service and private lands.

Design elements in the proposed action request retention of existing vegetation below these roads if possible, to screen them (Chapter 2, page 41).

The proposed rock sources and the remaining proposed road construction do not have the frequency of views or the topographic concerns that would negatively affect the natural appearance of the characteristic landscape.

At all viewing zones, it is expected that road construction would not greatly alter the existing landscape character and timber cutting and fuels treatment would be seen as nothing more than a textural change in the forest canopy. The scenic integrity and the valued landscape character would be retained, and the proposed activities would be consistent with the Forest Plan objectives of Partial Retention and Modification.

Landscape Character

Quaking aspen and other hardwoods are important components of the landscape character of the area and the scenery valued by the public. Hardwood retention design elements include conservation of all hardwoods in RHCAs; retention during commercial treatments of all aspen and cottonwoods greater than 10 inches in diameter; and retention everywhere to the extent possible all hardwoods (Chapter 2, page 41). One stand in particular, unit 210, was identified for NUT treatment because its aspen stand is being encroached on by conifer forest. The cut trees would be left on site (which is generally moist and unlikely to burn) to prevent cattle access.

Large bole ponderosa pines are also highly valued as a part of the scenery throughout the area and removal of small trees and debris around these trees during treatments would highlight that feature of the landscape. Larch are another valued feature of the landscape especially in the middleground viewing distance where the stands provide dramatic fall

displays of color. As previously discussed, proposed treatments would favor western larch and create conditions more suitable for its survival and reproduction. Treating these stands would be intended to sustain or preserve the valued landscape character over the long term.

Cumulative Effects

Treatment of the vegetation within the planning area, at a broad scale, whether through prescribed fire, commercial harvest or non-commercial means, would serve to perpetuate the desirable attributes of the existing landscape character. From a scenery standpoint, activities that treat vegetation at the landscape scale, without the introduction of long term negative visual elements, will meet the objectives of the Forest Plan. With design elements, the necessary temporary roads and harvest debris would not take away from the valued landscape character of the National Forest Lands.

The activities visible on private and land managed by the State and Bureau of Land Management, will continue to draw the attention of travelers in the area.

Heritage

Introduction

Data Collection

Field reconnaissance was conducted during the summer of 2006 by an archaeological field crew consisting of one archaeologist, one archaeological technician, and two archaeological aides. The planning area was stratified into high, medium and low probability zones based on the Forest's Inventory Design for Heritage Resources. 100% of high probability zones were surveyed in transects not greater than 25 meter intervals. 35% of medium probability and 5% of low probability zones were surveyed in transects not greater than 25 meter intervals. Shovel scraps were conducted in areas where mineral soils were not visible at least every 20 meters on each transect. Expedient inspections were made of disturbed areas such as root wads and road cuts.

Previously known historic properties were relocated, monitored, and, when necessary, re-recorded. Newly discovered and re-recorded historic properties were recorded using Washington State Department of Archaeology and Historic Preservation (DAHP) site forms. The following discussion is excerpted from the Heritage Resource Specialist's reports available in the project analysis file (Kramer 2007).

Framework

Pursuant to the National Historic Preservation Act of 1966, as amended, the Colville National Forest conducts a program designed to identify, evaluate, preserve and protect cultural resources.

As per 36CFR 296 specific sites are not listed nor described in the EA or project analysis file. Cultural resource sites will be made available to Sale Administrators and Fire Management Officers as needed in order to flag and avoid.

Issues, Direction, and Measures

Issues from Public Input

- None identified

Direction from Framework, Purpose, and Need

Preserve and protect cultural resources.

