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Environmental Assessment

Grass Flat Fuels Reduction and Forest Health Restoration Project

Feather River Ranger District of the Plumas National Forest
Plumas County, California

Figure A. Scenic viewpoint from the south shore of Little Grass Valley Reservoir within the Recreational Area providing connectors to the Pacific Crest Trail and featuring Bald Mountain in the background.

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Grass Flat Fuels Reduction and Forest Health Restoration Project

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Grass Flat Fuels Reduction and Forest Health Restoration Project

Introduction

Document Structure

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

- *Chapter 1 Introduction:* This section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public and how the public responded.
- *Chapter 2 Comparison of the Alternatives, including the Proposed Action*: This section provides a more detailed description of the agency's proposed action as well as the alternative methods for achieving the stated purpose. This action alternative was developed based on issues raised. This section provides a summary table of the environmental consequences associated with the no action and action alternative.
- *Chapter 3 Environmental Consequences:* This section describes the environmental effects of implementing the proposed action. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the no action alternative that provides a baseline for evaluation and comparison of the alternatives that follow.
- *Chapter 4 Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.

Planning for the project will use the pre-decision Administrative Review Processes (36 CFR 218) under the authority of the *Healthy Forest Restoration Act* of 2003 (HFRA).

Project Location

The Grass Flat project area borders the Little Grass Valley (LGV) Reservoir and lies roughly 3 air miles northwest of the community of La Porte, California, on the Feather River Ranger District, Plumas National Forest, in Plumas County. It is within sections 10, 11, 15, 17, 19, 20, 21, 22, 23, 27, 28, 29, 30, 31, 32, 33, and 34 of T22N, R9E, sections 24 and 25 of T22N, R8E, and sections 3, 4, and 5 of T21N, R9E, Mount Diablo Meridian (MDM).

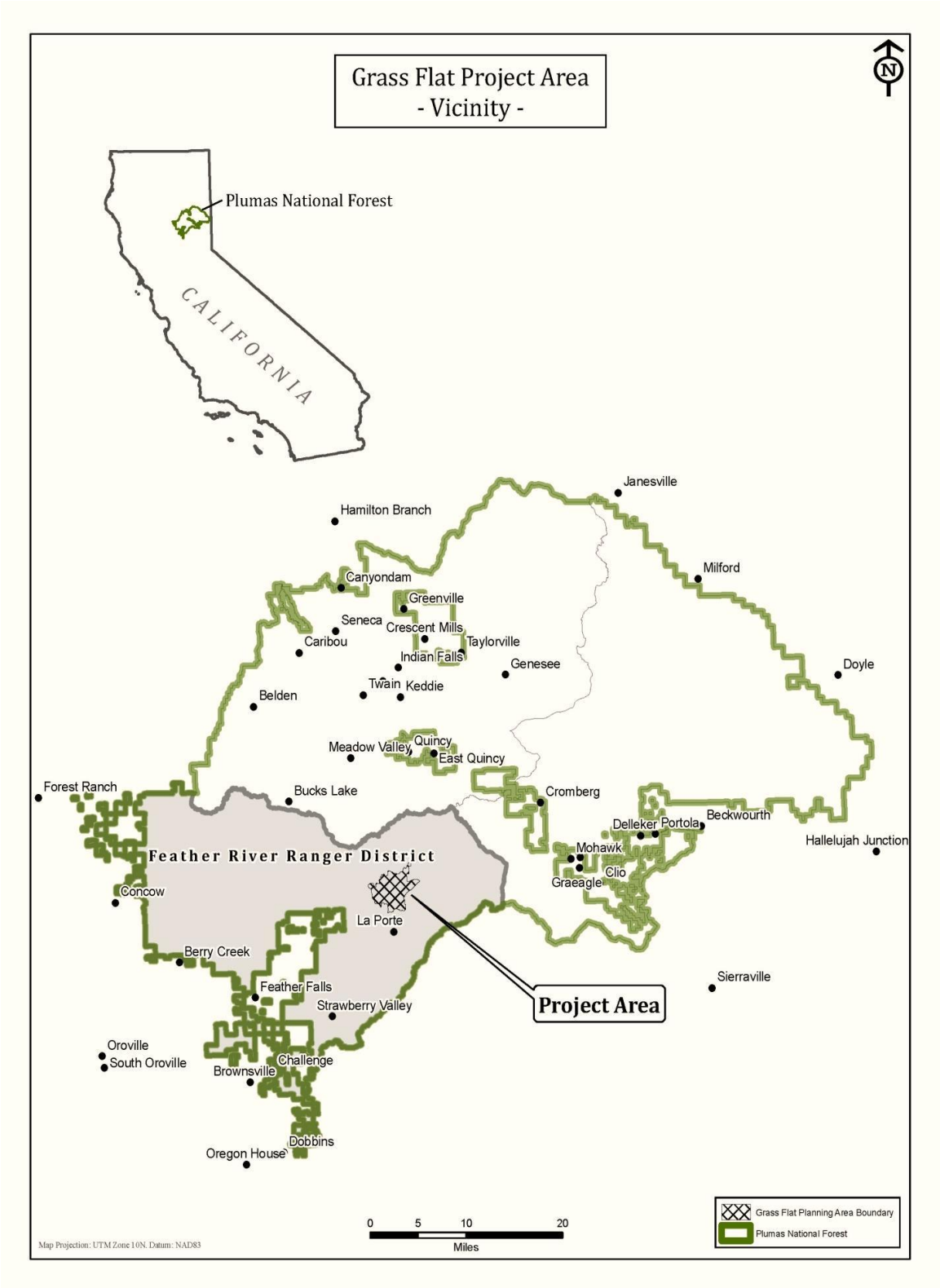


Figure 1-1 Grass Flat Project Area; Vicinity Map

Chapter 1 Purpose and Need for Action

1.1 Introduction

The Purpose and Need explains why an agency action is necessary and is the basis for identifying reasonable alternatives. The Forest Service developed "purpose and need" statements to fulfill the *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act), designed to test and demonstrate the effectiveness of certain fuels and vegetation management activities in meeting fuel-reduction , ecologic, and economic objectives.

The need for action described in the the following section is based upon field data and analyses further described in the Grass Flat Fuels Reduction and Forest Health Restoration Project Environmental Assessment (EA); chapter 3 - Affected Environment & Environmental Consequences, the appendices and associated resource reports and biological assessments.

1.2 Purpose and Need

The following subsections present the four Purpose and Need statements for the Grass Flat Fuels Reduction and Forest Health Restoration Project (hereafter Grass Flat Project):

1. Reduce the risk to natural resources, the rural community of La Porte, and adjacent communities by modifying hazardous fuels conditions.

This project responds to the need for reducing surface fuel loading while reducing lower and mid-level tree densities in the project area to establish defensible fuel profile zones (DFPZs). Reducing select overcrowded, forests and dense brush (surface, ladder and canopy fuels) that have become increasingly flammable with age is needed to lower elevated risk of wildfire to natural resources, the Little Grass Valley (LGV) Recreation Area infrastructures and visitors, and the nearby outlying communities of LaPorte. DFPZs are strategically placed, linear strips of land approximately ¼ to ½ mile wide where fuels are reduced to effectively interrupt potential fire spread. The Grass Flat Project would establish DFPZs connecting the Bald Onion DFPZ (to the north), proposed Sugarloaf DFPZs to the south, dispersed defensible space established by the private landowners and other completed small scale fuels reduction projects around La Porte.

Approximately 85 percent of the Grass Flat Project lies within the wildland urban interface (WUI). The total population in and adjacent to the Project Area is approximately 400 people, with hundreds of scattered homes and structures. The La Porte area homeowners have voiced their concerns over nearby fire hazards on NFS lands during Fire Safe Council/Forest Service public meetings. La Porte is identified as a "community at risk" from the threat of wildfire in the Plumas County Wildfire Protection Plan (CWPP).

The Grass Flat Project area falls predominately within the Lower-Montane ecological zone. Elevation ranges from approximately 4,600 feet to 5,700 feet in the treatment units. Tree species in the analysis area include mixed conifer-white fir and true fire stands; predominate species white fir (*Abies concolor*) and red fir (*Abies magnitica*) other species include; incense cedar (*calocedrus decurrens*), sugar pine (*Pinus lambortana*), Jeffrey pine (*Pinus jeffreyi*) and Douglas-fir (*Pseudotsuga menziesii*). Historically in these vegetative types, fires burned with low to moderate intensity, reducing fuel accumulations and vegetation density (Sugihara et al. 2006).

Current fire regimes are removed from the historic reference condition due to fire suppression and past timber management practices. As fire cycles are skipped, fuels accumulate and less fire resistant, shade tolerant tree species grow in forest understory.

The current conditions in the analysis area as described above are similar to those conditions which could lead to high-severity fires within the vicinity of the analysis area, such as the 1999 Devils Gap fire. Of particular note, 85 percent of the NFS lands within the analysis area are in condition class 3 where "vegetation composition, structure, and fuels have a high departure from the natural fire regime and predispose the system to high risk of loss of key ecosystem components." (Hann W.J. and Strohm D.J. 2003).

Figure 1-2 Fuel Hazards - Thinning of diseased lodgepole in 2009 in the LGV Recreation Area demonstrates the need for further fuels reduction.

Fire exclusion, past harvesting practices, and changes in various other land practices have decreased the incidence of historic low to moderate intensity fires, allowing for a build-up of surface and canopy fuels, as seen in Figure 1-2 at right.

Fires burning in dense over-crowded stands, such as the Devils Gap Fire, have greater potential for crown fire. In addition to the potentially larger more intense fire, impassable roads, distance of travel for second alarm resources, and steep inaccessible canyons make rapid access to fires on the Feather River Ranger District a problem for suppression resources.

Desired Condition. Approximately 1,815 acres of DFPZs are proposed for construction along ridgetops and roadways to improve accessibility to firefighters and provide strategic locations to initiate fire suppression activities while providing protection for communities at risk. The Defensible Profile Zone (DFPZ) is an all-aged multistory, fire-resilient forest, consistent with the 1999 HFQLG ROD/FEIS, Appendix J. The DFPZ would appear as open stands dominated by large fire resilient trees with crowns sufficiently spaced to limit the spread of crown fire. Smaller trees may be present in small clumps or individually. Surface fuels on the forest floor would be sparse with the exception of occasional large down logs.

DFPZ treatment key design features <u>within</u> the Little Grass Valley Reservoir Recreation Area developed campsites:

- Remove all snags, structurally unstable or unhealthy trees that could threaten the safety of campers and visitors (see EA; section 2.3, design measures mitigation measures and appendix A); hazardous trees ≥ 30 inches dbh would be removed only for public safety and operability.
- Decrease surface fuel loading (small diameter material < 3 inches) to 0-1 ton per acre within developed campsites to achieve flame lengths <4 feet at head of fire burning, under high fire weather conditions.
- Maintain where available 10-15 tons per acre of the largest down logs ≥20 inches diameter breast height (dbh), 10 feet or greater in length (approximately 8-12 logs/acre); selectively place as barriers to protect native plants (particularly wet meadows, seeps and streams), to restrict motor vehicle access and to create visual screening between campsites.
- Increase canopy base heights by removing surface and ladder fuels up to 10 inches dbh to achieve a minimal canopy base height of 15 feet.

DFPZ treatment key design features outside the Litte Grass Valley Reservoir Recreation Area developed campsites:

- Retain all live trees ≥ 30 inches dbh, except to allow for public safety and operability.
- Reduce forest canopy cover to 40 percent; except in California Wildlife Habitat Relationship (CWHR) classes 5M and 5D key habitats (trees >24 inch dbh; M = Moderate Cover (40-59 percent canopy closure) and D = Dense Cover (greater than 60 percent canopy cover) to support flame lengths <4 feet at head of flame front and increase canopy base heights to a minimal canopy base height of 15 feet.
- Decrease surface fuel loading (small diameter material less than 3 inches) to 5 tons per acre or less.
- Maintain where available 10-15 tons per acre of the largest down logs ≥20 inches diameter breast height (dbh), 10 feet or greater in length (approximately 8-12 logs/acre).
- Leave 4 of the largest snags larger than 15 inches dbh per acre. Consider leaving fewer snags strategically located in DFPZ treatment areas within the wildland urban interface (WUI); depicted in Figure 1-3.

Measurement indicators:

- Flame length, feet (the length of a flame from ground to tip)
- Canopy base height, feet (average tree crown base height)
- Fire type (surface fire, passive or active crown fire)

To better understand the fuels reduction/DFPZ connectivity of the proposed action, a landscape scale map is included to depict the relationship to past, present, and proposed treatments designed for fire protection of the La Porte and surrounding communities; illustrated for federally managed land as well as private. See Figure 3 Fuels Reduction/DFPZ Connectivity Map.

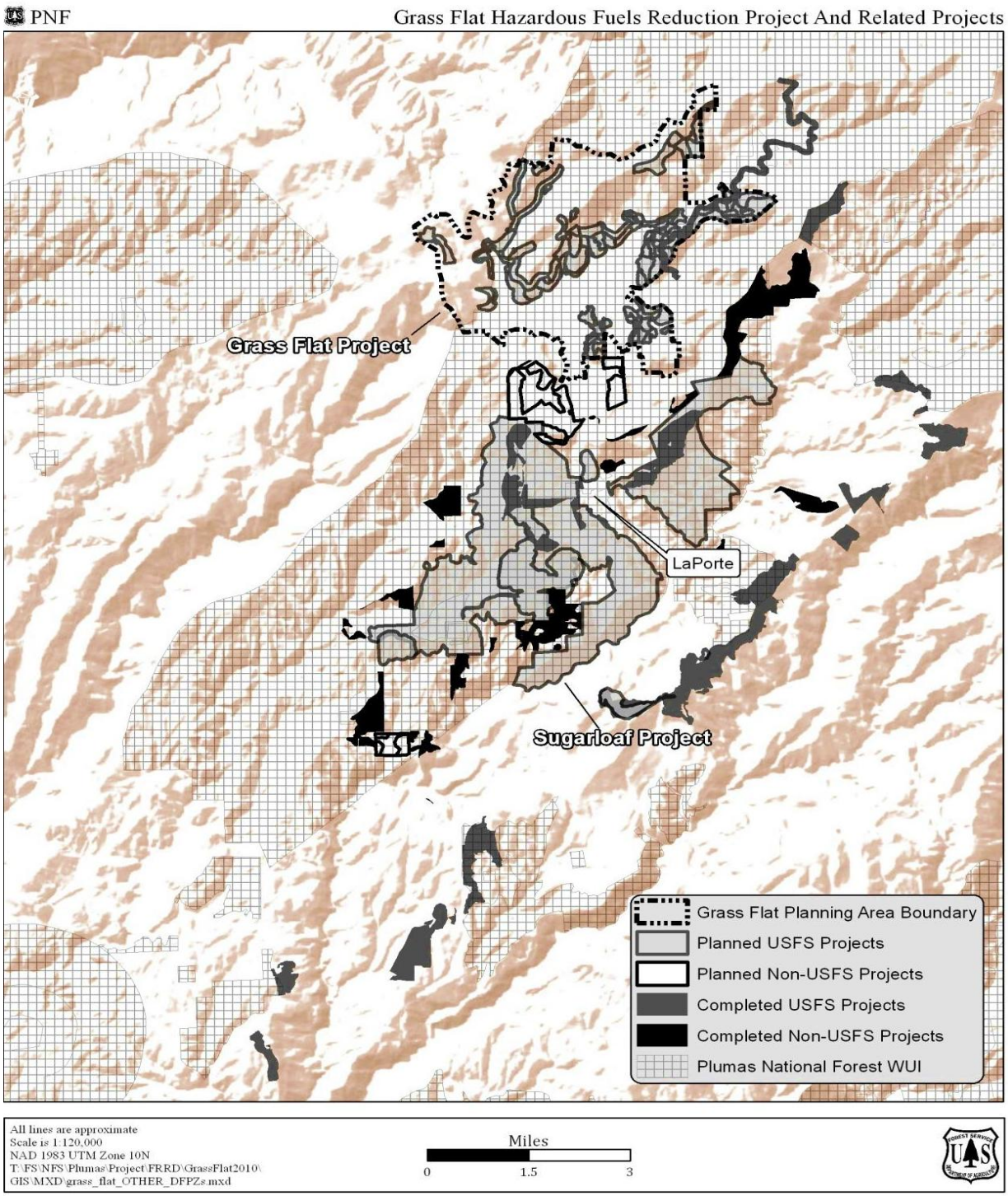


Figure 1-3 Fuels reduction/DFPZ connectivity of the proposed actions to demonstrate the past, present, and proposed treatments within the WUI.

2. Improve forest health to restore the natural recreation settings and scenery aesthetics while providing a safe environment for forest visitors in and around the Little Grass Valley Reservoir Recreation Area.

There is a need for restoring and preserving forest vegetation within and surrounding the campgrounds in the Little Grass Valley Reservoir (LGV) Recreation Area to reduce threats to public safety from tree hazards, while decreasing tree diseases and reducing fuels to restore the natural recreation settings and scenery aesthetics; consistent with the Little Grass Valley Reservoir Recreation Area Vegetation Management Plan (USDA 2008).

The Forest Service is challenged with sustaining adequate high-quality outdoor recreational experiences to meet the needs of forest visitors, while maintaining the ecological integrity of the natural resources. The combination of increasing populations and the continued decline of public access to privately owned forest land create the need or public lands to provide more recreational opportunities.

The LGV recreation area is one of the few developed, lakeside recreational areas administered by the Feather River Ranger District, featuring 7 family campgrounds with 323 campsites, including walk-in tent campsites, recreational vehicle (RV) campsites, double campsites, and traditional single campsites. There is one campground that is designed for equestrian camping. Sites are open from late May through mid-October depending on weather conditions; however, the area is also used throughout the winter by snowmobile enthusiasts as well.

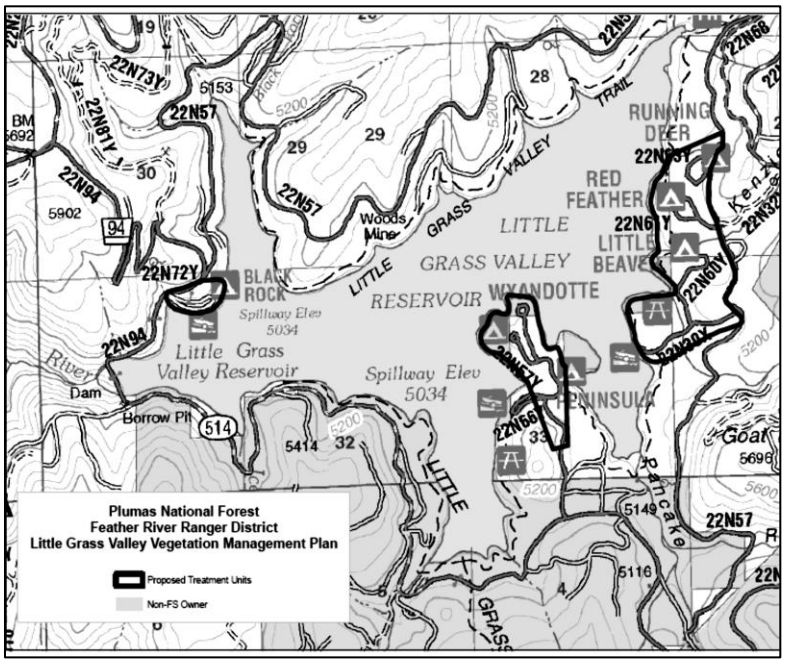


Figure 1-4 Treated areas implemented in 2009-2010 under the Forest Health Protection project was the first incremental step towards achieving desired conditions.

The use of the campgrounds over the past forty years has increased steadily to its present day level with subsequent impacts on the vegetation within and surrounding Little Grass Valley Reservoir. Overcrowded forest conditions are contributing to tree mortality and the potential for an increase of insect and disease activity and dead and down fuel conditions. High densities of trees increase inter-tree competition for water, light, and nutrients and contribute to stressed stand conditions increasing mortality caused by drought, insects, and disease.

Biologic agents such as dwarf mistletoe, root disease, stem decays, and bark beetles have all contributed to increased tree mortality, especially in white fir. Forest health evaluations conducted in the Little Grass Valley Reservoir Recreation Area in 2006 and 2009 identified a root decay caused primarily by *Heterobasidion occidentales* and heartwood decay caused primarily by *Echinodontium tinctorium* in white fir as posing the most serious forest health threat.

The combination of root disease and other biological agents have increased the risk for structural failure and create a hazard to public safety within campgrounds and along roadways and trails. As a result of worsening forest health conditions, recreational areas are experiencing a continual loss of forest cover from valued large trees and increased fuel loading which predispose stands to high severity stand replacing fire. In association with the high levels of disease, human caused disturbances including trampling of vegetation and compaction of forest soils have contributed to lower tree vigor and spread of root disease.

Mechanical injury on many trees is evident as a result of campers hammering nails into trees and cutting trees with hatchets or saws, increasing the trees vulnerability to insect infestations and disease. Heavy foot and vehicle traffic is occurring in and around the campsites, reducing vegetation in many areas and likely resulting in highly compacted soils around tree roots in addition to direct root damage.

Desired Conditions.
Forest health outside the LGV developed campsites. The desired condition for healthy forest conditions feature heterogeneity with horizontal diversity including canopy gaps and open canopy stand conditions favorable for the establishment and development of shade-intolerant pine species, as well as clumps of rare hardwood stands with multi-layered vertical structural diversity.

Forest health inside the LGV developed campsites. The desired condition for healthy forest conditions within developed recreational sites is to create and maintain an aesthetically pleasing, safe, well-maintained developed,natural recreational setting with low fuel loading occupied by vigorous-growing, diverse vegetation and properly functioning intact creeks and streams featuring abundant terrestrial and aquatic wildlife (i.e., deer, bear, bald eagles, osprey, songbirds and fish).

Scenic integrity is high and stable, appearing fully intact; as ecological processes are fully functioning; the transition to a more pine dominated forest is visually evident with preservation and enhancement of large sugar pines.The natural setting features ecologically dynamic vegetative niches where visitors can experience solitude as well as social interactions near accessible facilities. The developed and dispersed campsites are free of resource damage from over-use, accessible to natural features and settings by a variety of methods, dependent upon levels of solitude desired. The trail system provides opportunities for physical and spiritual reconnection with nature, for physical challenge, opportunities for discovery, opportunities to witness and experience the processes of nature.

Forest health along LGV Recreational Area perimeter roadside retention zones. The desired condition is widespread, highly-prized scenic values and character, whereby management of unhealthy vegetation, hazard trees and fuels do not appear visible or obvious to the viewer.

Measurement Indicators:

Recreation:
- Quantity of developed recreation use days affected.
- Number of developed recreation sites affected with closure.
- Miles of trail impacted.
- Qualitative measurement of impacts to the experience, i.e. presence of noise, dust, restricted access, presence of large truck traffic or heavy equipment congestion.

Lands:
- Number of days that would restrict access or use.
- Affects to existing uses of National Forest System lands.

Scenery:
- Degree of deviation from VQO allocation.
- Number of management activities visible from travelways, recreation sites or the PCT**.**

Forest Health
- Stand structure (vertical and horizontal arrangement of trees) Measure: CWHR Size Class.
- Tree Density, Measure: basal area (cross-sectional area of a tree at diameter breast height).
- Species Composition (diversity of tree species found in a given area) Measure: percent of basal area and the ratio of tolerant to intolerant species.

3. Improve watershed health and maintain and restore riparian/aquatic/wildlife habitats.

Since the 1950's past logging, recreational use, roads, and other disturbance activities have altered the natural environment; affecting the hydrologic function of the watersheds and degraded water quality and riparian, aquatic and wildlife habitats.

Logging in riparian areas has destabilized stream banks and deprived channels of large woody debris, resulting in reduced stream habitat complexity and compromised fishery production. Lack of fire has allowed conifer encroachment to alter (lower) water table levels, and caused shifts in vegetative species composition. Several culverts are preventing fish from using otherwise suitable habitat upstream. Particularly near campsites and along trails within the Little Grass Valley (LGV) Reservoir Recreation Area, foot traffic has acted to trample sensitive wet meadows plants and streambank vegetation.

To restore riparian habitats and watershed health there is a need for:
- Removing conifers encroaching and disturbing wet meadow habitats and hydrologic processes;
- Realigning and stabilizing eroding, and restoring diverted streams to a properly functioning condition;
- Upgrading a stream crossing culvert on National Forest System road 22N57, and removing another culvert on a decommissioned road.
- Safeguarding and educating forest visitors about sensitive wet meadows, stream channels and riparian areas, particularly within and adjacent to developed campsites, to lessen anthropogenic impacts to the natural environment.

The PNF Geographic Information System (GIS) shows a total of 84.42 miles of streams (ephemeral, intermittent, and perennial) in the Grass Flat Project aquatic analysis area, including stream reaches through private land within the PNF boundaries. These meadows and wetlands provide a variety of habitats for many species of flora and fauna. Healthy meadows and wetlands filter sediment from water flowing from their vicinity, providing suitably clean water for fish and human use, while providing diverse habitats for aquatic species (Ratliff, 1985).

When roads and associated drainage-control features contribute flow directly to a natural waterbody, they become part of the drainage network and are said to be hydrologically connected (HC). Furthermore, many slope disturbances are linked to the road network and roads are often the pathway for transporting pollutants (e.g. fine sediment) from these other types of disturbances. Hydrologically disconnecting roads by installing or improving road drainage facilities is a fundamental practice for eliminating chronic water quality impacts from roads and other disturbances.

Desired Condition. The desired condition for watershed health and riparian/aquatic/wildlife habitats demonstrates ecologically functioning meadows, streams, swales, ponds, springs, and seeps and other aquatic conditions occupied by diverse native vegetation and high quality surface water, supporting food and shelter for a variety of furbearing animals, amphibians, reptiles, insects, crustaceans, and fish species.

The National Forest System transporation road surfaces are properly aligned to allow for fish passage, stable (minimal erosion) and engineered to accommodate flood events.

Measurement Indicators:

Mountain yellow-legged frog (Rana muscosa):

- Acres of Riparian Habitat Conservation Areas (RHCAs) maintained or improved
- Acres of RHCA habitat quality reduced

Watershed Health (Water Quality) and Aquatic Habitat Condition:

- Threshold of Concern statue by subwatershed rating (1-3)
- Equivalent Roaded Acres (ERA)
- Best Management Practices (BMPs) Effectiveness Evaluations
- Length of Hydrologically Connected (HC) Road Segments
-

Riparian Habitat Diversity and Health

- Meadow and Wetland Vitality
- Stream Channel Continuity and Streambank Stability

4. Contribute to the stability and economic health of rural communities.

There is a need for producing forest products, providing job opportunities and improving the recreational scenic setting within and around the Little Grass Valley (LGV) Recreational Area (public investments) to contribute to the economic stability and health of the town of La Porte and Plumas County. Local factors influencing the economy of Plumas County includes geographic isolation from urban job markets and reliance on natural resource –based industries such as outdoor undeveloped and developed recreation, sale of forest products, logging and reforestation as driving factors supporting seasonal fluctuation of forestry-related employment. There are several local communities within reasonable log haul distance of the project area, highly dependent on the forest products industry for jobs and revenues.

Current declining trends in federal wood products availability (timber sale and stewardship contracts), recent mills closures and loss of jobs within the sphere of economic influence to the project area, coupled with the waning housing market and rising cost of living, has cumulatively resulted in the loss of indirect and induced jobs (1.6 – 2.25 according to IMPLAN documentation in the Sierra Nevada Framework EIS).

The Plumas National Forest (the Forest) contributes to the regional economy in two primary ways: (1) through the generation of income and employment opportunities for residents of the immediate area, and (2) through direct and indirect contributions to local county revenues. The Forest also contributes in secondary ways, such as through fee revenues and production of goods and services in local and regional markets. Although some economic effects are dispersed over a broad area, the most substantial impacts are felt locally in Butte, Plumas, Lassen, Sierra, and Yuba Counties.

Timber production from national forests peaked from the 1960s through the 1980s; plummeting in the last several decades. Because the Forest Service dominates timberland management in the Herger-Feinstein Quincy Library Group (HFQLG) Pilot area, and privately owned timber companies cannot compensate for the decline in timber production from NFS lands, there has been a sharp decline in forestry-related economic activity and employment. Consequently, rural communities have experienced a decrease in jobs and tax revenues associated with forest products.

Recreation opportunities in the forest areas surrounding the town of La Porte contribute to the economic vitality of the community and Plumas County in general. These opportunities are seasonal in nature, but occur year-round and take advantage of the natural forest and lake settings, the presence of historic and cultural remnants, and unique scenery along the Pacific Crest Trail that has regional and national significance to the backcountry and scenic hiking constituency including equestrians.

La Porte is a key stopping place for supplies, food and lodging. Camping, fishing, boating, hiking, mountain bike and OHV trails, scenic auto tours, hunting, snowmobiling and cross country skiing trails are all amenities supporting $130,000-$160,000 in recreation fee revenue annually. Further contributions to the Plumas National Forest budget, town of La Porte and Plumas County include the revenues and taxes paid by outfitter guides that have special use authorizations to operate fishing and hunting guide services at Little Grass Valley Reservoir and in the general forest surrounding the lake and La Porte. Ninety five percent (95%) of the fees collected contribute to managing and improving these facilities and contribute to Plumas County's tax revenue stream.

The forest road network surrounding the reservoir and extending east toward Onion Valley provides the foundation for the Feather River Ranger District's winter snowmobile program. This program leverages $22,000 of State of California Off-Highway Vehicle (OHV) funding, District appropriated funds with generous volunteer labor hours and private equipment contributions.

Desired Condition. The desired condition for community stability is local economies are supported by environmentally sustainable use of NFS land natural resources and recreational infrastructure amenities, including outputs of sustained timber yield and biomass supplies, use fees, indirect revenues from visitor support services and family wage jobs.

Measurement Indicators:

Revenue/Cost/ Employment

- Direct jobs
- Indirect jobs
- Total employee related income

1.3 Proposed Action

The Grass Flat Project is designed to fulfill the 1998 *Herger-Feinstein Quincy Library Group Forest Recovery Act* Pilot Project by establishing Defensible Fuel Profile Zones (DFPZs), Group Selections, maintaining and restoring healthy watersheds and habitats, while contributing to economic stability. The proposed action has the potential to produce 3.8 million board feet of timber volume (biomass is estimated to be 12 percent) and 92 direct and indirect jobs.

The proposed DFPZs would primarily be established along ridge tops and access roads connecting the Bald Onion DFPZ (to the north) and proposed Sugarloaf DFPZs to the south, and defensible space established by the private landowners. Group selections would be positioned within DFPZs, establishing 0.5 to 2 acre openings targeting areas or pockets of root disease, tree mortality and insect infestations.

The Forest Service proposes to establish 1,814 acres of (DFPZs), while promoting forest health and restoring natural recreation settings and scenery aesthetics in and around the Little Grass Valley Recreational Area by

- Mechanical thinning 200 acres;
- Biomass removal 98 acres to remove biomass, totaling 12 percent of the total thinning area;
- Hand cut, grapple pile and burning 371 acres;
- Hand cut, hand pile and burning 465 acres;
- Masticating 357 acres;
- Prescribed underburning 107 acres;
- Sanitizing (targets diseased and infected trees) and removing small, dense, overstocked trees over 45 acres within recreation area;
- Spot planting tree seedlings (2+ years) and native shrubs to establish vegetative screening between campsites over 45 acres.
- Roadside hazard tree removal producing approximately 350 ccf.

The Forest Service proposes to establish 56 acres of Group Selections (GSs) by:

- Mechanical thinning 56 acres;
- Masticating or hand cut, grapple pile and burning 56 acres;
- Prescribed underburning 56 acres;
- Site preparation, reforestation and releasing 56 acres

The Forest Service proposes the following improvements to accomplish logging operations:

- Temporary road construction 0.9 miles;
- Temporary road reconstruction 1.8 miles;
- 20 new landings (likely to be ½ acre or less).

The Forest Service proposes to restore watershed health and maintain and restore riparian/aquatic/wildlife habitats by:

- Hand cut and mechanically removing conifers and/or handcut and fell conifers within 12 meadows and wetlands over 15 acres;
- Mechanical thinning around the perimeter of 36 meadows and wetlands over 19 acres;
- Removing 1 stream crossing culvert on an old decommissioned road and upgrading another culvert on National Forest System road 22N57;
- Realigning 726 feet (630 ft. + 96 ft. or 0.14 miles) two spring feed, diverted streams;
- Revegetating (planting) barren streambanks on the South Fork Feather River and an intermittent tributary to Black Rock Creek over 24 acres.

The Forest Service proposes to manage plantations (3 years to 30 years old) by:

- Spot planting a variety of 1-2 year old ponderosa pine, Jeffrey pine, sugar pine, Douglas-fir, and incense cedar on 38 acres;
- Site preparation using mechanical grapple pile and pile burning on 38 acres;
- Releasing (grubbing around seedlings) using hand cutting and piling, and/ or under burning on slopes greater than 40% and grapple piling, masticating, pulling root sprouts, and/ or under burning on slope less than 40% on 38 acres.

Table 2.9 at the end of chapter 2 demonstrates the details of the proposed action with comparison of the alternatives. The proposed action is described in more detail in chapter 2, Alternative B.

1.4 Applicable Laws and Regulations

1.4.1 Herger-Feinstein Quincy Library Group Forest Recovery Act (1998)

On October 21, 1998, the President of the United States signed the *Department of the Interior and Related Agencies Appropriations Act*, including section 401—the *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act). The HFQLG Act states that the Secretary of Agriculture, acting through the Forest Service, and after completion of an EIS, shall conduct a pilot project for five years on federal lands in the Lassen and Plumas National Forests and the Sierraville District of the Tahoe National Forest.

The HFQLG Pilot Project is designed to test and demonstrate the effectiveness of certain fuels and vegetation management activities in meeting ecologic, economic, and fuel-reduction objectives. Full implementation of the HFQLG Pilot Project would result in an annual average of 8,700 acres of group selection across the Pilot Project Area, consistent with protection of ecosystems, watersheds, and other forest resources, utilizing good silvicultural practices and economic efficiency.

1.4.2 Herger-Feinstein Quincy Library Group Forest Recovery Act EIS, Supplemental EIS, Records of Decision (1999 and 2003) and Appropriations Acts

The HFQLG Act EIS was completed on August 17, 1999, and the Record of Decision was signed on August 20, 1999 (USDA Forest Service 1999). The Record of Decision amended the land and resource management plans for the three National Forests (Plumas, Lassen, and Sierraville RD Tahoe,) and gave direction to implement the resource management activities required by the HFQLG Act. The Record of Decision on the HFQLG final supplemental EIS addressing DFPZ maintenance was adopted on July 31, 2003 (USDA Forest Service 2003).

In February 2003, the *Department of the Interior and Related Agencies Appropriations Act* was signed and extended the HFQLG Pilot Project legislation by another five years. In December 2007, the *2008 Consolidated Appropriations Act* extended the HFQLG Pilot project to September 30, 2012. It also applied some portions of the *Healthy Forest Restoration Act* (Sections 104-106) to HFQLG projects. These sections relate to environmental analysis, public notice, comment and objection processes, and judicial review. In March 2009, the *Omnibus Appropriations Act* amended this, clarifying that Section 106 of the *Healthy Forest Restoration Act* (related to expedited judicial review) shall apply to all HFQLG projects, while Sections 104 and 105 (related to environmental analysis and objection processes) may be applied to HFQLG projects.

1.4.3 Sierra Nevada Forest Plan Amendment Final Supplemental EIS (2004)

In January 2004, the Regional Forester signed the SNFPA final supplemental EIS Record of Decision, which replaced the 2001 Record of Decision on the SNFPA final EIS and changed management direction to allow full implementation of the HFQLG Pilot Project, consistent with the goals identified in the HFQLG Act. The 2001 SNFPA final EIS and Record of Decision are incorporated by reference in the 2004 Record of Decision on the SNFPA final supplemental EIS. The 2004 Record of Decision on the SNFPA final supplemental EIS directed the Plumas National Forest to implement the HFQLG Pilot Project, which includes creation of DFPZs for the proposed project.

1.4.4 Forest Plan Direction (1988)

The 1988 Plumas National Forest Land and Resource Management Plan (commonly referred to as the "Forest Plan"), as amended by the 1999 HFQLG final EIS Record of Decision, and as amended by the 2004 SNFPA final supplemental EIS Record of Decision, guides the proposed action and alternatives. The 2004 SNFPA Record of Decision (page 68) displays the standards and guidelines applicable to the HFQLG Pilot Project Area. Land allocations that apply to this proposal include Off-base and Deferred Lands, late-successional old-growth stands, and California spotted owl Protected Activity Centers, and Spotted Owl Habitat Areas and the National Forest System lands outside these allocations that are available for vegetation and fuels management.

The project area is within portions of Plumas National Forest's Pinchard Management Area #12, Lost Creek Management Area #13, (Sawmill Management Area #14), and Little Grass Management Area #15. To guide the implementation techniques involved in recreation area improvements and restoration the Plumas National Forest relies on direction from the Land and Resource Management Plan (LRMP 1988). Lands, recreation, special uses, and trails are listed site specifically by prescriptions designated as RX-5 Recreation Prescriptions, RX-6 Developed Recreation Site Prescriptions, RX-10 Visual Retention Prescription, and RX-14 Visual Partial Retention Prescription. Further, the Grass Flat project area is classified under ROS classification system as Natural Roaded (RN) which provides indicators for physical settings, social settings, and managerial settings.