- See Known Sites discussion below
- Measures: Qualitative assessment

Existing Conditions, Direct and Indirect Effects

Known sites

Very few prehistoric sites have been located within the Colville National Forest, but research indicates prehistoric use of uplands. Small hunting camps, tool manufacturing areas, rock shelters, graves, pictographs, trails, vegetable processing sites, and religious sites may exist within the Forest. The most common historic sites are homesteaders' log cabins. These numerous sites make up the bulk of the heritage sites on the Forest. Other historic sites include mines, mining camps, logging camps, wagon roads, splash dams, Civilian Conservation Corps camps, and early Forest Service Administrative sites, including abandoned fire lookout towers and old Forest Service trails

There are fifteen identified historic properties within the proposed planning area. All fifteen of these historic properties are located within or near identified planning units, and have the potential to be affected. All sites are considered Management Class 2.

Past management practices have not identified any of these properties as evaluated for their eligibility to the National Register of Historic Places. Historic properties that are unevaluated are managed as if eligible, and mitigations for these properties will follow management prescriptions as specified.

A system of site evaluation has been developed to classify existing historic properties according to the type of management required. The following list of management prescriptions was developed for heritage properties on NFS lands (defined in table 3.20 below).

Table 3.20 Management class prescriptions for heritage resources.

Management Class	Prescription
1	Evaluated as Not Eligible. No further need to actively manage.
2	Not Evaluated. Property must be protected and preserved as if eligible. Protect historic property through avoidance.
3	Evaluated as Eligible to the National Register. Project will have No Effect on property. Property must be protected and preserved as defined by Regulation. Protect historic property through avoidance.
4	Evaluated as Eligible. Project will have an Adverse Effect on property. Property must be protected and preserved as defined by Regulation. Protect historic property through avoidance.

Management class 2 sites must be protected and preserved as is. There are two protection options available. Either provisions must be made to avoid direct impacts to the site during the planned activities (e.g. delete entire unit or a sufficient amount of the unit to avoid impacts to the site) or if it is determined this is not a viable option, a plan for

mitigating the adverse effects to the site must be developed with the Heritage staff. There are several mitigation options that can be explored including, research, interpretation, public education, site enhancement or a combination of these and other options. The State Historic Preservation Office (SHPO) concurs with these actions.

Having a buffer left around each one of the sites will protect the management class 2 sites. The size of the buffer will vary based on site-specific circumstances dealing with yarding methods and site vulnerability. With the buffering, each site will be protected. This will reduce the volume available in each unit by a small amount, and may influence how the logs are yarded adjacent to each site.

Cumulative Effects

Because the proposed action will have no effect on heritage resources in the planning area, there are no foreseeable cumulative effects on historic properties.

Special Uses

Introduction

Per 36 CFR 251.50(a), "All uses of National Forest System lands, improvements, and resources, except those provide for in the regulations governing the disposal of timber (part 223) and minerals (part 228) and the grazing of livestock (part 222), are designated as "Special Uses." A special-use authorization is a legal document such as a permit, lease, or easement, which allows occupancy, use, rights, or privileges of National Forest System (NFS) lands. The following report is based on emails received in response to inquiry regarding special uses in the planning area (DiRienz 2007).

Data Collection

The Colville National Forest Special Uses database was queried on August 9, 2007 by Kim DiRienz, Forest Special Uses Coordinator.

Framework

The National Forest Roads and Trails Act (FRTA), October 13, 1964 (16 U.S.C.532-538), which authorizes the Secretary of Agriculture to grant permanent or temporary easements for specified periods or otherwise for road rights-of-way over national forest lands and other lands administered by the Forest Service.

36 CFR (Code of Federal Regulations) 251, Subpart B, provides direction on the process for granting special use authorizations.

Forest Service Manual 2700 – Special Uses Management, Chapter 2730 – Road and Trail Rights-of-Way Grants, Section 2732 – National Forest Road and Trail Act Easements, which delegates authority for granting FRTA easements to the Regional Forester and, with specific delegation, to Forest Supervisors.

Issues, Direction, and Measures

Issues from Public Input

- None identified

Direction from Framework, Purpose, and Need

Minimize impacts to existing Special Use Permits and coordinate granting of future permits during the lifetime of the project.