1.4.5 Healthy Forest Restoration Act (2003)

The HFRA is designed to improve the capacity of the Departments of Interior and Agriculture to conduct hazardous fuels reduction projects to protect communities, watersheds, and other at-risk lands from catastrophic wildfire, enhance watershed protection and address threats to forest health.

On Sept. 17th 2008, the Secretary of Agriculture established final regulations for a pre-decisional administrative review process for authorized hazardous fuels reduction projects on National Forest System (NFS) lands ((36 CFR 218) Federal Register Vol 73, Number 181). Only authorized hazardous-fuels reduction projects are subject to these special procedures.

1.4.6 Little Grass Valley (LGV) Vegetation Management Plan (2012)

The LGV Vegetation Management Plan serves as a guide in the management and enhancement of Little Grass Valley Reservoir Campgrounds. The primary purpose of this vegetation management plan is to inform and provide direction for the restoration and rehabilitation of the forest vegetation in the campgrounds surrounding Little Grass Valley Reservoir, ensuring public safety for campground recreational users, to develop strategies for addressing user impacts to the vegetation and resources, and to enhance the visual quality within and immediately adjacent to the campground area.

1.4.7 Upper and Lower Slate Environmental Assessments (2001)

The Upper and Lower Slate Environmental Assessments (EAs) analyzed the need for the construction of DFPZs in the vicinity of Slate Creek to improve protection of rural communities and forests from high-intensity wildfire. As the Grass Flat Project overlaps with the areas analyzed in the Upper and Lower Slate EAs, the analyses are incorporated by reference as pertinent to the Grass Flat Project.

1.4.8 Slate Creek Landscape Assessment (1999)

The Slate Creek Landscape Assessment (LA) identifies opportunities to enhance existing conditions in the Grass Flat Project area. The objectives for the Grass Flat Project were derived from opportunities identified in the LA, incorporated by reference as relevant to the Grass Flat Project by identifying DFPZ locations.

1.4.9 Bald Mountain Landscape Analysis (1998)

In the fall of 1994, the Feather River Ranger District staff developed ranking factors for evaluating and electing candidate watersheds for landscape analysis. The ranking factors were based on three critical and management issues: forest health, land disturbance and fire hazard. The staff identified watersheds most impacted by human activities over the past 150 years. Watersheds were identified to manage opportunities to address these impacts.

1.5 Decision Framework

Based upon the effects analysis of the alternatives, the Plumas National Forest Supervisor as the Responsible Official will decide whether to implement the Grass Flat Project as proposed, implement the project based on an alternative to this proposal that is formulated to resolve identified conflicts, or not implement the project at this time.

1.5.1 Public Involvement

The Feather River Ranger District collaborated with private land owners and the Fire Safe Council in Plumas County to design and implement fuel reduction projects on public and private lands in the La Porte area annually since 2005.

To prepare for the Grass Flat Fuels Reduction Project, the district initiated a strategic plan of collaboration as directed under *Healthy Forest Restoration Act* (HFRA) to include the local residents in the development of the proposed action, the alternative development, and to identify concerns related to the proposed action. As part of this process, the Feather River Ranger District's Fuels Officers have maintained a direct line of communication and has worked diligently with the La Porte Pines County Club Homeowner Association by attending meetings and conducting site visits.

A scoping packet was sent to those who expressed interest in the project, were directly affected by the project, or lived in the adjacent area. Publication of the Legal Notice in the Feather River Bulletin, the newspaper of record, was posted on December 14, 2011. The concurrent scoping and comment period remained open through January 17, 2012. Comments were received from the Sierra Forest Legacy (SFL) on January 13, 2012 and Frank Stewart, QLG Forester on January 10, 2012. A summary of the comments are described below.

> **The Sierra Forest Legacy -** is concerned the design of the project does not conform to the PSW General Technical Reports (GTR) 220 and 237 (2009 and 2012 respectively) for retaining diversity and heterogeneity in treated landscapes. They stress a GTR-220/237 consistent approach is needed to take proactive, intentional measures to protect important wildlife habitat (limiting fragmentation of or degradation of high quality spotted owl habitat) while still pursuing other objectives. They would like to see the upper diameter limit of trees removed not to exceed 20 inches diameter (dbh) as directed in the GTR-220 and the 2001 Sierra Nevada Framework.
>
> The locations of the Group Selections are also of concern. They suggest:
>
> - Avoid locating group selections units in CWHR types 5M, 5D, and 6, and areas with high numbers of large trees.
> - Avoid locating groups within suitable habitat that occurs within home range core areas (HRCAs) for spotted owls.
> - Avoid locating groups in areas that are cutover or habitat that is otherwise fragmented.
> - Locate group selection units in areas dominated by uniformly-sized, smaller white fir and have significant amounts of small down logs or standing small deadwood.
> - If group selection units are located in areas with pine species, retain pine and convert to pine restoration units.
>
> Other areas for consideration:
>
> - Retain important forest structure
> - Examine snag and down wood retention levels
> - Identify any logging proposed for purposes other than fuels reduction (i.e salvage, insects and disease).

- Identify the acreage and type of logging by land allocation

Wildlife:

- Old forest emphasis areas versus degradation of owl habitat in light of strong evidence of decline in populations.
- Promoting Pacific Fisher viability is dependent on a) protecting and enhancing currently occupied habitat and b) protecting and restoring habitat north of the southern fisher conservation areas to facilitate fisher recolonization and expansion.
- Research has shown the American Marten is highly sensitive to forest fragmentation, generally tolerating a landscape with no greater than 20-25 percent forest openings.
- The marten has a low reproductive potential, a large home range, and is considered vulnerable to local extirpation due to its affinity for old forests.
- Based on the Forest Service Sensitive species rating, the Northern Goshawk should be considered adversely affected by implementation of the 2004 Framework ROD. Mitigations to retain higher levels of stand basal area could be incorporated into individual projects.

Fuels Reduction:

- Based on research and information from the Cone Fire….there is little evidence that logging trees as large as 20 inches dbh or extensive overstory canopy reductions, as proposed by this project, is needed to achieve fire resiliency and positive fire behavior outcomes.
- The project should fully consider the impacts of logging and other management activities on critical fire-related ecological functions of riparian areas.
- The Forest Service should analyze the cumulative impacts of the project together with other past, present, and reasonably foreseeable future actions.

Frank Stewart, Counties' Quincy Library Group Forester – comments were received in support of this critically important project because it provides urgently needed social, economical, fire protection and environmental benefits for the citizens, businesses, and local government in Plumas County.

Points of Emphasis:

- A clear diameter breast height (DBH) definition is needed for large trees that will be left for visual diversity and other purposes. While incorporating various aspects of the PSW-GTR-220 report intermediate trees are described as 20-30 inches dbh and large trees as over 31 inches dbh. Clearly state these diameter limits in the EA.
- Although the intent of the DFPZs are to provide protection to the rural communities, they may also provide protection to wildlife species and their associated habitats, watershed and riparian structures, recreation and other multiple use aspects of the national forests.
- Fifty six acres of group selection falls short of the .57 percent required under the Act which should calculate as ~ less than 200 acres over a 1,815 acre project.
- Utilize group selection within or near DFPZs so group harvests can help support costs of fuels reduction and DFPZ or matrix thinning can protect regeneration of groups.
- Connectivity of DFPZs to the network and other public and private shaded fuel break projects within the pilot project area must take a high priority.

1.5.2 Issues

Issues are points of discussion, debate, or dispute about the potential environmental impacts of a proposed action and may influence the design and evaluation of alternatives to the proposed action. The Interdisciplinary Team (IDT) looked at internal issues (brought up by the Forest Service resource specialists) and external issues (received from other agencies and the public) to provide a basis for the analysis of environmental effects.

The California Environmental Quality (CEQ) regulations that implement the National Environmental Policy Act (NEPA) guide federal agencies in handling minor issues by directing them to "identify and eliminate from detailed study the issues that are not significant or which have been covered by prior environmental review (CEQ Section 1506.3)…" (40 CFR 1501.7).

There are no Significant Issues representing unresolved conflicts with the Proposed Action associated with severe and possibly highly noticeable environmental impacts. The IDT categorized issues as either being Relevant, Minor or Issues Not Analyzed in Detail as defined below.

Relevant issues for the Grass Flat Project are those derived from a variety of sources including; 1) scoping comments, 2) those developed by the IDT through initial interdisciplinary process and evaluation of data and information collected during the 2011 field season, and 3) those developed in coordination with the Deciding Official. Public comments suggest modifications to the proposed action including incorporating PSW-GTR-220/237 concepts, retaining a minimum 50 percent canopy cover and avoiding Group Selections in California spotted owl home range core areas (CSO HRCAs), forest carnivore movement areas and with CWHR 5D /5M habitats. The Forest Service reviewed proposed mechanical treatment alternatives and conducted a preliminary analysis to wildlife species of concern. The outcome was the modification of the proposed action. Alternative B-Modified addresses public relevant issues by incorporating GTR concepts, limiting Group Selections while retaining a minimum 50% canopy cover for all CWHR size class 5s in DFPZs.

- Minor issues are those that are: 1) already addressed by law, regulation, Forest Plan or higher level decision; 2) beyond the scope of the purpose and need described in the Legal Notice; 3) not connected to the proposed action; 4) conjectural and not supported by scientific or factual evidence; or 5) irrelevant to the decision to be made. Minor Issues involve measurable or noticeable effects at a low level to affect alternative design and/or range of mitigation measures. Minor issues also function to display environmental effects required by law or policy.
- Issues not analyzed in detail have been determined to have no relevance to the decision or the predicted effects are considered to be inconsequential to the decision. Hence, no further disclosure of these issues is incorporated into this EA.

A meeting was held on August 6, 2011 in La Porte at the Fire House to discuss a number of Feather River RD projects with Grass Flat being one of them. Maps were displayed to orient the project area demographics and help describe the proposed action and placement of the DFPZs. Attendees had the opportunity to comment and become more geographically oriented with the proposed project during that time.

A meeting was held at the Feather River Ranger District office on December 14th, 2011 to open the 30 day scoping/comment period and provide the opportunity for the public to assist in the development of the alternatives. Comments received have been considered in the development of the alternatives and are discussed in further detail in Chapter 2 of this EA.

Chapter 2 Alternative Development

2.1 Introduction

This chapter describes and compares no action (Alternative A), the proposed action (Alternative B), modified Alternative B (preferred) and the non commercial funded (Alternative C), considered in detail for the Grass Flat Fuels Reduction and Forest Health Restoration Project (Grass Flat Project). The action alternatives are designed to fulfill the *Herger-Feinstein Quincy Library Group Forest Recovery Act* of 1998 (HFQLGFRA 1998) and the National Fire Plan objectives, planned under the *Healthy Forest Restoration Act* (HFRA) legislation.

The requirement to develop a noncommercial funding alternative is in effect until the agency remedies the deficiencies of the programmatic 2004 Sierra Nevada Framework. Therefore, it is in place until a settlement is reached or a supplemental EIS is completed.

The proposed Defensible Fuel Profile Zones (DFPZs) in this project are part of a larger, strategic network of DFPZs on the Plumas, Lassen and Tahoe National Forests (Sierraville District). The Grass Flat Project would contribute to the larger network by positioning segments of DFPZs to connet the Bald Onion DFPZ (to the north), proposed Sugarloaf DFPZs to the south, dispersed defensible space established by the private landowners, and areas of reduced fuels treated under the La Porte Pines Fuels Reduction, La Porte Hazardous Fuels Reduction, and Poverty Hill Projects.

The proposed DFPZ treatments which lie within the Little Grass Valley (LGV) Reservoir Recreation Area target surface and ladder fuels, while aggressively removing all safety hazards (down woody debris and structurally unstable snags and trees); consistent with the design features described in the LGV Vegetation Management Plan (USDA 2008), incorporated as key design features and mitigations measures described below, and in more detail in Appendix C.

2.2 Alternative A (No Action)

While this alternative takes no action at this time, on-going activities such as routine road mainteneance, fire suppression and recreation may still occur in this area. This alternative serves as a baseline against which to compare the action alternatives.

Under Alternative A, no fuels treatments or DFPZ construction would be implemented to accomplish the purpose and need. The desired condition set forth in the HFQLG Act of an uneven-aged (all-aged), multistory, and fire-resilient forest would not be achieved. The no-action alternative would not meet the intent of the Forest Plan, as amended by the 1999/2003 HFQLG-HFRA FEIS and ROD and the 2004 Sierra Nevada Forest Plan Amendment ROD or the *2008 Consolidated Appropriations Act*.

While no operational costs would be incurred under the no-action alternative, no fuels reduction or economic benefit would be extended to the rural communities as a result of this project.

2.3 Project Design Features Common to the Action Alternatives

2.3.1 Introduction

This project will comply with the directions, and standards and guidelines within the Plumas National Forest LRMP as amended by the 1999 HFQLG FEIS and ROD and 2004 SNFPA FSEIS and ROD. In addition to measures included in the project description, the following resource protection measures are included as part of the proposed project design. Implementation of the following Resource Protection Measures would meet Forest Service Management Direction and are incorporated in the proposed action. Further discussion of design features and mitigation measures are located in appendix A following chapter 4 of this EA.

2.3.2 Air Quality

Specific air quality mitigations for prescribed burning would include number of acres burned daily, preferred wind direction for smoke dispersal, and desired weather conditions. These mitigations would be agreed upon with the appropriate Air Quality Districts and addressed in the Smoke Management portion of the Burn Plans developed for the Grass Flat Project.

2.3.3 Aquatics and Hydrology

Applicable Best Management Practices (BMPs) and Scientific Analysis Team (SAT) guidelines would be implemented before and during the timber harvest, DFPZ construction, and temporary road closure process.

SAT and RMO Guidelines. The SAT guidelines for delineating RHCAs are defined in the Northwest Forest Plan, and adopted for the 1999 HFQLG FEIS and ROD. RHCAs in the Grass Flat Project would be treated with underburn only. In general, standards and guidelines prohibit activities in the RHCAs not specifically designed to improve the structure and function of the RHCA and benefit aquatic species. Where riparian conditions are presently degraded and a determination that no action would result in adverse effects, management activities must be designed to improve habitat conditions and meet Riparian Management Objectives (RMOs). RHCA widths shall be consistent with Riparian Management Objectives.

RHCA widths applied to the Grass Flat Project are 300 feet for fish-bearing streams and lakes; 150 feet for perennial non-fish-bearing streams, lakes, and ponds, and wetlands greater than one acre; and 100 feet for ephemeral and intermittent streams, and wetlands less than one acre; or to the extent of landslides and landslide prone areas. The RHCAs would be defined and marked onsite when DFPZ units are laid out.

Best Management Practices. These are practices designed to minimize or eliminate points of pollution from timber harvest and other management activities, by prohibiting or limiting types of ground disturbance that are likely to discharge sediment and negatively affect water quality.

Applicable Best Management Practices (BMPs) would be implemented during and post implementation of project.

<u>Stream realignment</u>

Realignment will be conducted during low flows.

<u>Riparian Habitat Conservation Areas a (RHCA) and Streamside Management Zones (SMZ) buffers for fuel and timber management activities.</u>

The following buffers by treatments apply to RHCAs, unless otherwise specified below. All buffers are no-treatment buffers, unless specified otherwise. Treatments are expected on slopes less than or equal to 35 percent.

- *Groups Selection:* Maintain the standard RHCA widths, 150 feet for non-fish bearing and 300 feet for fish bearing on each side of stream.
- *Handcut Pile Burn (HCPB):* No buffer on all ephemeral streams, but retain at least 50 percent canopy cover and all riparian vegetation post treatment. Piles should be at least 25 feet from edge of stream. Apply a 25 feet buffer to all other non-fish bearing streams and a 50 feet buffer to fish bearing streams.
- *Handcut Grapple Pile (HCGP):* Same as HCPB, but apply a 50 feet equipment exclusion zone in addition to the buffer. In the case of ephemerals, equipment would be excluded in 50 feet zones from the stream edges.

- *Mastication*: Apply a 25 feet buffer for SMZs, a 50 feet buffer for all non-fish bearing streams and a 75 feet buffer for fish bearing streams.
- *Meadows*: Treat up to meadows edge. No treatment within meadows unless otherwise designated. Refer to the table in the hydrology section in chapter 3 for more details on which meadows will be treated within and the type of treatment. Hydrology department (with Botany input) will mark the cut and leave trees within the meadows to be treated.
- *Mechanical (includes Thin-Handfell and Sanitation)*: Apply a 50 feet buffer for SMZs, a 75 feet buffer for all other non-fish bearing streams and 150 feet for fish bearing streams.
- *Plantations/Planting:* No buffers.
- *Shoreline:* Buffers for all units along the Little Grass Valley reservoir are 75 feet from vegetation line.
- *Underburns (UB)*: Buffer is not necessarily a no-treatment buffer because, while fire ignition would be prohibited within the buffer, fire would be allowed to back into the buffer. On average a 25 feet buffer for SMZs, 75 feet buffer for non-fish bearing streams and 150 feet buffer for fish bearing streams.

2.3.4 Soils

Applicable Best Management Practices (BMPs) would be followed during the implementation of all activities of the Grass Flat Project. BMPs would be implemented throughout timber harvest, DFPZ construction, road closures to ensure appropriate erosion and sedimentation protection in disturbed areas and to protect long term soil productivity.

The Limited Operation Period for soils is applicable to all the units that have mechanical treatment.

- The LOP would only allow ground-based harvest equipment to operate when soils are considered dry. Soil is defined as “dry” when the upper 8 inches is not sufficiently moist to allow a soil sample to be squeezed and hold its shape, or crumbles when the hand is tapped. Dryness would be determined by the sale administrator upon the recommendation of a soil scientist.

<u>Soil Moisture Restriction</u>
A Limited Operation Period (LOP) would be applied to the entire Grass Flat Project. The LOP would allow ground-based harvest equipment to operate only when soils are considered dry. Soil in the 8 inches below the ground surface is defined as “dry” when it is not sufficiently moist to allow a soil sample to be squeezed and hold its shape, or when the squeezed sample crumbles when the hand is tapped. Dryness would be determined by the sale administrator upon the recommendation district watershed staff.

<u>Effective Soil Cover</u>
Treatment units will need to maintain a certain percentage of soil cover relative to the soil erosion hazard rating (EHR) post-treatment. The range for percent effective soil cover for the project is 50 to 70 percent. For more specifics on the level of effective soil cover required post-activity refer to the soils section in chapter 3.

<u>Slope Restriction for Mechanical Equipment</u>
Restrict mechanical equipment to slopes less than 35 percent for all treatment units.

<u>Landings</u>
All landings and the last 200 feet of main skids leading to the landings will be reseeded with three species of native grasses post-treatment. The species of native grasses that will be used are Blue Wild Rye (*Elymus elaucus)*, California Brome (*Bromus carinatus*) and Orcutt’s Brome (*Bromus orcuttianus*).

Additional Soils Mitigations**.** The Forest Service Handbook (Soils Management Handbook, Washington Office Amendment, FSH 2509.18-95-1; Soils Management Handbook, Region 5 Supplement, FSH 2509.18-95-1) establishes National and Regional direction for soil quality analysis. All mitigations would be specified in the Grass Flat Project timber sale contract and in the service contracts and adhered to for any work performed for this project.

2.3.5 Roads

Road Improvements

Any culvert-related work will be conducted during periods of low flows to minimize impacts.

- 22N57—7 new ditch relief culverts (DRC's) and replacement of one existing stream-crossing culvert was suggested.
- 22N60—Clear the inside ditch and DRC's. Blade the road.
- 22N27—there are two long hydrologic connectivity (HC) issues on this road,/
    - One at the junction with the 22N77Y and extending east for 1550 feet. Suggest putting in 3 new DRC's at 400 feet intervals from the stream crossing
    - The second HC issue is about 1.1 miles east of the above mentioned issue and it extends both ways from the crossing (800 feet west and 650 feet east) for a total of 1450 feet. Recommend installing 2 new DRC's 400ft from the crossing, one to the east and the other to the west.

2.3.6 Invasive Weeds

Invasive weeds would be controlled through the use of integrated management practices. Prevention measures would be implemented to reduce the introduction and spread of invasive weeds. (FSM 2081.2). Also, the overall risk that this project poses to the spread of invasive weeds has been analyzed in a Invasive Weed Risk Assessment as outlined in the HFQLG FEIS and located at the Feather River District Office.

2.3.7 Minerals

a) Protect mining claim corner markers and discovery markers, unless attached to trees. Those signs attached to trees should be removed from the tree and turned in to the Minerals staff.

b) Plan on the ground project activities so as not to interfere with active mining operations. Scoping letters should be sent to active mining claim holders.

2.3.8 Recreation

Permanent photo points will be established in the individual campgrounds to provide for future management decisions. Ten to twenty points should be established per campground. Tags are attached to trees, with photos taken in each of the cardinal directions. Photos should illustrate pre-treatment and post treatment stand condition and clearly display stand density, tree size and species composition for each proposed treatment type. Mature forest character with small areas of different age classes are desirable. Thinning of dense stands will accentuate desired characteristics of irregular edges, openings and special vegetation such as hardwoods.

Thinning and pruning and establishment of trees and shrubs for scenery management could include the following:

- Use groupings of trees or shrubs to help frame the view and direct the view toward the desired object, for example a stream, wetland, or mountain top.

- Enhance the visual composition with contrasts of color or texture, use of form and line, for example, meandering walks, streams, or shoreline, the contrast of dark conifers against the blue lake.

The highest priorities for removal are trees that are structurally compromised that are within a tree length proximity to campsites, facilities and user trails. Hazardous tree reduction should follow guidelines set forth in the 2008 Roadside/Facility Hazard Tree Identification Guidelines prepared for the Lassen, Plumas, Modoc and Tahoe National Forests.

This project will identify specific areas within campgrounds that have the high priority needs for hazard reduction, and outline the process for removal of these hazards while still providing for area recreation users. Removal of hazard trees is primarily restricted to after Labor Day to avoid disturbing wildlife in and around campgrounds and to limit the impact of silvicultural activities on recreation users.

In the short-term, objectives are to reduce density levels of overstocked white fir and lodgepole pine stands to maintain tree vigor. Managing stocking levels will allow for maintenance of the most desirable trees to meet recreation value objectives. For the LGV recreation area, the visual quality objectives are retention and partial retention (1988 Plumas National Forest LRMP).

Entry intervals should be managed to minimize site impact. Control of spacing and density in reforestation will help rehabilitate the areas where disease is creating open canopy gaps, will aid in creation of visual diversity, and provide for shading and screening between camp sites.

Developed Recreation Areas: Objective – An aesthetically pleasing, safe and natural environment, free of obvious management activities, with intact and healthy tree stands, creeks and streams, active and abundant wildlife including deer, bear, bald eagles, osprey, songbirds and fish in a developed, well maintained recreation setting.

- Remove 100% of standing snags or hazard trees in developed recreation areas.
- Flush cut all tree stumps, or no taller than 6” within campgrounds or slant cut away from roads. Grind all stumps at ground level prior to treatment with borax.
- Clean up slash and debris from treatment activities within 60 days of completion of project.
- Hand pull and pile slash for handpile and burning a minimum 15 feet away from the undefined perimeter of campsites, day use areas and boat ramps so that they don’t interfere with recreation use as much as feasible.
- Mark only those trees to take. Do not mark leave trees.
- Maintain shrub groups and stands as much as feasible during operations.
- Drag cull logs greater than 18 inches dbh to locations directed by the landscape architect or recreation staff for use as barriers, to define campsites, to improve stream habitats, etc. Do not stack or pile cull logs in decks within the developed recreation area.
- Directionally fall timber away from infrastructure improvements as flagged or identified.
- Uneven age management activity would maintain smaller scale openings no larger than ¼-1/2 acre in size and single tree selections to avoid appearance of clear cuts.
- Locate skid trails parallel to the roadway and at least 25 feet from the main road.

- Locate landings at least 25 feet off the main roads or internal access roads and out of sight from drivers, by placement uphill or downhill from line of sight. If not possible to locate out of sight, maintain a vegetative buffer between the road and landing.
- Restore skid roads and landings by recontouring to blend with the surrounding topography and replanting with native grasses and shrubs. Closure with berms and logs is not an acceptable form of restoration.

Perimeter Roadways in Retention zones: Objective – Manage vegetation, hazard trees and restore forest health while maintaining highly prized scenic values in a heavy use recreation area. Perform management activities so that they don't appear visible or obvious to the viewer; perform activities that restore the high scenic character of the area.

- Mark only take trees, and put the mark on the unseen side of the tree.
- Select trees with upper and lower diameter limits. Maintain 3-5 random trees per acre.
- Create irregular edges for treatment units to de-emphasize the activity and to mimic natural events. Feather vegetation edges by leaving trees in irregular edge alignments and of various heights and sizes.
- Slant cut all stumps at lowest possible level, however no higher than 8" maximum height above soil surface, pointing away from the roadway.
- Maintain at least 50 feet of vegetation between viewer and landing for screening purposes.
- Locate skid trails parallel to the roadway and at least 25 feet from the main road.
- Leave cull logs in the woods. Do not skid or deck.
- Do not create piles for burning within 100 feet of the road edge.

Perimeter Roadways in Partial Retention zones: Objective: Manage vegetation, hazard trees and restore forest health and scenic values while maintaining highly prized scenic values. Perform management activities so that they don't interfere with natural appearing landscape. Management activities are not dominant in the landscape, but not invisible either.

- Mark only take trees and put mark on the unseen side of the tree.
- Same treatments as above, within 150' of roadway only. Areas beyond 150 feet do not have mitigation requirements.
- Open stand treatments, i.e. treatments that create an open stand structure would maintain sufficient clumps of large trees to mimic natural park like stands with no low branches.
- Closed stand treatments need to leave sufficient spacing and full branching down to ground surface or would maintain some random trees and shrubs of sufficient density and spacing to appear as a natural closed stand, yet sufficiently reduce fuels.
- Prescribed fire intensity would be managed sufficiently to limit scorch of canopy vegetation.
- Meander handline shapes on edges to avoid a hard, unnatural appearing edge and to mimic natural fire.

Pacific Crest Trail (PCT) Zones: Objective: Preserve the natural landscape character and sense of wildness and solitude, to ensure the scenic integrity is preserved, enhanced or restored.

- Do not mark any trees within ¼ mile as seen from the PCT
- Mechanized timber harvest activities will be limited to areas greater than 1500 feet from the trail or outside the viewshed, i.e. downhill from trail and out of sight.
- Harvest area edges must conform to the topography and mimic natural openings and edges. Trees shall be left of edges to soften the harsh contrasts and exposed trunks of stark edges.
- Mechanized treatments may not be used within ¼ mile of the trail to preserve the setting and sense of solitude.

- Handcut and pile burning are acceptable for short term treatments. Piles must be burned within 12 months of creation.
- Handcut vegetation would be cut no higher than 6" above the soil surface and must be covered with duff , dirt or debris to hide or stain the newly exposed cut trunks.
- Stand regeneration treatments, ie. Group selections would be no larger than ¼- ½ acre in size when located within the foreground.
- The use of low intensity prescribed fire is a preferred method of fuels treatment and forest regeneration. Fire intensity would not be so high that canopy scorch occurs. Fire scarring on tree trunks is an acceptable outcome.

Lands Special Uses: Objective: Maintain access to private lands or authorized uses; protect authorized uses from damage as a result of land management activities.

- Flag and avoid all identified areas or uses.

Additional site specific design features identifying individual recreation areas are located in Appendix C.

2.3.9 Wildlife

Alternatives would be implemented in compliance with all rules and regulations governing land management activities, including the use of appropriate Limited Operating Periods (LOPS) identified in table 2-1, LOPs are listed in the HFQLG FEIS, pages 2-8, table 2.3 and 2004 SNFPA ROD, pages A-54, A-58, A-60, A-61 and A-62.

Wildlife species such as the Pacific fisher, American marten, Northern goshawk, and the California spotted owl are positively associated with occupancy in contiguous patches of dense, late-seral forest and should be a high priority. Although fuels reduction, if applied properly, may protect remaining fragments of late-seral habitat from loss due to fire, these treatments can also result in a reduction of canopy cover and layers; potentially increasing fragmentation of existing suitable habitat.

Table 2.1. Limited Operating Periods by Species and Location

Species	Location	Limited Operating Period
California Spotted Owl	Within ¼ mile of a protected activity center boundary	March 1 – August 15
Goshawk	Within ¼ mile of territory or active nest site	February 15 – September 15
Marten den	100 acre den site buffer	May 1 – August 1
Fisher den	700 acre den site buffer	March 1 – July 1
Willow Flycatcher	Within occupied willow flycatcher sites	Breeding period (June 1 – August 15)
Pallid and Townsend's big-eared bats	Within ¼ mile of maternity and other roosts	April 1 – October 31
Western red bat	Within RHCAs with hardwoods	May 20 – August 21
Mountain Yellow-legged Frog	Where suitable habitat is found	October 15 or the 1st wetting rain greater than ¼ inch

See Mitigations Appendix A for full disclosure of wildlife design features and regulatory agreements.

2.3.10 Vegetation

All standard contract practices would be applied (timber sale contract B-provisions) as would some additional C-provisions and site specific prescription recommendations. Recommended mitigations associated with vegetation management would be designed to reduce logging damage to residual trees, reduce fuels, and reduce opportunities for infection of trees by fungal disease or insect attack.

Recommended mitigations include: 1) minimizing logging in the spring when bark is loose and trees are more susceptible to logging wounds; 2) removal of small trees damaged beyond repair in harvesting operations, particularly in thinning units; 3) no chainsaw thinning in plantations from January through July to minimize bark beetles (*Ips* spp.) attack. 4) no removal of specially identified trees (e.g. marked survey trees, superior genetics trees, and/or proven rust resistant sugar pine).

Whole tree-ground based logging systems utilizing mechanized thinning and biomass removal would be used in the construction of DFPZs. Whole tree yarding removes most limbs and tree tops from the stand, effectively reducing the need for post-project slash pile fuels treatments. Mechanical equipment used in thinning operations would not impact Riparian Habitat Conservation Areas (RHCAs) as buffers for would be in place for protection and only underburning would be used for treatment. After thinning, pile burning would be used to treat residual slash and pre-existing fuels and shrub where necessary.

Application of a borax compound to freshly cut stumps over 3 inches dbh within the recreation area and over14 inches dbh outside of the recreation area may be used to reduce the potential for spread of annosus root disease. Application of borax would not occur within any RHCAs in the project area. The Evaluation of Human and Ecological Risk for Borax Stump Treatments for the Grass Flat Project can be found in the Silvicultural Report Appendices.

2.3.11 Wildlife Habitat

Where California black oak is present in DFPZs, an average basal area of 25 to 35 square feet per acre would be retained for oaks over 15 inches dbh where present; where basal area of oaks is below desired levels, smaller oaks to 8 inches dbh will be retained where feasible on a site specific basis when determined necessary for future recruitment. In the Grass Flat project area only two units have oak populations.

CWHR classifies existing vegetation types important to wildlife. This system was developed to recognize and logically categorize major vegetative complexes at a scale sufficient to predict wildlife habitat relationships. The description below outlines the CWHR guide by canopy closure in the Grass Flat project area.

The CWHR system has three elements: (1) major tree-dominated vegetation associations, (2) tree size, and (3) canopy cover. Tree size and canopy cover classes are:

Tree Size Classes

1 = Seeding (less than inch dbh)
2 = Sapling (1-6 inches dbh)
3 = Pole (6-11 inches dbh)
4 = Small (11-24 inches dbh)
5 = Medium/Large (greater than 24 inches dbh)
6 = Multilayered (size class 5 over a distinct layer of size 3 or 4, total canopy greater than 60-percent closure). In this EIS, class 6 is included in class 5.

Canopy Cover Classes

S = Sparse Cover (10-24 percent canopy closure)
O = Open Cover (25-39 percent canopy closure)
M = Moderate Cover (40-59 percent canopy closure)
D = Dense Cover (greater than 60 percent canopy cover)

DFPZs in CWHR in 5M, 5D, and 6 Size Classes

- Design projects to retain a minimum of 40% canopy cover.
- Design projects designed to avoid reducing pre-treatment canopy cover by more than 30%.

- Design projects to retain at least 40% of existing basal area, generally comprised of the larger trees.
- Design projects to retain, where available, 5% of total treatment area in lower layers comprised of trees 6-24 inches dbh.
- Design projects to retain all live trees >30 inches dbh, exceptions allowed for safety and/or operability. Minimize impacts to ≥30 inch trees as much as practicable.

Large Trees

- Design projects to retain all live trees >30 inches dbh, exceptions allowed for safety and/or operability. Minimize impacts to ≥30 inch trees as much as practicable.

MITIGATION: A design feature would be in place to protect and retain large trees. During harvest activities ensure that fuels are clear from around large trees without damaging the tree. Prior to underburning, fuels loads would be removed or reduced around large trees which could be lost due to underburn activities.

Snags

- Determine snag retention levels on an individual basis. Design projects to sustain across the landscape a generally continuous supply of snags and live decadent trees suitable for cavity nesting wildlife. Retain some mid and large diameter live trees that are currently in decline, have substantial wood defect, or have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole) to serve as future replacement snags and to provide nesting structure.
- When determining snag retention levels, consider land allocation, desired condition, landscape position, and site conditions (such as riparian areas and ridgetops) avoiding uniform distribution across large areas. During project-level planning, consider the following guidelines for large-snag retention:
    - In westside mixed conifer and ponderosa pine types, four of the largest snags per acre.
    - In the red fir forest type, six of the largest snags per acre.
    - In westside hardwood ecosystems, four of the largest snags per acre (hardwood or conifer).
    - Where standing live hardwood trees lack dead branches, six of the largest snags per acre to supplement wildlife needs for dead material.
    - Use snags larger than 15 inches dbh to meet this guideline. Snags should be clumped and distributed irregularly across the treatment units. Consider leaving fewer snags strategically located in treatment areas within the WUI and DFPZs. While some snags will be lost due to hazard removal or use of prescribed fire, consider these potential losses during project planning to achieve desired snag retention levels.

MITIGATION: A design feature would be in place to retain existing snags, where feasible. During harvest activities ensure that fuels are clear from around snags. Prior to underburning, fuels loads would be removed or reduced around snags which could be lost due to underburn activities.

Large Down Wood

- Determine retention levels of down woody material on an individual project basis. Within Westside vegetation types, generally retain an average over the treatment unit of 10-15 tons of large down wood per acre. Emphasize retention of wood that is in the earliest stages of decay. Consider the effects of follow-up prescribed fire in achieving desired retention levels of down wood.

  MITIGATION: A design feature would be in place to **not** YUM (Yard Unmerchantable Material) logs 20 inches diameter and 10 feet length but to leave the cull logs to meet the large down wood standard, where feasible.

2.3.12 Heritage

Under Alternative B, Cultural Resources will be protected from all activities using the *Standard Resource Protection Measures* set forward in the Regional 106 Compliance Programmatic Agreement (USDA, 2001). All sites will be considered potentially eligible for the National Register and therefore will be protected until such time as an eligibility determination is made.

Archaeologist sites will be afforded protection using the *Standard Resource Protection Measures* set forward in the Regional 106 Compliance Programmatic Agreement, (USDA 2001), as follows:

- Within site boundaries felled trees may be removed using only hand bucking and carrying.
- No skidding or tracking equipment shall be allowed within historic property boundaries.
- All activities must be monitored by qualified heritage specialists at time of removal.
- Flag and avoidance of sites.
- A map showing the location of sites in the project area will be provided to the Forest Service Project Manager.
- Sites will be monitored during and after the project.
- If additional heritage resources are identified during the project activities, all work shall stop in that area until the District Archaeologist assesses the situation.
- Historic sites within burn units must have fire lines placed around them so they are not burnt over.
- Linear sites may be crossed or bounded in areas where their features or characteristics clearly lack historic integrity.

2.4 Alternative B – (Proposed Action)

The proposed action represents a cost-effective, integrated forest health, fuels reduction and scenic restoration strategy contributing to economic stability, while preserving recreational facilities and natural resources from high-intensity natural disturbances (targeting wildfire behavior, insect and disease levels). This Alternative is predicted to produce timber receipts from the sale of 3.8 million board feet of timber volume [12 percent biomass]), while providing up to 92 direct and indirect job opportunities. It also incorporates complimentary watershed health improvements including meadow and stream restoration along with repair of road infrastructures.

The proposed fuels reduction and forest health treatment prescriptions are unique to areas within and outside the Little Grass Valley (LGV) Reservoir Recreation Area, while the restoration is dispersed throughout the project area (see EA; appendix B for a map of the LGV Reservoir Recreation Area). The following section begins with a discussion of proposed activities inside the LGV Reservoir Recreation Area, than those proposed outside, followed by a detailed description of restoration. See below for a detailed listing of proposed treatment methods and treatment maps.

Table 2.2 Alternative B (proposed action) fuels and vegetative treatment by acres of forest type.