- See Recreation Opportunity Spectrum discussion below; also see Scenery section page227, and Roads section page 125
- Measure: Qualitative assessment

Existing Conditions, Direct and Indirect Effects

The only two authorizations within the planning area are Forest Roads and Trails Act (FRTA) easements issued to Ferry County. One is for South Fork of St. Peter Creek Road also called County Road 584 (T38N, R34E, S29). The other is for Lambert Creek Road also called County Road 546 (T37N, R33E, S1).

There is potential for impacts to these roads if and when roads are blocked or traffic diverted due to prescribed fires or timber harvest. Design elements would be employed to minimize any inconvenience (Chapter 2, page 41). Closures, maintenance or traffic flow impacts on the County road easements should be coordinated with the County Public Works Department. No road closures are anticipated.

Cumulative Effects

Special-use permits pertaining to county roads are likely to continue with no change into the future. Short-term special uses for specific events are analyzed on a case by case basis. There are currently no pending special use permits in the planning area awaiting analysis. Because the planning area has no formal campgrounds, it is not anticipated that short-term event special use permits would increase over the very infrequent levels we see today.

The pending timber sale by BLM on the Lambert Creek Road could involve temporary road closures. That sale is anticipated to begin in fall of 2007, and will most likely not overlap in time or space with the proposed action.

An application for right of way status on an existing unauthorized road to access private land was submitted in May of 2008. To date, this has not been permitted. Access on this road will have no bearing on potential road closures or the project.

Public Health and Safety

Introduction

There are a substantial number of health and safety hazards to Forest Service employees and private contractors involved with carrying out the proposed action. There are no hazards identified that are unusual or unique to the MEL project. The health and safety hazards to Forest Service employees and contractors are addressed by the USDA Forest Service Health and Safety Code (Forest Service Handbook 6709.11), and by Occupational Health and Safety Administration (OSHA) requirements. Analyses of these health and safety hazards are not repeated here. The following report is excerpted from the Fire and Fuels and Roads reports located in the project analysis file (Green et al 2008, Holt 2008).

Framework

The Forest Plan (p 4-55 and 4-56) directs that the Forest provide and maintain public road and trail access to NFS lands with user safety as the primary emphasis. It also allows for seasonal or long-term road and area closures where necessary to protect public safety.

The Forest Plan (p 4-59 and 4-60) directs that fuel treatments will conform to air quality guidelines.

The United States Clean Air Act of 1963 as amended (42 USC 1857) provides for the protection and enhancement of the nation's air resources.

The Washington State Clean Air Act, revised in 1995 provides direction for State Implementation and State Smoke Management Plans. The 1995 revision exempted "emissions from silvicultural burning that is conducted in eastern Washington for the purpose of restoring forest health or preventing the deterioration of forest health" from the Clean Air Act emission reduction targets.

The Washington State Department of Natural Resources 1996 Smoke Management Plan serves to coordinate and facilitate statewide regulation of prescribed outdoor burning on lands managed by the Department of Natural Resources, on unimproved federally-managed forest lands, and participating tribal lands to meet the requirements of the Washington Clean Air Act (RCW70.94), Forest Protection laws (RCW 76.04), and the United States Clean Air Act (42 USC 7401 et. seq.).

Issues, Direction, and Measures

Issues from Public Input

Concern that smoke produced by use of prescribed fire in the MEL project will affect the public.

- See Smoke discussion
- Measures: Qualitative Smoke discussion below

Direction from Framework, Purpose, and Need

Provide access on open NFS system roads as long as public safety is not compromised.

- See Increase Traffic, and Improved Road Safety discussions below
- Measures: Qualitative

Existing Conditions, Direct and Indirect Effects

Smoke

Washington State is divided into Airsheds, and imposes guidelines for Washington's Class I Airsheds including restrictions on prescribed burning during weekends from July 1 through Labor Day. Specific prescribed burning restrictions during this period of time are based on distance from the Class I area, the nearest Class I Airshed is the Pasayten Wilderness in the Okanogan National Forest, approximately 70 air miles to the west of the planning area. No restrictions are placed on prescribed burning occurring more than 60 air miles from a Class I Airshed. Since the proposed prescribed burning treatments in the MEL planning area are approximately a 70 miles distance from the Pasyaten Wilderness and prevailing winds move smoke away from the Pasayten, effects to Class I Airsheds will not be analyzed for this Environmental Assessment.