ALTERNATIVE B: Proposed (acres are rounded)

Acres	CWHR											
TREATMENT	**3D**	**3M**	**3P**	**3S**	**4D**	**4M**	**4P**	**5D**	**5M**	**5P**	**MCP**	**TOTAL**
GS					6	26		1	23			**56**
MT25%							14			33		**47**
MT35%						207						**207**
MT40%					40	12			268			**320**
MT60%								35				**35**
HCGP				28	111	107						**246**
HCPB	3	29	10	16	75	300	10		16			**459**
MAST		18	28	94	24	43		22	23	24	38	**314**
UB		73				34						**107**
ST	7					7	3					**17**
NT								6				**6**
TOTAL	**10**	**120**	**38**	**138**	**256**	**736**	**27**	**64**	**330**	**57**	**38**	**1814**

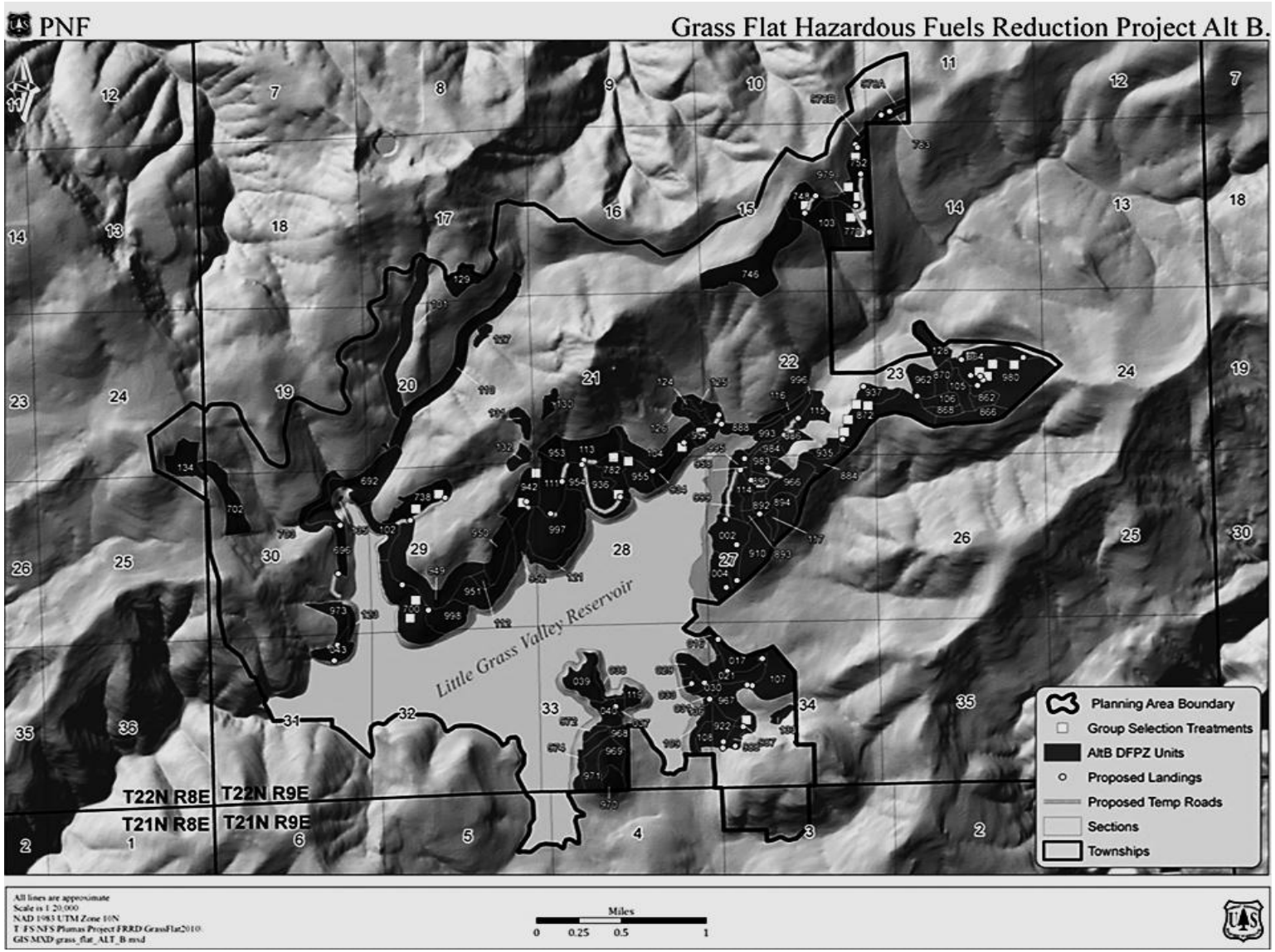


Figure 2-1 Map of Alternative B treatments by unit

***Treatments* Inside Developed Recreation Facilities in the Little Grass Valley (LGV) Reservoir Recreation Area:**

Defensible Fuel Profile Zones.

DFPZ treatments are designed to remove down and standing dead and live tree hazards around campsites and facilities, while thinning ladder fuels and removing surface fuels applying primarily manual treatments. Hand thinning of <9 inch dbh trees would appear natural, irregular appearance, with 3-5 trees in random clumps and openings 30-50 ft. wide between clumps. Residual trees would be thinned to varying spacing and selective pruned to remove dead limbs to create open views.

When thinning trees in campgrounds where *annosus root* disease is present, a mix of tree species and sizes other than true fir would retained. Preference for removal would be trees infected with dwarf mistletoe, root disease, trees infested with bark beetles and trees and those with extensive human caused injuries. Drought tolerant species such as Jeffrey pine and incense cedar would be retained over red and white fir to increase species diversity and make the stand more resilient to disturbance agents such as insects, disease, and fire.

In addition to reducing tree stress, thinning, especially of the understory, would somewhat reduce the risks and damage from any fire that might occur and provide a more defensible space for the campground. Focus would be on maintaining and protecting existing healthy Jeffrey pine, ponderosa pine and incense cedar as important secondary species. Diversity of tree species would help reduce the impact of existing biotic agents on residual trees, and add visual interest and structural elements to the forest surrounding the camping areas.

In lodgepole pine dominated lakeshore stands, mortality is occurring as a result of overstocking and trampling. Trees that have been heavily infected with western gall and stalactiform rust are a priority for removal. Even-aged lodgepole pine stands would be thinned to 80 to 100 square feet of basal area to lessen their risk to bark beetle attack. Areas of heavy fuel accumulations would be treated to reduce fuel hazards, particularly where human ignition is most likely.

Native trees (2+ year seedlings) and shrubs would be strategically planted to establish barriers to protect sensitive natural resource from trampling and between campsites to create visual privacy screens. Select large logs considered non-commerical would be used to restrict motor vehicle access and foot traffic to protect soils and wet seeps and springs.

Elements of a thinning regime for campgrounds should include a diversity of age and size classes to achieve a clumpy irregular natural looking appearance. To avoid wind throw and snow breakage, stocking reduction would occur over time. Selective pruning within the crown to remove the dwarf mistletoe infection would improve the health and vigor of the tree.

Materials left after hazard tree reduction and precommercial thinning, including any chips or pole size material would be utilized for campground restoration activities including fencing, barriers and trail surfacing. Large cull logs could be used to limit recreation impacts on stream areas.

Around the perimeter of the LGV Reservoir Recreation Area, particular along the primary access National Forest System road 22N57 designated as sensitive visual retention zones, tree density would be thinned to a minimum of 40 percent canopy cover, retaining a mixture of ages and species to provide for a continual forest canopy throughout the coming years.

The proposed action (Alternative B) would establish Defensible Fuel Profile Zones inside the LGV Reservoir Recreation Area by applying the following treatments:

- **Hazard Tree (no diameter restrictions) and Sanitation (up to 29.9 dbh) -** Treatment prescriptions would call for removal of structurally unstable, diseased, dead or dying trees within campsites to ensure public safety. Hazard tree removal would include dead or dying trees, dead parts (i.e., dead tops or limbs) of live trees, or unstable live trees that are likely to fall in the near future and are within the striking distance of people, facilities, or roads.

  Sanitation treatments would include removal of live disease and insect infected trees up to 29.9 inches in dbh to reduce potential spread, minimize site deterioration and improve stand health. Hazard tree marking guidelines would follow the Plumas National Forest "Roadside/Facility Hazard Tree Guidelines and Identification Criteria" (April 109, 2008) as amended by the "Hazard Tree Guidelines for Forest Service, Facilities and Roads in the Pacific Southwest" (Forest Health Protection, Pacific Southwest Region, Report #RO-12-01, April 2012).

- **Hand cut and remove 3-10.0 inches dbh-** Hand cutting and removal of trees and shrubs that are 3 feet in height to 10.0 inches diameter breast height (DBH) will be manually cut from beneath overstory trees, and aggregations of small-diameter conifers will be thinned for horizontal and vertical crown spacing. The cut trees, shrubs, and existing slash will be removed and disposed of offsite (either burned or chipped).

- **Hand Cutting and Tractor Piling of Trees and/or Shrubs, and Pile Burning or Biomass Removal 3.0- 9.9 inch dbh -** This treatment involves manual cutting of: (1) shrubs; (2) trees greater than 12 inches in height to less than 9 inches dbh from beneath overstory trees; and/or (3) thinning aggregations of 1 to 6 inches dbh conifers. Most trees cut would be 1–6 inches dbh. Cut trees, shrubs, and existing slash would be gathered into piles with a tractor containing a brush rake head and burned or chipped and removed. Spacing of residual conifers and black oaks would be approximately 18–24 feet (±25 percent) to allow retention of the healthiest, largest, and tallest conifers and black oaks and to avoid creating openings. Hand cutting and pile burning would be used to reduce fuels in areas where mechanical equipment is not allowed.

- **Planting -** Where openings have been created from hazard tree reduction or where additional screening is desired, planting Jeffrey pine, rust-resistant sugar pine and incense cedar saplings would provide replacement trees. Incense cedar may be utilized as a low vegetation screen, as it maintains its limbs in an open grown situation, and may also be utilized as a physical barrier to the spread of mistletoe between trees. Hardwoods such as black oak (*Quercus kelloggii*) would also be considered as replacements for some more rocky areas found around the lake. New stocking levels would be mimic natural regeneration with a widely varied spacing; open sparse areas would then contrast with more heavily stocked areas.

Treatments Outside Developed Recreation Facilities in the Little Grass Valley (LGV) Reservoir Recreation Area:

Defensible Fuel Profile Zones (DFPZs) and Group Selections (GSs).

The proposed vegetation and fuels reduction treatment prescriptions are spatially unique, as a "one-size fits all" strategy would not adequately achieve desired condtions. Alternative B incorporates guidance from the General Technical Reports PSW–GTR-220, *An Ecosystem management Strategy for Sierran Mixed-Conifer Forests* (USDA 2009) and PSW-GTR-237 (USDA 2012); considering spatial variations in disturbance mechanisms.

DFPZ and Group Selection treatments are designed to increase forest heterogeneity by creating horizontal and vertical structural diversity, including canopy gaps and open canopy stand conditions, favorable for altering fire behavior and establishing shade-intolerant pine and hardwood dominated forests. DFPZs would retain many beneficial characteristics such as spacing between overstory tree crowns and reduced ladder fuels that will aid in fighting fire and reducing fire intensity; designed to be effective for 10-15 years.

Fuels treatments in this alternative follow Agee's four basic principles of effective fuels reduction; reduction of surface fuels, increase canopy base heights, decrease crown density and retain large fire resistant trees (Agee and Skinner, 2005), positioned strategically to connect the Bald Onion DFPZ (to the north), proposed Sugarloaf DFPZs to the south, dispersed defensible space established by the private landowners and areas where small scale fuels reduction projects have been implemented, as described below.

Table 2.3 Proposed Treatment Schedule for Defensible Fuel Profiles Zones (DFPZs)

Year	Activity	Method
1	Harvest DFPZ	Whole Tree sawlog with or without biomass option
2	Fuels Pre-treatment	Hand cut Tractor pile
3	Fuels Treatment	Burn Piles or Underburn

*Burning may be extended beyond year 3 as prescriptions become attainable.

Defensible fuels profile zones (DFPZs) would reduce fuels on strips of land from ¼ to ½ mile wide on approximately 1,814 acres, featuring a range of forest canopy covers and amounts of down wood, depending on proximity to recreational infrastructures, topographic position, forest stand and correlating habitat conditions (California Wildlife Habitat Relationship [CWHR] type) and desired condition objectives.

Group selection (GS) harvests would be implemented on 56 acres, involving the removal of trees less than 30 inches diameter breast height (dbh) in 0.5 to 2 acre patches within DFPZ treatment units. Group Selection treatments would reduce trees per acre by greater than 90 percent, on average, and would reduce basal area per acre by 75 percent on average within the immediate one to two acre group.

Mechanical treatments function to alter canopy cover (CC), vegetative structure and trees densities at a forest stand scale to affect fire behavior and reduce public safety hazards, while perserving wildlife habitats, plant communities and promoting scenic integrity.

Within DFPZs, the reduction of pre-treatment canopy by more than 30 percent would be avoided and preclude the reduction of canopy cover to the allowable 40 percent minimum in CWHR size class 5 stands.

Conifers ranging from 9.0 to 29.9 inch dbh would be removed (harvested) as necessary to achieve desired DFPZ tree canopy cover reductions of 35- 40 percent in most mid-seral CWHR 4M stands. The reduction in inter-tree competition for solar radiation, nutrients and water (necessary for growth) would act to accelerate growth and promote the vigor of residual trees into later-seral open canopy stands, characterized by CWHR 5. Treatments in CWHR 5M stands would maintain more closed-canopy conditions from 40 to 45 percent canopy, as well as more intermediate (up to 30 inch dbh) and large-sized trees (>30 inch dbh). Overall, canopy cover would be reduced by 28 percent on average from existing conditions within DFPZ mechanical thinning units.

Overall, the proposed action applies more restrictive prescriptions to riparian habitat conservation areas (RHCAs), CWHR 5M/5D, and California spotted owl home range core area (HRCA) land allocations, as they relate to CCs and general retention size for trees. Hardwoods less than 8 inches dbh would be retained as feasible to meet future recruitment needs for retention of 25 to 35 square feet per acre of oaks greater than 15 inches dbh. Conifers and hardwoods from 3 feet in height to 10.0 inches dbh are considered biomass and would be thinned, piled and burned.

A borax compound would be applied to approximately 370 acres within the recreation area and 540 acres outside the recreation area with evidence of annosus root rot (*Heterobasidium annosum*). In these areas, borax would be applied to all harvested stumps ≥ 3 inches in diameter in the recreation area and ≥ 14 inches outside the recreation area. Approximately 47 acres in forest stands heavily affected with *Heterobasidion* root rot are proposed to be thinned to 25 percent canopy cover to promote forest health. Forest canopy cover would be reduced to 35 percent on 233 acres to address blister rust and other tree diseases.

Whole tree-ground based logging systems utilizing mechanized thinning and biomass removal would be used in the construction of DFPZs. Whole tree yarding removes most limbs and tree tops from the stand, effectively reducing the need for post-project slash pile fuels treatments. Mechanical equipment used in thinning operations would not impact Riparian Habitat Conservation Areas (RHCAs) as buffers for would be in place for protection and only underburning would be used for treatment. After thinning, pile burning would be used to treat residual slash and pre-existing fuels and shrub where necessary.

The proposed action (Alternative B) would establish Defensible Fuel Profile Zones and Group Selections outside of the LGV Reservoir Recreation Area by applying the following treatments:

- **Mechanical Thinning up to 29.9 dbh inch trees to 25 – 50 percent canopy cover** – Some units were found to comprise 25 to 35 percent canopy cover per-treatment. Treatment prescriptions would call for removal of the smaller, suppressed, and intermediate-crown-class trees; removal of some co-dominant trees; and retention of the largest trees to achieve fire resiliency, target canopy cover and/or spacing guidelines. Species preference for the residual trees would include shade-intolerant species where they exist. Ponderosa pine is most preferable, followed in order by Jeffrey pine, sugar pine, Douglas-fir, black oak, incense-cedar, and true fir. The largest snag trees (>15 inches dbh), will be retained at 4 trees per acre where available to provide for habitat needs of old forest-associated wildlife species.

- **Hand cut and remove 3-10.0 inches dbh-** Hand cutting and removal of trees and shrubs that are 3 feet in height to 10.0 inches diameter breast height (DBH) will be manually cut from beneath overstory trees, and aggregations of small-diameter conifers will be thinned for horizontal and vertical crown spacing. The cut trees, shrubs, and existing slash will be removed and disposed of offsite (either burned or chipped).

- **Hand Cutting and Tractor Piling of Trees and/or Shrubs, and Pile Burning or Biomass Removal 3- 9 inch dbh -** This treatment involves manual cutting of: (1) shrubs; (2) trees greater than 12 inches in height to less than 9 inches dbh from beneath overstory trees; and/or (3) thinning aggregations of 1 to 6 inches dbh conifers. Most trees cut would be 1–6 inches dbh. Cut trees, shrubs, and existing slash would be gathered into piles with a tractor containing a brush rake head and burned or chipped and removed. Spacing of residual conifers and black oaks would be approximately 18–24 feet (±25 percent) to allow retention of the healthiest, largest, and tallest conifers and black oaks and to avoid creating openings. Hand cutting and pile burning would be used to reduce fuels in areas where mechanical equipment is not allowed.

- **RHCA Underburning –** Prescribed underburning would be used to treat excess live and dead vegetation. Treatment in Riparian Habitat Conservation Areas (RHCAs) would be limited to underburning. Ignition would occur along contour strips upslope of the RHCA and fire would be allowed to back down-slope into them.

- **Prescribed Burning**. Prescribed burning would be used to treat excess live and dead vegetation, including hardwoods or conifers. This type of burning would be employed when fuel moisture levels are low enough to carry fire and still be within prescription parameters. Burning can only be initiated on "Burn Days" as designated by the State Air Quality Control Board. After burning, residual fuels (<3 inches dbh) would not exceed 5 tons per acre. Where available, an average over the treatment unit of 10–15 tons per acre of large down wood >12 inches dbh would be retained. Firelines would be constructed by mechanical or manual methods, whereby surface fuels would be scraped to expose mineral soil. Dead fuel would be scattered away from the handline for approximately six feet on either side. Firelines would be constructed mechanically with surface fuels scraped to mineral soil approximately six feet wide and vegetation cleared to approximately ten feet either side.

- **DFPZ Maintenance -** In July of 2003, a ROD was signed for the HFQLG FSEIS. It documented the results of an environmental analysis of the effects of alternative management strategies for maintenance of DFPZs within the HFQLG Pilot Project area. The HFQLG FSEIS and ROD, in combination with the original HFQLG Act FEIS and ROD, provide programmatic guidance for DFPZ construction and maintenance in the HFQLG Pilot Project area. The HFQLG FSEIS ROD calls for consideration of all practicable methods of vegetation control for site-specific projects. Even if no maintenance is conducted in these DFPZs, the DFPZs should be effective for 10-15 years. In the natural stands, the DFPZs' effectiveness should not be seriously reduced for 10 to 15 years.

Transportation Improvements:

The National Forest System transporation system provides safe passage for Forest Service administration, cooperator emergency vehicles and to meet public access needs. The following transportation improvements required to implement DFPZ and group selection mechanical treatments:

- Up to 1.8 miles of existing temporary spur roads will be opened to provide access to the DFPZ and group select treatment areas;

- Up to 0.9 miles of new temporary road will be constructed to provide access to treatment areas where existing road access is absent, but needed to facilitate the removal of wood products from the DFPZ and group select treatment units and to move landings away from Forest Service road 22N57 to comply with visual retention guidelines;

- Harvest landing construction and reconstruction are needed to facilitate removal of wood products.