The Washington State Department of Natural Resources (DNR) manages that air quality of the State by regulating the quantity of burning throughout the year. Prescribed fire planned by the Forest Service must be approved by DNR Smoke Management before ignition. The DNR takes into account atmospheric circulation patterns to determine trajectory of smoke emissions and how quickly smoke dissipates to harmless levels. When regional haze, and, or particulate counts accumulate to predetermined limits, additional smoke emissions are prohibited.

Managing smoke from prescribed fire involves timing and cooperating with the weather to minimize the impacts of smoke. The Republic Ranger District's burning program takes place when fuels and weather conditions meet predetermined prescription parameters. The burning of either logging slash or natural fuels is done primarily in the dry periods of spring and fall, with the exception of pile burning which will take place after adequate moisture in the fall. In any year, the burning program may involve ignitions on an average of 12-20 days in a year. Burn days are chosen when winds will move the smoke out of the planning area and dissipate it. Ignition typically ceases by late

afternoon so the smoke from burning that lingers overnight generally shows in a "mid-elevation" inversion layer within the valleys. Inversions generally break up mid-morning and the smoke dissipates upward. Smoke from prescribed fire use settling into the valley bottoms is rarely seen.

It is not expected that visibility would be reduced to the extent that driving safety would be impaired. Signing is done along roads in the vicinity of burns to alert motorists that smoke may be seen and is from a legitimate source. Additional signing and posting traffic control personnel is another option in the rare event of smoke becoming a traffic hazard. If such an event should ever occur, its duration would likely only be a matter of hours.

Valley-bottom smoke can adversely affect the breathing of a small number of susceptible individuals. The Forest Service routinely announces to the public in advance when burning is to take place, so that susceptible individuals can take the necessary precautions to avoid adverse health effects. Most prescribed fire treatments adjacent to private property will be pile burning in the late fall. There may be impacts from underburning in the remainder of the planning area. These would be mitigated by notifying landowners through letters and phone calls when their residence may be affected.

Dust

During dry periods when unpaved roads are used in conjunction with any activity associated with the project (especially log hauling), dust will occur. In most cases, dust is not considered a serious health and safety hazard. However, in severe instances (which are occasionally associated with log hauling), visibility can be severely reduced, and breathing, especially in certain individuals, can be adversely affected. Signage would be posted by the contractor during periods of haul to alert users that logging traffic is to be expected. Dust abatement methods would be employed on FS roads at the discretion of the Sale Administrator. Coordination with Ferry County regarding County roads will help to mitigate impacts to some degree.

Increased Traffic

Implementation of the proposed action would increase traffic on roads within, and leading to, the planning area. By a small amount, this added traffic increases the chance of vehicle accidents. Signage would be posted by the contractor during periods of haul to alert users that logging traffic is to be expected. Flaggers will be used on an as needed basis.

Logging Hazards

The general public is routinely advised (with warning signs) to stay out of active logging areas. Where logging occurs along main open roads, the Timber Sale Contract contains provisions to protect the public while passing through the logging area. As a result, the risk to the general public from logging (other than traffic hazards discussed above) is very small. Such hazards include falling trees, debris on roadways, rolling rocks or other material, and encounters with moving logging equipment.

Prescribed Burning Hazards

The general public is routinely advised (with warning signs) to stay out of active prescription burn areas. During aerial ignitions, no one is allowed inside the ignition area. As a result, the risk to the general public from prescribed burning operations is very small. In addition to smoke (discussed above), the health and safety hazards to members of the public who enter active burn areas include being burned, being hit by falling trees or rolling material, stepping into stump or root holes, or being hit (and, or burned) with flammable materials used to ignite prescribed fires.

Weed Treatments

Health and safety effects from treating noxious weeds are found in the Invasive plant final Environmental Impact Statement, Pacific Northwest Region (2005). Appropriate notice and signage is used during noxious weed treatments to alert public of the ongoing activity.

Improved Road Safety

Public safety on Forest roads would be improved following timber sales. Roads that are reconstructed for timber sales that are to be open to public use following the timber sale include measures to enhance public safety (i.e. wider curves, more frequent turnouts). In addition, road maintenance is accomplished on all roads used for timber sales, resulting in improved visibility and smoother running surfaces.

Reduced Wildfire Risk

Implementing any of the hazard-fuel management actions will result in reduced risk of large wildfires that can threaten public health and safety.

Cumulative Effects

The proposed action is unlikely to pose adverse cumulative effects from smoke. In general, smoke emissions from prescribed fire use are occasional short-term events that disappear in the large-scale motions of daily wind and rain. Cumulative effects of the smoke in the atmosphere are negligible since natural atmospheric processes work to rid the air of particulates over time. State and national air quality regulations work to limit the rate of emissions so the production of particulates does not exceed the natural cleansing processes of the atmosphere. Permissions are granted for prescribed fire use emissions only after ambient air quality is considered. In other words, the everyday activities that produce vehicle exhaust, dust, home wood stove smoke and other emissions are taken into account before smoke from forestry and agricultural burning is permitted.

Contributions toward global warming from forest removal have been discussed in regards to climate change. An article donated by the public “A plan to keep carbon in check,” (Socolow and Pacala, Scientific American 295:3) lists stopping all deforestation as one method for reducing the future output of carbon emissions. Carbon dioxide is a major green house gas thought to be contributing to climate change. Deforestation is not, however, defined in the article, but is assumed to mean removal of all trees on a site. The

accompanying use of fossil fuels for extraction of trees would add, in part to global warming as defined by this article. However, deforestation in the sense that all trees are removed would not occur in the proposed action.

Based on a recent Scientific American article (Schultz 2008), forests dominated by large trees sequester more carbon than ones comprised of many smaller trees. Hurteau et al. (2008) concluded that dry type forests "thinned to approach pre-settlement tree density and stand structure harbor substantially more carbon after wildfire than adjacent dense stands that have not been thinned. Moreover, the biomass removed by thinning is available for wood products or energy generation, the latter replacing fossil-fuel emissions…" Treatments to remove the majority of small-diameter trees and manage for large trees preserve more carbon in forests because when they burn, less carbon is catastrophically released as smoke, and therefore contributes less to green house gasses (Hurteau et al. 2008).

Economics

Introduction

Due to the fluctuations of the value of timber, price of fuel, salaries, and other expenses, this project is based on current rates as of September 2007 and includes a 4.0 percent annual interest rate. The following report is excerpted from the Economics report located in the project analysis file (Davis and Jones 2008).

Data Collection:

Data was taken from stand exam surveys and field reconnaissance and entered into the Region 6 LOGCOST program for determining logging cost up to and including loading trucks at the landing (in other words, it includes felling costs and stump-to-truck costs). Results from this program and costs from other parts of the project were then entered into the Region 6 TEA.ECON program to determine the economic viability of the Malo East Lake Fuels Reduction project. Current market prices were collected from a local mill to help determine the value of the logs delivered to market. The outcome includes cost of transport to the mill.

Framework

Forest Service Manual 1900, chapter 1970; directs us to conduct an economic analysis as a tool to aid the decision maker. Forest Service Handbook 1909.17 guides us as to how the economic analysis should be done.

Issues, Direction, and Measures

Issues from Public Input

- None identified

Direction from Framework, Purpose, and Need

- None Identified

Existing Condition, Direct and Indirect Effects

The proposed action would generate if fully implemented, approximately 12 million board feet of timber (23,700 hundred cubic feet) to the local mill. If all portions of the project are implemented, the project would not generate revenue in excess of costs. The degree of deficit is variable on a week to week basis due to fluctuations in the lumber market, gas prices and other costs.