The road system and improvements would be constructed to minimize adverse effects on resources such as watershed and wildlife. All temporary spurs which are re-opened or newly constructed would be water-barred and closed after operations are completed to reduce erosion, sedimentation, soil compaction, and impacts to wildlife.

Roads near streams or in riparian zones have the greatest probability of intercepting, concentrating, and diverting flows from natural flow paths and would therefore be minimized where feasible. No new temporary roads would be constructed close to streams or riparian areas. Any existing spur road within a riparian management zone needed for unit access would leave regenerated vegetation along the stream side undisturbed and would be water-barred and permanently closed after use.

To implement vegetation treatments within the recreation area and adjacent locations there may be a need to phase project activities to accommodate seasonal visitor usage to provide for access and safety. If so, traffic control and/or signs would be provided as needed.

Restoration Watershed, Riparian, Aquatic and Wildlife Habitat Treatments

Meadows and wetlands are rich and diverse habitats for many species of flora and fauna. The previous century bore witness to an age of largely unmanaged and unsustainable human use, often resulting in the degradation and destruction of many of these valuable entities. The health of meadows and wetlands are good indicators of overall watershed condition and hydrologic function. Healthy meadows and wetlands filter sediment from water flowing from their vicinity, providing suitably clean water for fish and human use while providing habitat for aquatic species (Ratliff, 1985).

Active and passive restoration of meadows and wetlands would promote an increase in their water storage capacity (Lindquist and Wilcox, 2000), their flora and fauna diversity, and their sediment filtering capacity (Lang and Halpern, 2007; Ratliff, 1985). It would also facilitate the reestablishment of a natural fire disturbance regime to help impede conifer re-encroachment in the future (DeBenedetti and Parsons, 1979, 1984).

Meadow and Wetlands*:* There are approximately 15 acres spread across 12 meadows and wetlands recommended for active restoration, where management activities will be performed within and around the boundaries of the meadows and wetlands to improve their health, reclaim their lost territory and fortify them against future damage. Restoration activities include the removal of encroaching conifers, and on sites within or adjacent to developed recreation areas, the installation of interpretive signs and infrastructure (trail armoring and installation of a bridge) to lessen anthropogenic impacts.

There are also 36 other meadows and wetlands, a total of about 19 acres, proposed for passive restoration, where treatment in the form of encroaching conifer removal is implemented up to the outer boundaries of these meadows and wetlands. Table 2.3 below shows details of the proposed meadow and wetland restoration treatments.

Hydrologic Feature	Hydrology Name Designation	Acres	Treatment within Meadows and Wetlands	Other
Meadow	021M1	0.64	HCPB conifers < 6" DBH. Hand fell and leave conifers ≥ 6" and ≤ 29.99" DBH within meadow. Hydrology Dept. will mark ***cut*** trees.	Erect Interpretive signs
Meadow	021M2	0.44	Handcut conifers < 6" DBH, then pile and burn outside meadow.	
Alderbog	021M3	5.45	Handcut conifers < 6" DBH, then pile and burn outside alderbog. Hand fell and yard (where feasible) conifers ≥ 6" ≤ 29.99" DBH. Hydrology Dept. will mark ***cut*** trees.	
Meadow	031-109M	0.37	Handcut conifers < 6" DBH, then pile and burn outside meadow. Hand fell and leave conifers ≥ 6" ≤ 29.99" DBH within meadow. Hydrology Dept. will mark ***cut*** trees.	
Meadow	109M	0.30	HCPB conifers < 6" DBH. Hand fell and leave inside meadow conifers ≥ 6" ≤ 29.99" DBH. Hydrology Dept. will mark ***leave*** trees.	Put in small footbridge or armor stream
Meadow	109-922M	0.53	HCPB conifers < 6" DBH. Hand fell and yard conifers ≥ 6" ≤ 29.99" DBH. Hydrology Dept. will mark ***cut*** trees.	
Alderbog	967M1	0.66	HCPB conifers < 6" DBH. Hand fell and yard conifers ≥ 6" ≤ 29.99" DBH. Hydrology Dept. will mark ***cut*** trees.	
Meadow	967M2	0.16	HCPB conifers < 6" DBH. Hand fell and yard conifers ≥ 6" ≤ 29.99" DBH. Hydrology Dept. will mark ***cut*** trees.	
Meadow	966M1	0.13	Handcut conifers < 6" DBH, then pile and burn outside of meadow. Hand fell and leave conifers ≥ 6" ≤ 29.99" DBH within meadow. Botany Dept. will coordinate with Hydrology Dept. to mark ***cut*** trees.	
Meadow	966M2	0.37	HCPB conifers < 6" DBH.	
Meadow	993M	0.46	HCPB conifers < 6" DBH. Hand fell and leave conifers ≥ 6" ≤ 29.99" DBH within meadow. Hydrology Dept. will mark ***cut*** trees.	
Fen	124M	5.04	Handcut conifers < 6", then pile and burn outside fen. Hand fell and yard conifers ≥ 6" ≤ 29.99" DBH. Hydrology Dept. will mark ***cut*** trees.	
	Total Acres	14.56		

Table 2.3. Treatments Proposed for the 12 Active Restoration Meadows and Wetlands Stream Channel Restoration.

Continuity and Streambank Stability. Two streams (total length 726 feet (630 ft. + 96 ft. or 0.14 miles) are identified as having been diverted from their historic channels would be realigned. Both these streams are fed by springs. One stream is diverted by a legacy road while the other is diverted by an old skid. Two other streams, including the fish-bearing South Fork Feather River, have streambank instability issues and are proposed for streambank stabilization work.

Streambank Planting. Select barren or sparsely vegetated streambanks on the South Fork Feather River and an intermittent tributary to Black Rock Creek would be planted with native vegetation on 24 acres.

Two stream crossing culverts are recommended for action: one for removal and one for an upgrade. The stream crossing culvert proposed for removal is on an old decommissioned road crossing a perennial stream that feeds directly into the reservoir. It is currently undersized, plugged and in danger of failing. If the crossing fails, it would contribute to increased sediment delivery to the stream and reservoir. The stream crossing culvert proposed for an upgrade on the 22N57 road is also undersized and completely buried, causing the ephemeral stream to flow over the road during storm events.

***Reforestation*:** Plantation acres exist in the project area. They vary in age from 3 years to 30 years old. The species composition consists of ponderosa pine, Jeffrey pine, sugar pine, Douglas-fir, and incense cedar.

Replanting within the recreation area is a multi-faceted design strategically planned to provide screening between campsites, provide soil stability and erosion control in and adjacent to foot traffic areas, as well as to restore the pine component and mixed conifer setting which was historically prolific throughout the project area. Unlike in most plantations where it is common to stock them with one or two year old seedling, the campgrounds and campsites will require a larger more mature stock to withstand the daily influx of traffic. In order to maximize survival opportunities, each newly create plantation will need to have a site preparation treatment. These treatments would include mechanical methods and/ or prescribed fire.

***Plantation Maintenance*:** Maintenance in plantations is extremely critical to the health and growth of young conifers. A treatment or in some cases multiple treatments during a young tree's life will free them from suppression of competing vegetation and enhance the growth and vigor. The treatment methods that will be used will include hand cutting and piling, and/ or under burning on slopes greater than 40% and grapple piling, masticating, pulling root sprouts, and/ or under burning on slope less than 40%.

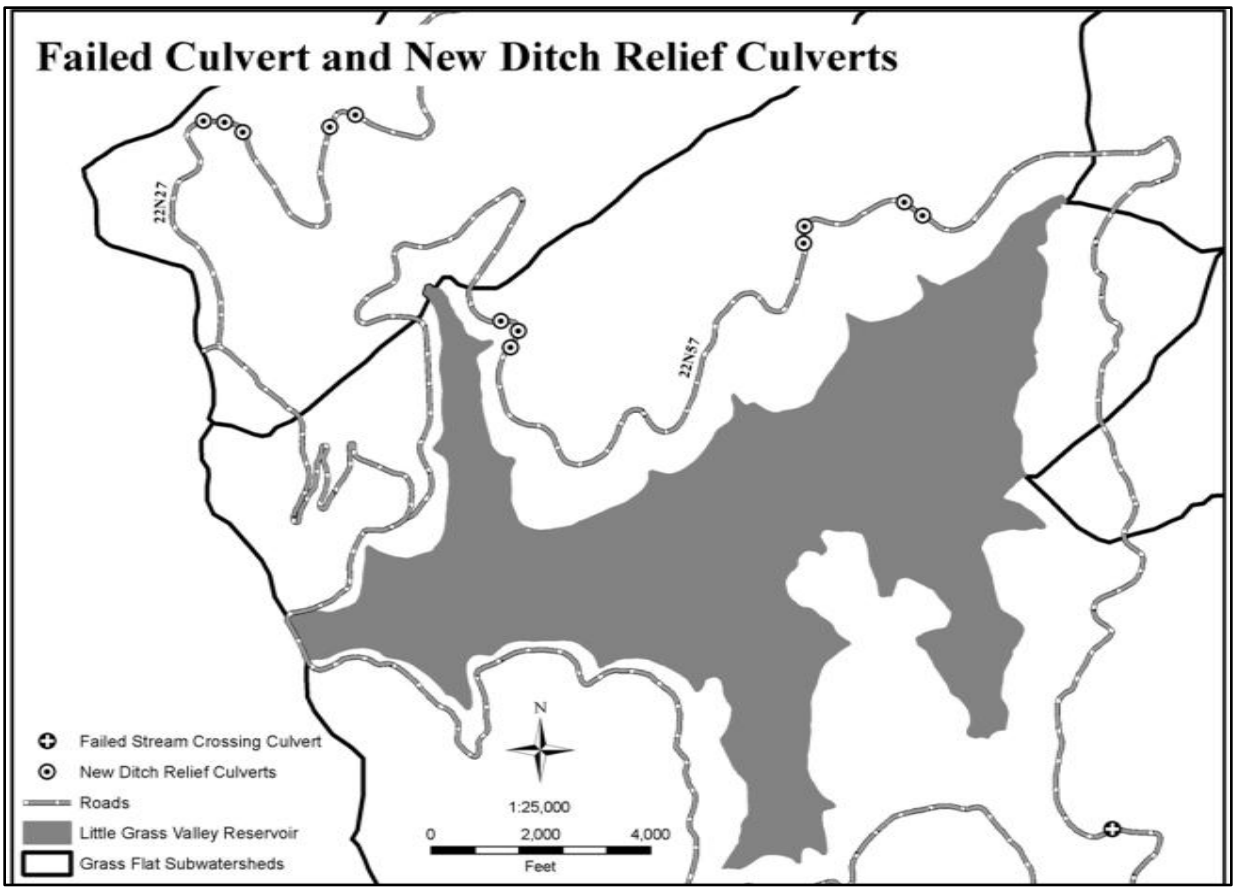
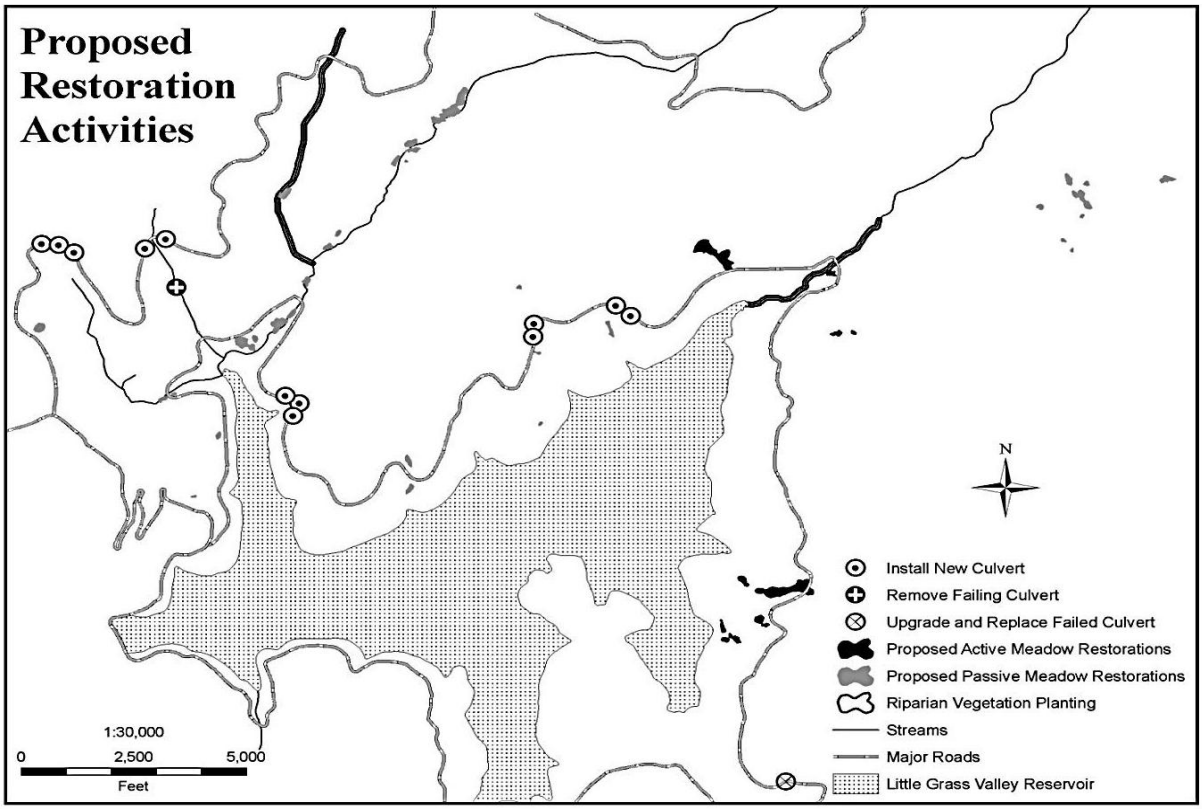
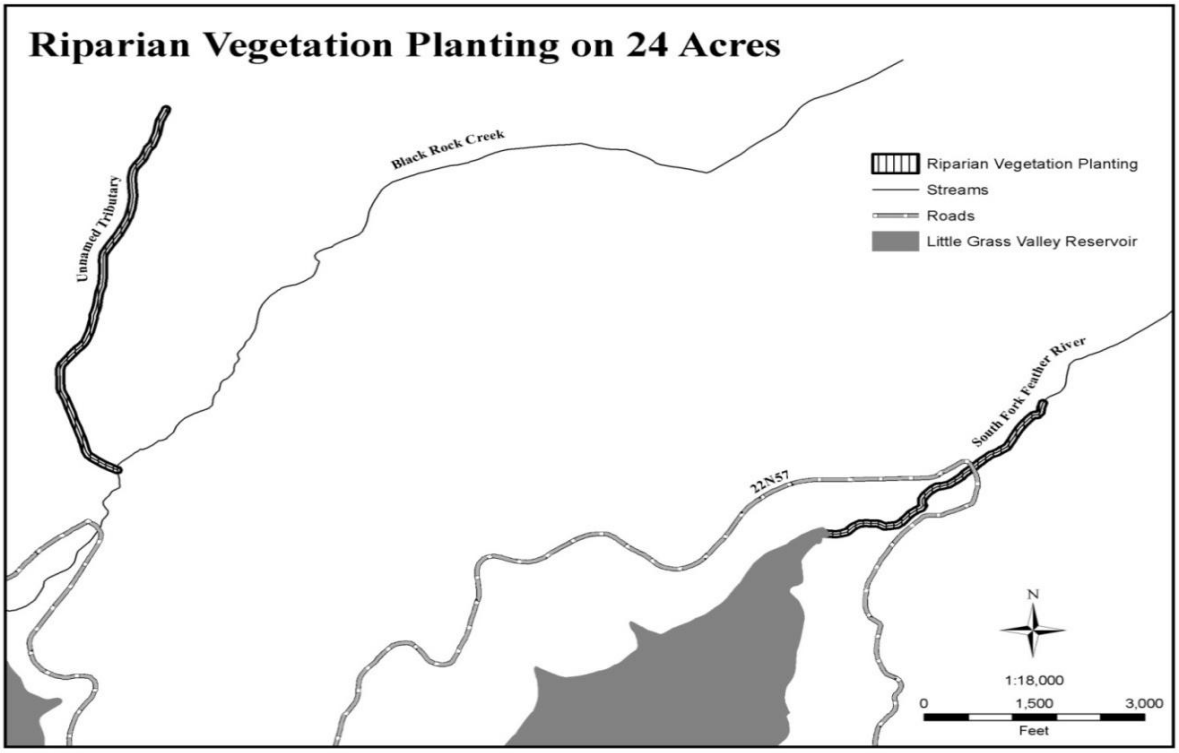


Figure 2-2 Map showing failed stream crossing culvert and new ditch relief culverts.





Figures 2-3 and 2-4 Maps showing proposed restoration activities and riparian vegetation planting.

2.5 Modified Alternative B – (Preferred)

Modified Alternative B is similar to Alternative B, with the exception of proposed treatments to incorporate GTR-220 and GTR-237 concepts by retaining more acres of higher canopy cover (40 percent vs. 25-35 percent over 281 acres) in CWHR size classes 4M/5D and 5M/5D, while preserving strategically positioned key wildlife habitats east of Little Grass Valley (LGV) Reservoir Recreation Area. Alternative B would produce approximately 2.8 million board feet of timber volume (mmbf), including 30 acres of biomass removal.

The modifications to the proposed action are based on issues raised by the public to apply GTR concepts and retain a minimum 50 percent canopy cover within California spotted owl home range core areas (CSO HRCAs), forest carnivore movement areas and with CWHR 5D /5M habitats. The Grass Flat Prescription and Marking Guidelines incorporate elements from GTR-220 and GTR-237, which include variable density (gaps, low and high density matrix), radial thinning around black oaks and large legacy conifers, retaining some areas or stands with higher canopy cover (i.e., 50 and 60 percent), and retaining some trees for future snags and wildlife habitat (roosting, nesting, etc.). The low density matrix would be located near the upper slopes, ridge tops, and along roads. The high density matrix would be located on the lower slopes and near stream drainages. However, due to previous management activities and the existence of root disease in the fir within the recreation areas concepts of PSW GTR-220 and GTR-237 lacks the intent of the purpose and need for this particular project location.

The Forest Service reviewed preliminary analysis to wildlife species of concern and available management options to maintain more old forest components and contiguous corridors needed for wildlife habitat.

Modified Alternative B, the preferred alternative, includes canopy cover reduction based on size class with CWHR 4s to 40 percent and CWHR 5s to 50 percent with two units of CWHR 5Ms to remain at 60 percent. Utilizing this criterion, group selection would remain at 56 acres (17 units) similar to Alternative B; however 11 of the units would not be thinned around the group selections. Instead, only hand cut and pile burning would be implmented to maintain a higher level of canopy cover throughout. Six units would be thinned from 40 to 50 percent depending on CWHR typing. See EA; section 2.6 Comparison of Alternatives Considered in Detail. The proposed fuels reduction and forest health treatment prescriptions are unique to areas within and outside the Little Grass Valley (LGV) Reservoir Recreation Area, while the restoration is dispersed throughout the project area. The following section begins with a discussion of proposed activities inside the LGV Reservoir Recreation Area, than those proposed outside, followed by a detailed description of restoration. See below for a detailed listing of proposed treatment methods and treatment maps.*Treatments Inside Developed Recreation Facilities in the Little Grass Valley (LGV) Reservoir Recreation Area:*

Defensible Fuel Profile Zones.

DFPZ treatments are designed to remove down and standing dead and live tree hazards around campsites and facilities, while thinning ladder fuels and removing surface fuels applying primarily manual treatments. Hand thinning of <9 inch dbh trees would appear natural, irregular appearance, with 3-5 trees in random clumps and openings 30-50 ft. wide between clumps. Residual trees would be thinned to varying spacing and selective pruned to remove dead limbs to create open views.

When thinning trees in campgrounds where *annosus root* disease is present, a mix of tree species and sizes other than true fir would retained. Preference for removal would be trees infected with dwarf mistletoe, root disease, trees infested with bark beetles and trees and those with extensive human caused injuries.

Drought tolerant species such as Jeffrey pine and incense cedar would be retained over red and white fir to increase species diversity and make the stand more resilient to disturbance agents such as insects, disease, and fire.

In addition to reducing tree stress, thinning, especially of the understory, will somewhat reduce the risks and damage from any fire that might occur and provide a more defensible space for the campground. Focus would be on maintaining and protecting existing healthy Jeffrey pine, ponderosa pine and incense cedar as important secondary species. Diversity of tree species would help reduce the impact of existing biotic agents on residual trees, and add visual interest and structural elements to the forest surrounding the camping areas.

In lodgepole pine dominated lakeshore stands, mortality is occurring as a result of overstocking and trampling. Trees that have been heavily infected with western gall and stalactiform rust are a priority for removal. Even-aged lodgepole pine stands would be thinned to 80 to 100 square feet of basal area to lessen their risk to bark beetle attack. Areas of heavy fuel accumulations would be treated to reduce fuel hazards, particularly where human ignition is most likely.

Native trees (2+ year seedlings) and shrubs would be strategically planted to establish barriers to protect sensitive natural resource from trampling and between campsites to create visual privacy screens. Select large logs considered non-commerical would be used to restrict motor vehicle access and foot traffic to protect soils and wet seeps and springs.

Elements of a thinning regime for campgrounds should include a diversity of age and size classes to achieve a clumpy irregular natural looking appearance. To avoid wind throw and snow breakage, stocking reduction would occur over time. Selective pruning within the crown to remove the dwarf mistletoe infection would improve the health and vigor of the tree.

Materials left after hazard tree reduction and precommercial thinning, including any chips or pole size material would be utilized for campground restoration activities including fencing, barriers and trail surfacing. Large cull logs could be used to limit recreation impacts on stream areas.

Around the perimeter of the LGV Reservoir Recreation Area, particular along the primary access National Forest System road 22N57 designated as sensitive visual retention zones, tree density would be thinned to a minimum of 40 percent canopy cover, retaining a mixture of ages and species to provide for a continual forest canopy throughout the coming years.

The proposed action (Alternative B) would establish Defensible Fuel Profile Zones inside the LGV Reservoir Recreation Area by applying the following treatments:

Hazard Tree (no diameter limit) - Hazard tree removal would include removing dead trees, dead parts (i.e., dead tops or limbs) of live trees or unstable live trees that are likely to fall and are within the striking distance of people, facilities, or roads. Hazard tree marking guidelines would follow the Plumas National Forest "Roadside/Facility Hazard Tree Guidelines and Identification Criteria" (April 109, 2008) as amended by the "Hazard Tree Guidelines for Forest Service, Facilities and Roads in the Pacific Southwest" (Forest Health Protection, Pacific Southwest Region, Report #RO-12-01, April 2012).

- **Sanitation (up to 29.9 dbh)** Sanitation treatments would include removal of live disease and insect infected trees up to 29.9 inches in dbh to reduce potential spread, minimize site deterioration and improve stand health.

- **Hand cut and remove 3-10.0 inches dbh-** Hand cutting and removal of trees and shrubs that are 3 feet in height to 10.0 inches diameter breast height (DBH) will be manually cut from beneath overstory trees, and aggregations of small-diameter conifers will be thinned for horizontal and vertical crown spacing. The cut trees, shrubs, and existing slash will be removed and disposed of offsite (either burned or chipped).

- **Hand Cutting and Tractor Piling of Trees and/or Shrubs, and Pile Burning or Biomass Removal 3- 9 inch dbh -** This treatment involves manual cutting of: (1) shrubs; (2) trees greater than 12 inches in height to less than 9 inches dbh from beneath overstory trees; and/or (3) thinning aggregations of 1 to 6 inches dbh conifers. Most trees cut would be 1–6 inches dbh. Cut trees, shrubs, and existing slash would be gathered into piles with a tractor containing a brush rake head and burned or chipped and removed. Spacing of residual conifers and black oaks would be approximately 18–24 feet (±25 percent) to allow retention of the healthiest, largest, and tallest conifers and black oaks and to avoid creating openings. Hand cutting and pile burning would be used to reduce fuels in areas where mechanical equipment is not allowed.

- **Planting -** Where openings have been created from hazard tree reduction or where additional screening is desired, planting Jeffrey pine, rust-resistant sugar pine and incense cedar saplings would provide replacement trees.
  Incense cedar may be utilized as a low vegetation screen, as it maintains its limbs in an open grown situation, and may also be utilized as a physical barrier to the spread of mistletoe between trees. Hardwoods such as black oak (*Quercus kelloggii*) would also be considered as replacements for some more rocky areas found around the lake. New stocking levels would be mimic natural regeneration with a widely varied spacing; open sparse areas would then contrast with more heavily stocked areas.

Treatments Outside Developed Recreation Facilities in the Little Grass Valley (LGV) Reservoir Recreation Area:

Defensible Fuel Profile Zones (DFPZs) and Group Selections (GSs).

Identifical to Alternative B, Modified Alternative B incorporates guidance from the General Technical Reports PSW–GTR-220, *An Ecosystem management Strategy for Sierran Mixed-Conifer Forests* (USDA 2009) and PSW-GTR-237 (USDA 2012); considering spatial variations in disturbance mechanisms.

DFPZ and Group Selection treatments are designed to increase forest heterogeneity by creating horizontal and vertical structural diversity, including canopy gaps and open canopy stand conditions, favorable for altering fire behavior and establishing shade-intolerant pine and hardwood dominated forests. DFPZs would retain many beneficial characteristics such as spacing between overstory tree crowns and reduced ladder fuels that will aid in fighting fire and reducing fire intensity; designed to be effective for 10-15 years.

Fuels treatments in this alternative follow Agee's four basic principles of effective fuels reduction; reduction of surface fuels, increase canopy base heights, decrease crown density and retain large fire resistant trees (Agee and Skinner, 2005), positioned strategically to connect the Bald Onion DFPZ (to the north), proposed Sugarloaf DFPZs to the south, dispersed defensible space established by the private landowners and areas where small scale fuels reduction projects have been implemented, as described below.

Table 2.4. Proposed Treatment Schedule for Defensible Fuel Profiles Zones (DFPZs)

Year	Activity	Method
1	Harvest DFPZ	Whole Tree sawlog with or without biomass option
2	Fuels Pre-treatment	Hand cut Tractor pile
3	Fuels Treatment	Burn Piles or Underburn

*Burning may be extended beyond year 3 as prescriptions become attainable.

Defensible fuels profile zones (DFPZs) would reduce fuels on strips of land from ¼ to ½ mile wide on approximately 1,814 acres, featuring a range of forest canopy covers and amounts of down wood, depending on proximity to recreational infrastructures, topographic position, forest stand and correlating habitat conditions (California Wildlife Habitat Relationship [CWHR] type) and desired condition objectives.

Group selection (GS) harvests would be implemented on 56 acres, involving the removal of trees less than 30 inches diameter breast height (dbh) in 0.5 to 2 acre patches within DFPZ treatment units. Group Selection treatments would reduce trees per acre by greater than 90 percent, on average, and would reduce basal area per acre by 75 percent on average within the immediate one to two acre group.

Mechanical treatments function to alter canopy cover (CC), vegetative structure and trees densities at a forest stand scale to affect fire behavior and reduce public safety hazards, while perserving wildlife habitats, plant communities and promoting scenic integrity. Within DFPZs, the reduction of pre-treatment canopy by more than 30 percent would be avoided and preclude the reduction of canopy cover to the allowable 40 percent minimum in CWHR size class 5 stands.

Conifers ranging from 10.0 to 29.9 inch dbh would be removed (harvested) as necessary to achieve desired DFPZ tree canopy cover of 40 – 50 percent in mid-seral CWHR 4M/4D and 5M/5D stands. The reduction in inter-tree competition for solar radiation, nutrients and water (necessary for growth) would act to accelerate growth and promote the vigor of residual trees into later-seral open canopy stands, characterized by CWHR 5. Treatments in CWHR 5M stands would maintain more intermediate (up to 30 inch dbh) and large-sized trees (>30 inch dbh).

Overall, the proposed action applies more restrictive prescriptions to riparian habitat conservation areas (RHCAs), CWHR 5M/5D, and California spotted owl home range core area (HRCA) land allocations, as they relate to CCs and general retention size for trees. Hardwoods less than 8 inches dbh would be retained as feasible to meet future recruitment needs for retention of 25 to 35 square feet per acre of oaks greater than 15 inches dbh. Conifers and hardwoods from 3 feet in height to 10.0 inches dbh are considered biomass and would be thinned, piled and burned.

A borax compound would be applied to approximately 370 acres within the recreation area and 540 acres outside the recreation area with evidence of annosus root rot (*Heterobasidium annosum*). In these areas, borax would be applied to all harvested stumps ≥ 3 inches in diameter in the recreation area and ≥ 14 inches outside the recreation

Whole tree-ground based logging systems utilizing mechanized thinning and biomass removal would be used in the construction of DFPZs. Whole tree yarding removes most limbs and tree tops from the stand, effectively reducing the need for post-project slash pile fuels treatments. Mechanical equipment used in thinning operations would not impact Riparian Habitat Conservation Areas (RHCAs) as buffers for would be in place for protection. Only hand cut,handpile and pile burning or underburning would be applied.

The proposed action (Alternative B) would establish Defensible Fuel Profile Zones and Group Selections outside of the LGV Reservoir Recreation Area by applying the following treatments:

- **Mechanically thin from 40 to 59 percent canopy** with removal of trees from 10 inches dbh to 29.9 inches dbh, including Borax stump treatment on stumps greater than 14 inches in diameter. The spacing of residual conifers would be approximately 18 – 24 feet (± 25%) to allow retention of the healthiest, largest, and tallest conifers and to avoid creating openings.

  Hand cut and remove 3.0 – 10.0 inches dbh- Hand cutting and removal of trees and shrubs that are 3 feet in height to 10.0 inches diameter breast height (DBH) would be manually cut from beneath overstory trees, and aggregations of small-diameter conifers would be thinned for horizontal and vertical crown spacing. The cut trees, shrubs, and existing slash will be removed and disposed of offsite (either burned or chipped).

- **Hand Cutting and Tractor Piling of Trees and/or Shrubs, and Pile Burning or Biomass Removal 3.0 - 9.9 inch dbh** - This treatment involves manual cutting of: (1) shrubs; (2) trees greater than 12 inches in height to less than 10 inches dbh from beneath overstory trees; and/or (3) thinning aggregations of 1 to 6 inches dbh conifers. Most trees cut would be 1–6 inches dbh. Cut trees, shrubs, and existing slash would be gathered into piles with a tractor containing a brush rake head and burned or chipped and removed. Spacing of residual conifers and black oaks would be approximately 18–24 feet (±25 percent) to allow retention of the healthiest, largest, and tallest conifers and black oaks and to avoid creating openings. Hand cutting and pile burning would be used to reduce fuels in areas where mechanical equipment is not allowed.

- **RHCA Underburning –** Prescribed underburning would be used to treat excess live and dead vegetation. Treatment in Riparian Habitat Conservation Areas (RHCAs) would be limited to underburning. Ignition would occur along contour strips upslope of the RHCA and fire would be allowed to back down-slope into them.

- **Prescribed Burning**. Prescribed burning would be used to treat excess live and dead vegetation, including hardwoods or conifers. This type of burning would be employed when fuel moisture levels are low enough to carry fire and still be within prescription parameters. Burning can only be initiated on “Burn Days” as designated by the State Air Quality Control Board. After burning, residual fuels (<3 inches dbh) would not exceed 5 tons per acre. Where available, an average over the treatment unit of 10–15 tons per acre of large down wood >12 inches dbh would be retained. Firelines would be constructed by mechanical or manual methods, whereby surface fuels would be scraped to expose mineral soil. Dead fuel would be scattered away from the handline for approximately six feet on either side. Firelines would be constructed mechanically with surface fuels scraped to mineral soil approximately six feet wide and vegetation cleared to approximately ten feet either side.

- **DFPZ Maintenance -** In July of 2003, a ROD was signed for the HFQLG FSEIS. It documented the results of an environmental analysis of the effects of alternative management strategies for maintenance of DFPZs within the HFQLG Pilot Project area. The HFQLG FSEIS and ROD, in combination with the original HFQLG Act FEIS and ROD, provide programmatic guidance for DFPZ construction and maintenance in the HFQLG Pilot Project area. The HFQLG FSEIS ROD calls for consideration of all practicable methods of vegetation control for site-specific projects. Even if no maintenance is conducted in these DFPZs, the DFPZs should be effective for 10-15 years. In the natural stands, the DFPZs' effectiveness should not be seriously reduced for 10 to 15 years.

Table 2.5 Alternative B-Modified (preferred) treatment methods by forest stand type.

ALTERNATIVE B-Modified:

	CWHR											
TREATMENTS	**3D**	**3M**	**3P**	**3S**	**4D**	**4M**	**4P**	**5D**	**5M**	**5P**	**MCP**	**TOTAL**
GS					6	26		1	23			**56**
MT40%					24	151			12			**188**
MT50%								6	7			**13**
HCGP				28	112	168	14	29	203	24		**371**
HCPB	6	29	10	16	76	298	10		20			**465**
MAST		18	28	94	38	51		22	35	33	38	**357**
UB		73				34						**107**
ST	4					7	3		31			**45**
NT								6				**6**
TOTAL	**10**	**120**	**38**	**138**	**256**	**735**	**27**	**64**	**332**	**57**	**38**	**1814**

*** Numbers are approximate and rounded.**

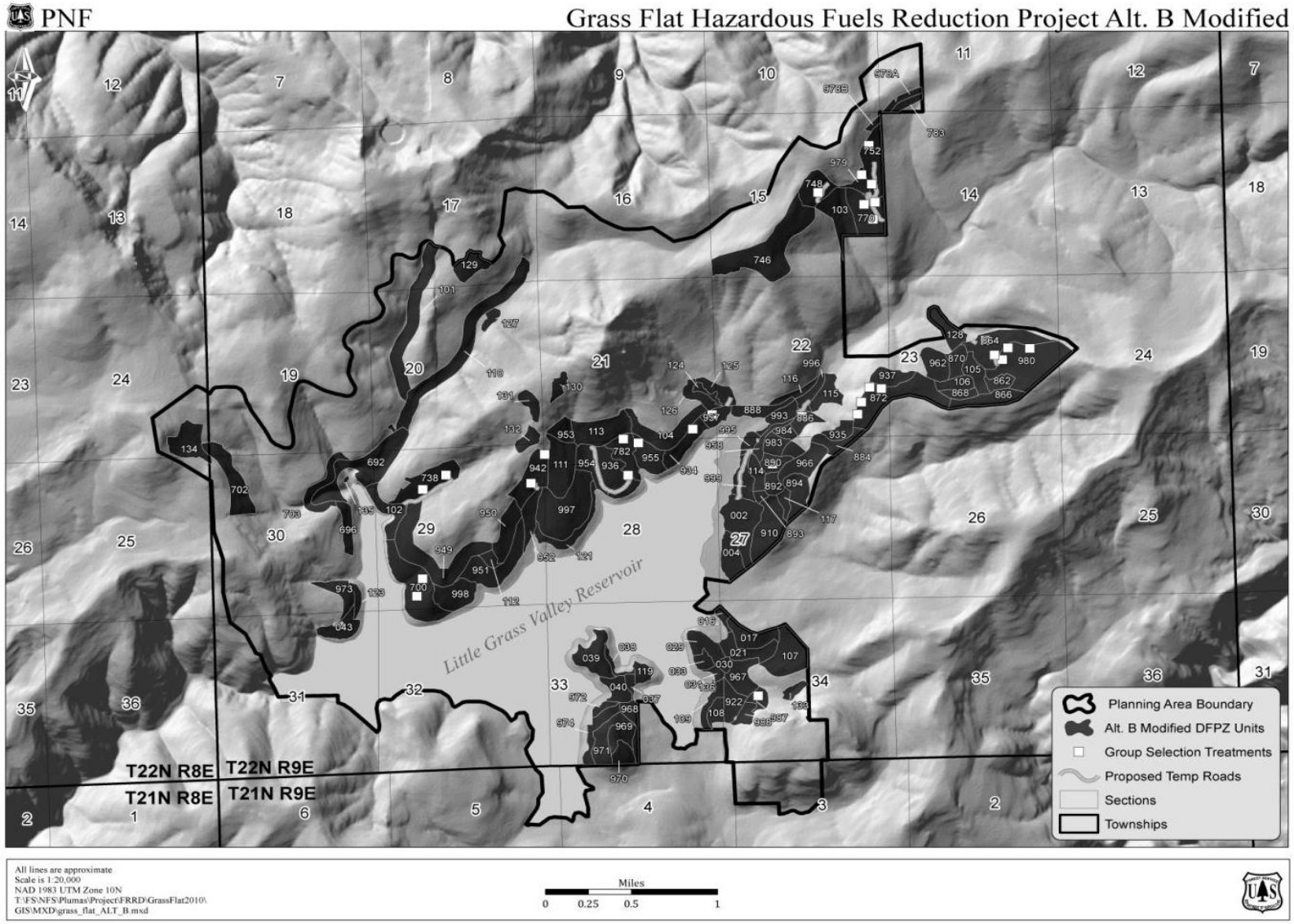


Figure 2-5. Modified Alternative B fuels and forest health treatments.

Alternative B Modified – Preferred

Transportation Improvements:

Alternative B Modified is the same as Alternative B with the following exceptions:

- New construction of up to 0.3 miles of temporary spurs will be needed for project implementation.
- Reconstruction of temporary spur road of up to 1.3 miles would be needed.
- Forty (40) landings are anticipated to be needed; twenty-three (23) existing and seventeen (17 new.