Returns to the treasury from receipts from selling timber are $0.50 per thousand board feet (MBF) or $0.26 per hundred cubic feet (CCF) and is the minimum distribution that is mandated. The remaining receipts can be distributed to the Roads and Trails Fund (10 percent), the Salvage Sale Fund, KV-SAI (Knutsen-Vandenberg Sale Area

Improvements), and Retained Receipts under stewardship contracts. Typically, the distribution in order of priority is mandatory returns to treasury, roads and trails fund, salvage sale fund, mitigated sale area improvements, and remaining sale area improvements. Retained receipts under stewardship contracts generally take the place of sale area improvement funds. Brush disposal and road maintenance are included as a cost to the project for all commercial units.

Table 3.21 Economics Summary

Activity	Value (Cost)
Logging Cost	($2,066,000)
Road Construction/Reconstruction/Road Use Fee	($153,000)
Mitigations (Riparian)	($23,000)
Fuels Disposal (all)	($3,054,000)
Delivered Product Value 12 MMBF	$4,750,000
Net Project Value	**($546,000)**

The table above shows the approximate volume of timber the project will remove, the logging cost to remove that volume, construct and reconstruct roads, implement mitigations, and fuels treatments for the commercial units, the commercial product value.

While the sale project generates value that can be used for other projects, the sale would not be able to pay for all of the projects identified. Some projects may not be funded and possibly dropped or other funds would need to be used to accomplish projects.

Retained receipts from other stewardship projects may be a possible source of funding for projects. Currently, there is not a large pool of funds to use.

Cumulative Effects

A project this size within Ferry County would provide employment and additional income through contracts. In addition to other projects within Ferry County, this would provide a fairly large project for long-term contracts.

Other Required Analyses

Effects on Consumers, Civil Rights, Minority Groups and Women (Includes Environmental Justice Analysis)

The action alternatives would contribute to consumers, but only in a limited capacity. All action alternatives would provide wood products to one or more area sawmills, thus contributing raw materials that would become available to consumers.

All contracts and employment offered by the Forest Service contain Equal Employment Opportunity requirements. Therefore, no adverse or discriminatory effects to Civil Rights, Minority Groups or Women are expected with regards to access to federal contracts or jobs.

Environmental Justice means that, to the greatest extent practicable and permitted by law, all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner by, government programs and activities affecting human health or the environment. In examining the MEL project, there are two potential "populations" that may be affected: Tribes of the Colville Reservation and low-income residents of Ferry County.

Tribal Interests

The Confederated Tribes of the Colville Reservation reserve hunting, fishing, and gathering rights on the North Half of the Reservation, which includes the MEL planning area. The Confederated Tribes of the Colville Reservation were included in project scoping and thus were informed and invited to consult on the project and the proposed actions. There was no response received from the Tribal Council or any tribal members.

There may be some effect to access because 5.5 miles of road are proposed or closure. However, hunting may be improved as mule deer habitat would be improved and sight distances increased in treated stands. Traditionally gathered plants may be improved with the opening of closed forest canopies and reintroduction of fire. Fishing would not be affected.

The Spokane Tribe and Kalispell Tribe of Indians were also contacted by letter on three occasions. There was no response received from the Tribal Council or any tribal members.

Low Income Residents of Ferry County

Ferry County has some of the highest unemployment and poverty rates in the State of Washington. In 2004, the Ferry County poverty rate was 17.8 percent compared to the overall Washington State rate of 11.6 percent (U.S. Census Bureau 2007). The average

annual unemployment for September 2007 in Ferry County was estimated by the State at approximately 5.9 percent verses 4.8 for the State of Washington and 4.6 for the Nation (Workforce Explorer, Washington). Similarly median household income in 2004 was approximately 63 percent of the Washington State average (U.S. Census Bureau 2007).

Changes in the availability of firewood would likely affect low-income residents more than others because alternate sources of heat are more costly. The MEL project would temporarily open several roads for timber harvest, and leave some of these roads open for a short firewood-gathering period. Firewood (downed wood that has been behind road closures, and logging slash created by the project) would be more available for a few years as a result of the MEL project.

Effects on Farmland, Rangeland and Forestland

The Malo East Lake planning area (National Forest System lands) contains no farmland. Effects to rangeland and forestland are discussed in the resource reports and the environmental assessment beginning on pages 215 and 96 respectively. There are prime timberlands scheduled for treatment in the proposed action. However, treatments are not expected to adversely impact productivity or remove acres from the “prime” forest landbase. No "prime" rangelands occur in the planning area as defined in Forest Service Handbook 1909.15, section 65.21.

Effects on Wetlands and Floodplains

Wetlands occupy very small areas within the planning area; however, they play an important role in moderating peak flows and sustaining baseflows, especially during periods of drought. They also provide specialized aquatic habitats for wildlife as well as water for cattle. See the Hydrology (page 147) and Riparian and Fisheries (page 163) sections of this report for an evaluation of effects.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

The proposal is intended to restore and maintain sustainability and long-term productivity. Short-term and long-term effects are discussed for the various subjects in the Discussion of Effects from the Proposed Action section of this Environmental Assessment.

Unavoidable Adverse Impacts

Either by implementing the proposed action, or taking no action, complete prevention of noxious weeds invading disturbed soils is not possible. Mitigation measures are prescribed that would be expected to substantially prevent weed invasion onto new sites, and to reduce weed spread from existing noxious weed infestations. Foreseeable unavoidable effects from the Malo East Lake project would occur if noxious weed populations become established behind road closures in the Art Creek basin area. This is because this area currently has very little disturbance and little access by motorized vehicles and cattle which potentially spread noxious weeds seeds. Additional discussion

of effects on noxious weeds is included in the Noxious Weed Report in the project analysis file (Fletcher 2008).

Soil compaction and erosion as a result of logging is unavoidable. Sediment from soil-disturbing activities reaching streams is unavoidable. Many of these unavoidable effects are substantially mitigated by Design Elements (Chapter 2, page 41), and Best Management Practices (Appendix B). Further discussion is included in the Soil and Watershed Reports in the project analysis file (Glines 2008; Coates 2007).

Smoke from burning forest fuels is unavoidable. By burning within prescription parameters documented in project Burn Plans, potential adverse effects will be substantially reduced. Adverse air quality effects from prescribed burning will be substantially less than would result from the same forest fuels burning under wildfire conditions. For more discussion about smoke and air quality effects, see the Fuels Report in the project analysis file (Green et al. 2008).

Changing forest stands from multi-story with large trees to single-story with large trees will adversely affect old growth-dependent wildlife species that prefer multi-story old-growth stand conditions. These changes will, however, benefit species that prefer single-story large tree stand conditions. It should be noted that in all cases, the change from multi- to single-story stand conditions is proposed in biophysical environments where multi-story large tree stands are within or above the level needed to support dependent wildlife, but the amount of single-story large tree stands is below the historic range of variability and may not be sufficient to support dependent wildlife. For more discussion, see the Management Indicator Species report in the project analysis file (Loggers 2008b).

Snags and downed logs will be unavoidably lost as a result of timber harvest and prescribed burning. However, sufficient numbers will be left, and replacement cavity nesting trees created so that Forest Plan standards (including Eastside Screens) will be met, and additional snags and downed logs will be created by prescribed burning and subsequent secondary tree mortality. Regardless, adequate snags and down logs will be retained to meet Forest Plan standards and thus maintain viability of dependent wildlife species. For more discussion, see the Management Indicator Species report in the project analysis file (Loggers 2008b).

Some extent of noise and evidence of harvest or fire is an unavoidable effect of this project. However, the Forest Plan identifies specific visual and recreational objectives across the Forest. These values will be maintained in the proposed project (Bodie 2008a and Bodie 2008b).

Irreversible and Irretrievable Commitments of Resources

The term “irreversible commitment of resources” refers to actions that disturb a nonrenewable resource or a renewable resource to the point that renewal can occur only over a long period of time, and, or at great expense. “Irretrievable commitment of

resources" is the loss of production or use of renewable resources because of an allocation decision.

Fuel reduction work proposed in the Malo East Lake Fuels Reduction project is not expected to have any irretrievable or irreversible effects.

Live trees equal to or greater than 21 inches in diameter would be retained in all alternatives as per direction from the Eastside Screens, no matter how severely infested with disease it may be. Leaving large mistletoe infected trees in the stand would encourage spread of the disease. In some cases, negative effects from leaving the large mistletoe infected overstory can be minimized by managing the residual understory stand for a resistant species (dwarf mistletoes are generally host specific, meaning infection spreads only to trees of the same species). But this may not be possible without even-age or regeneration harvests. Loss of large trees to disease would result in reduced wood fiber production, an irretrievable effect.

There is no irreversible and irretrievable commitment of aquatic resources associated with the MEL project. This includes the fish populations, the fish habitat, and the INFISH Riparian Management Objectives.

Roads represent an irretrievable commitment of resources. The proposed action would construct 1.6 miles of new system roads. These new roads would become part of the forest transportation system and are considered an irretrievable commitment of resources (soil, timber production). These resources are only restored to natural conditions after long periods of time and are considered irreversible.

Regardless of soil type and site conditions, detrimental soil compaction and displacement always occurs on roads and landings. The construction of roads and landings is considered an 'irreversible effect' on soil productivity as described in 40 CFR 1502.16. Roads and landings can be obliterated and some productivity restored; however, full productivity would not be restored for many years until organic matter is restored, soil tilth has redeveloped, an A horizon develops, and soil processes are restored (Foth 1984).

The main tractor and cut-to-length trails are likely to remain compacted for a long time and probably constitute an 'irreversible effect' on soil productivity as described in 40 CFR 1502.16. Areas of very light tractor skidding (single pass, over slash, dry conditions), or light cut-to-length use (1 to 3 passes, over very good slash bed) are expected to de-compact over a period 30 to 50 years.

There are no irreversible or irretrievable effects to Sensitive plants associated with the MEL Project.

There is no irreversible, and, or irretrievable effect concerning range management from the Malo East Lake Project if design elements are implemented.

Conflicts with Objectives of Other Land Management Plans, Policies, and Controls

There are no known conflicts with the objectives of other land management plans, policies, or controls.

Unique Characteristics of the Geographic Area

The Malo East Lake planning area contains no unique characteristics or features. There are no park lands, prime farmlands, wild and scenic rivers, ecologically critical areas, congressionally designated areas (such as wilderness, wilderness study areas, or National Recreation Areas), Research Natural Areas, or municipal watersheds. There is one inventoried roadless area, but there would be no effects to its roadless character. The area does contain steep slopes and highly erosive soils, threatened or endangered species or their habitat, floodplains and wetlands, and cultural sites; however, the effects to these resources have been examined in the Environmental Assessment, and there is nothing noted about these features that would suggest that they are unique, or that associated effects would be significant.

The Degree to which the Effects are Highly Uncertain or Involve Unique or Unknown Risks

There were no highly uncertain, unique, or unknown risks identified in any of the effects analyses conducted for the MEL project.

The Degree to which the Action may Establish a Precedent for Future Actions with Significant Effects

None of the actions proposed in the MEL project set precedents. The Republic Ranger District has been conducting timber sales and prescribed burns for years; many of which are similar in scope and nature to those proposed in the MEL project. Recent examples of timber harvest thinning and prescribed underburning similar to the MEL project include Lone-Deer Ecosystem Management Projects, Scatter Ecosystem Management Project, Trout Vegetation Management Project, and Vulcan Vegetation Management Project, which have been in various stages of implementation since 1996.