2.5 Alternative C – (Noncommercial Funding)

Alternative C is designed to meet the R5 Guidance for the noncommercial funding alternative addressed in a Memorandum and Order dated 11/04/09 for all fuel reduction projects, where the purpose and need and all proposed treatments are directed at reducing hazardous fuels. Under the noncommercial funding alternative, standing tree hazards would not be removed, Group Selection would not be established and restoration would not be applied to contribute toward promoting forest health and economic stability objectives, beyond that needed to achieve desired DFPZ conditions.

This Alternative emphasizes an aspect position treatment strategy to address unique environmental conditions affecting vegetative conditions and fire behavior, just as soil moisture content, growth carrying capacity and potential for surface solar heating. South-facing slopes which are normally warmer and drier would be managed at a canopy cover of 40 percent where it currently exists. North and east-facing cool wet slopes would be managed at 50 percent where it currently exists. Two stands would be managed at a canopy cover of 60 percent near riparian areas that serve as travel corridors for various wildlife species.

Alternative C allows for the removal or harvest of medium to large trees up to 29.9 inches dbh in CWHR size classes 4 and 5 to establish DFPZs to achieve 18 to 24 foot inter-tree spacing. Shrubs and trees < 9 inch dbh would be cut and removed as biomass from 38 acres where concentrated, totaling <5 percent of the potential thinning volume. Other areas would apply grapple pile and burning to remove surface and ladder non commercial fuels. Alternative C would produce approximately 1.0 million board feet to mechantible timber.

Treatments Inside Developed Recreation Facilities in the Little Grass Valley (LGV) Reservoir Recreation Area:

Defensible Fuel Profile Zones.

DFPZ treatments are designed to remove down and standing dead and live tree hazards around campsites and facilities, while thinning ladder fuels and removing surface fuels applying primarily manual treatments. Hand thinning of <9 inch dbh trees would appear natural, irregular appearance, with 3-5 trees in random clumps and openings 30-50 ft. wide between clumps..

In addition to reducing tree stress, thinning, especially of the understory, would somewhat reduce the risks and damage from any fire that might occur and provide a more defensible space for the campground. Focus would be on maintaining and protecting existing healthy Jeffrey pine, ponderosa pine and incense cedar as important secondary species. Diversity of tree species would help reduce the impact of existing biotic agents on residual trees, and add visual interest and structural elements to the forest surrounding the camping areas.

In lodgepole pine dominated lakeshore stands, heavy fuel accumulations would be treated to reduce fuel hazards, particularly where human ignition is most likely using manual treatments.

Around the perimeter of the LGV Reservoir Recreation Area, particular along the primary access National Forest System road 22N57 designated as sensitive visual retention zones, tree density would be thinned to a minimum of 40 percent canopy cover, retaining a mixture of ages and species to comply with Visual Quality Objectives (VQOs) standards in compliance with the 1988 PNF LRMP.

Alternative C would establish Defensible Fuel Profile Zones inside the LGV Reservoir Recreation Area by applying the following treatments:

- **Hazard Tree (no diameter limit) -** Hazard tree removal would include removing dead trees, dead parts (i.e., dead tops or limbs) of live trees or unstable live trees that are likely to fall and are within the striking distance of people, facilities, or roads. Hazard tree marking guidelines would follow the Plumas National Forest "Roadside/Facility Hazard Tree Guidelines and Identification Criteria" (April 109, 2008) as amended by the "Hazard Tree Guidelines for Forest Service, Facilities and Roads in the Pacific Southwest" (Forest Health Protection, Pacific Southwest Region, Report #RO-12-01, April 2012).

- **Sanitation (up to 29.9 dbh)** Sanitation treatments would include removal of live disease and insect infected trees up to 29.9 inches in dbh to reduce potential spread, minimize site deterioration and improve stand health.

- **Hand cut and remove 3- 9 inches dbh-** Hand cutting and removal of trees and shrubs that are 3 feet in height to 9 inches diameter breast height (DBH) will be manually cut from beneath overstory trees, and aggregations of small-diameter conifers will be thinned for horizontal and vertical crown spacing. The cut trees, shrubs, and existing slash will be removed and disposed of offsite (either burned or chipped).

- **Hand Cutting and Tractor Piling of Trees and/or Shrubs, and Pile Burning or Biomass Removal 3- 9.9 inch dbh** - This treatment involves manual cutting of: (1) shrubs; (2) trees greater than 12 inches in height to less than 9 inches dbh from beneath overstory trees; and/or (3) thinning aggregations of 1 to 6 inches dbh conifers. Most trees cut would be 1–6 inches dbh. Cut trees, shrubs, and existing slash would be gathered into piles with a tractor containing a brush rake head and burned or chipped and removed. Spacing of residual conifers and black oaks would be approximately 18–24 feet (±25 percent) to allow retention of the healthiest, largest, and tallest conifers and black oaks and to avoid creating openings. Hand cutting and pile burning would be used to reduce fuels in areas where mechanical equipment is not allowed.

Treatments Outside Developed Recreation Facilities in the Little Grass Valley (LGV) Reservoir Recreation Area:

Defensible Fuel Profile Zones (DFPZs)

Alternative C incorporates guidance from the General Technical Reports PSW–GTR-220, *An Ecosystem management Strategy for Sierran Mixed-Conifer Forests* (USDA 2009) and PSW-GTR-237 (USDA 2012); considering spatial variations in disturbance mechanisms. DFPZ are designed to increase forest heterogeneity by creating horizontal and vertical structural diversity, including canopy gaps and open canopy stand conditions, favorable for altering fire behavior. DFPZs would retain many beneficial characteristics such as spacing between overstory tree crowns and reduced ladder fuels that will aid in fighting fire and reducing fire intensity; designed to be effective for 10-15 years.

Fuels treatments in this alternative follow Agee's four basic principles of effective fuels reduction; reduction of surface fuels, increase canopy base heights, decrease crown density and retain large fire resistant trees (Agee and Skinner, 2005), positioned strategically to connect the Bald Onion DFPZ (to the north), proposed Sugarloaf DFPZs to the south, dispersed defensible space established by the private landowners and areas where small scale fuels reduction projects have been implemented, as described below.

Table 2.6 Proposed Treatment Schedule for Defensible Fuel Profiles Zones (DFPZs)

Year	Activity	Method
1	Harvest DFPZ	Whole Tree sawlog with or without biomass option
2	Fuels Pre-treatment	Hand cut Tractor pile
3	Fuels Treatment	Burn Piles or Underburn

*Burning may be extended beyond year 3 as prescriptions become attainable.

Defensible fuels profile zones (DFPZs) would reduce fuels on strips of land from ¼ to ½ mile wide on approximately 1,814 acres, featuring a range of forest canopy covers and amounts of down wood, depending on proximity to recreational infrastructures, topographic position, forest stand and correlating habitat conditions (California Wildlife Habitat Relationship [CWHR] type) and desired condition objectives.

Mechanical treatments function to alter canopy cover (CC), vegetative structure and trees densities at a forest stand scale to affect fire behavior, while perserving wildlife habitats, plant communities and promoting scenic integrity. Within DFPZs, the reduction of pre-treatment canopy by more than 30 percent would be avoided and preclude the reduction of canopy cover to the allowable 40 percent minimum in CWHR size class 5 stands.

Conifers ranging from 9.0 to 29.9 inch dbh would be removed (harvested) as necessary to achieve desired 40 percent canopy cover reductions in most mid-seral CWHR 4M/5M stands stands on south facing slopes and 50 percent in similar CWHR types on north facing slopes..

Overall, the proposed action applies more restrictive prescriptions to riparian habitat conservation areas (RHCAs). Conifers and hardwoods from 3 feet in height to 10.0 inches dbh are considered biomass and would be thinned, piled and burned.

A borax compound would be applied to approximately 500 acres with evidence of annosus root rot (*Heterobasidium annosum*) in or surrounding the treatment area. In these areas, borax would be applied to all harvested stumps over 14.9 inches dbh.

Whole tree-ground based logging systems utilizing mechanized thinning and biomass removal would be used in the construction of DFPZs. Whole tree yarding removes most limbs and tree tops from the stand, effectively reducing the need for post-project slash pile fuels treatments. Mechanical equipment used in thinning operations would not impact Riparian Habitat Conservation Areas (RHCAs) as buffers for would be in place for protection and only underburning would be used for treatment. After thinning, pile burning would be used to treat residual slash and pre-existing fuels and shrub where necessary.

The proposed action (Alternative B) would establish Defensible Fuel Profile Zones and Group Selections outside of the LGV Reservoir Recreation Area by applying the following treatments:

- **Mechanical Thinning up to 29.9 dbh inch trees to 40 – 50 percent canopy cover depending on aspect** - Treatment prescriptions would call for removal of the smaller, suppressed, and intermediate-crown-class trees; removal of some co-dominant trees; and retention of the largest trees to achieve fire resiliency, target canopy cover and/or spacing guidelines.
  Species preference for the residual trees would include shade-intolerant species where they exist. Ponderosa pine is most preferable, followed in order by Jeffrey pine, sugar pine, Douglas-fir, black oak, incense-cedar, and true fir. The largest snag trees (>15 inches dbh), would be retained at 4 trees per acre where available to provide for habitat needs of old forest-associated wildlife species.

- **Hand cut and remove 3-9 inches dbh-** Hand cutting and removal of trees and shrubs that are 3 feet in height to 10.0 inches diameter breast height (DBH) will be manually cut from beneath overstory trees, and aggregations of small-diameter conifers will be thinned for horizontal and vertical crown spacing. The cut trees, shrubs, and existing slash will be removed and disposed of offsite (either burned or chipped).

- **Hand Cutting and Tractor Piling of Trees and/or Shrubs, and Pile Burning or Biomass Removal 3- 9 inch dbh** - This treatment involves manual cutting of: (1) shrubs; (2) trees greater than 12 inches in height to less than 9 inches dbh from beneath overstory trees; and/or (3) thinning aggregations of 1 to 6 inches dbh conifers. Most trees cut would be 1–6 inches dbh. Cut trees, shrubs, and existing slash would be gathered into piles with a tractor containing a brush rake head and burned or chipped and removed. Spacing of residual conifers and black oaks would be approximately 18–24 feet (±25 percent) to allow retention of the healthiest, largest, and tallest conifers and black oaks and to avoid creating openings. Hand cutting and pile burning would be used to reduce fuels in areas where mechanical equipment is not allowed.

- **RHCA Underburning –** Prescribed underburning would be used to treat excess live and dead vegetation. Treatment in Riparian Habitat Conservation Areas (RHCAs) would be limited to underburning. Ignition would occur along contour strips upslope of the RHCA and fire would be allowed to back down-slope into them.

- **Prescribed Burning**. Prescribed burning would be used to treat excess live and dead vegetation, including hardwoods or conifers. This type of burning would be employed when fuel moisture levels are low enough to carry fire and still be within prescription parameters. Burning can only be initiated on "Burn Days" as designated by the State Air Quality Control Board. After burning, residual fuels (<3 inches dbh) would not exceed 5 tons per acre. Where available, an average over the treatment unit of 10–15 tons per acre of large down wood >12 inches dbh would be retained. Firelines would be constructed by mechanical or manual methods, whereby surface fuels would be scraped to expose mineral soil. Dead fuel would be scattered away from the handline for approximately six feet on either side. Firelines would be constructed mechanically with surface fuels scraped to mineral soil approximately six feet wide and vegetation cleared to approximately ten feet either side.

- **DFPZ Maintenance -** In July of 2003, a ROD was signed for the HFQLG FSEIS. It documented the results of an environmental analysis of the effects of alternative management strategies for maintenance of DFPZs within the HFQLG Pilot Project area.

The HFQLG FSEIS and ROD, in combination with the original HFQLG Act FEIS and ROD, provide programmatic guidance for DFPZ construction and maintenance in the HFQLG Pilot Project area. The HFQLG FSEIS ROD calls for consideration of all practicable methods of vegetation control for site-specific projects. Even if no maintenance is conducted in these DFPZs, the DFPZs should be effective for 10-15 years. In the natural stands, the DFPZs' effectiveness should not be seriously reduced for 10 to 15 years.

Table 2-7 Alternative C treatments by CWHR size class acres

ALTERNATIVE C

	CWHR											
TREATMENT	**3D**	**3M**	**3P**	**3S**	**4D**	**4M**	**4P**	**5D**	**5M**	**5P**	**MCP**	**TOTAL**
MT40%						34			126			**160**
MT50%					46	28		7	51			**132**
HCGP				28	112	297	18	29	114	33		**631**
HCPB	3	29	10	12	75	294	10		16			**448**
MAST		18	28	87	24	44		21	23	24		**269**
UB		73				34						**107**
NT	7			11		5		6			38	**67**
TOTAL	**10**	**120**	**38**	**138**	**256**	**734**	**28**	**63**	**332**	**57**	**38**	**1814**

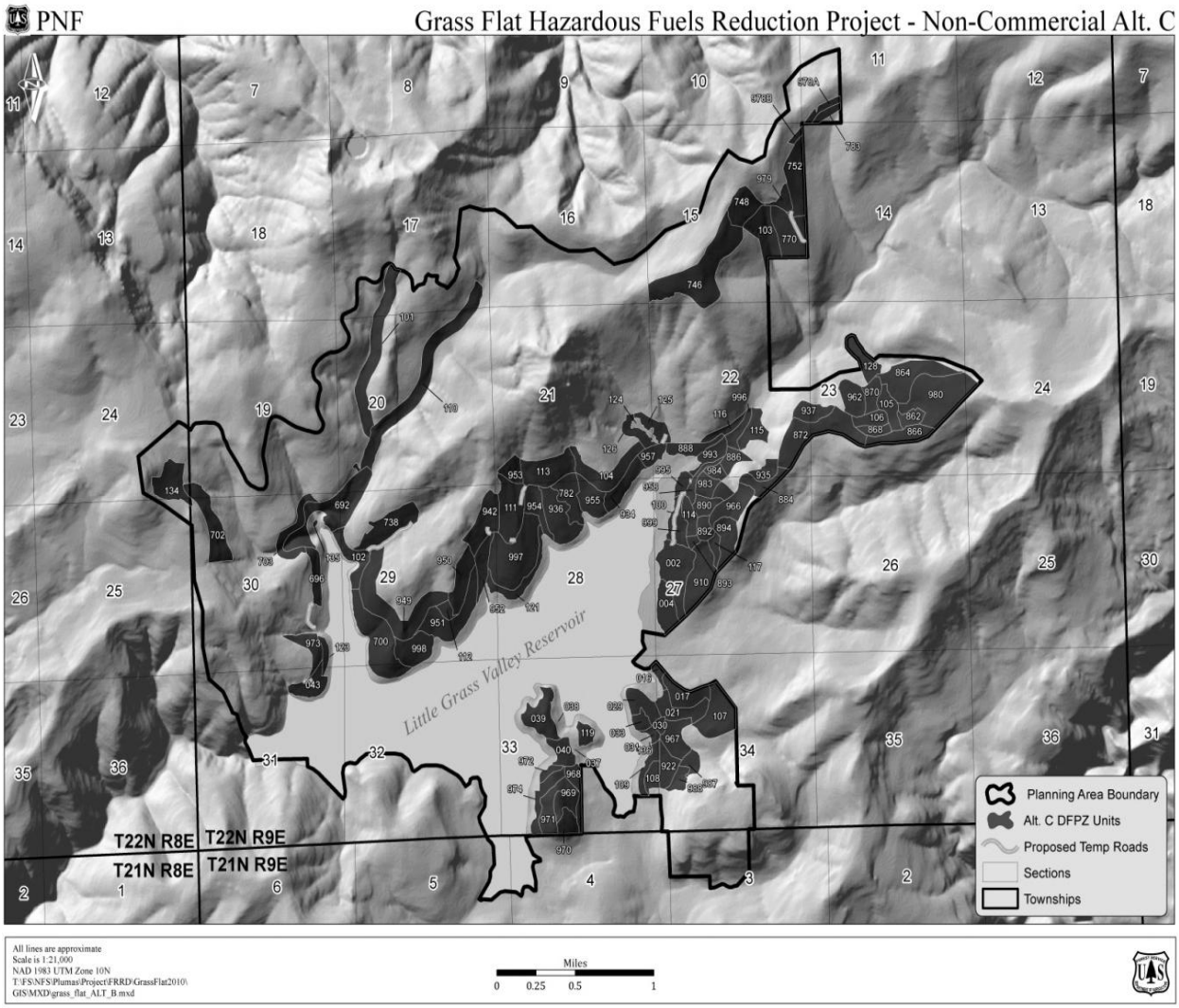


Figure 2-6. Alternative C fuels and forest health treatments.

Transportation Improvements:

Alternative C

Alternative C is the same as Alternative B with the following exceptions:

- New construction of up to 0.2 miles of temporary spurs will be needed for project implementation.
- Reconstruction of temporary spur road of up to 1.2 miles would be needed.
- Twenty-five (25) landings are anticipated to be needed; nineteen (19) existing and six (6) new.

2.6 Comparison of the Action Alternatives Considered in Detail

Alternative B-Modified addresses the first three purposes and needs, and least effects suitable habitat for the American marten. One of the objectives of Alternative B-Modified is to retain a minimum 50 percent canopy cover for all size class 5s treated. Many of the acres of 5s identified for thin under Alternative B were already close to or below 50 percent canopy cover so did not require thinning and were modified to other fuels treatments. The acres would still be treated by other fuels reduction treatments to lower surface fuels. Reducing the number of size class 5 acres treated, and retaining higher canopy covers, retains higher quality suitable habitat. This alternative would have the least effect on suitability of the habitat due to fewer acres treated and higher canopy cover retention as compared to Alternative B. Under the preferred alternative, Alternative B-Modified, the majority of the size class 5s would not have GS or be mechanically thinned. Alternative B would have the greatest effect on suitability of the habitat for travel and foraging (or nesting) due to the reduction canopy cover, canopy cover reduced to below suitability and the reduction of understory layers. Although not as intensive as Alternative B, Alternative C reduces the percent canopy cover on more acres then Alternative B-Modified.

Whole tree-ground based logging systems utilizing mechanized thinning and biomass removal would be used in the construction of DFPZs. Whole tree yarding removes most limbs and tree tops from the stand, effectively reducing the need for post-project slash pile fuels treatments. Mechanical equipment used in thinning operations would not impact Riparian Habitat Conservation Areas (RHCAs) as buffers for would be in place for protection and only underburning would be used for treatment. After thinning, pile burning would be used to treat residual slash and pre-existing fuels and shrub where necessary.

The environmental effects of each alternative disclosed in the Grass Flat Project Environmental Assessment (EA) are summarized below in table 2-2. The summary presents the predicted environmental consequences of each alternative relative to the purpose objectives, any issues considered effective to depict similarities and differences between the alternatives to provide a clear basis for a decision. A comprehensive description of the affected environment and the environmental consequences are described in the EA; chapter 3.

Table 2-8 Acre comparison of the alternatives showing canopy cover percentages proposed by mechanical thin and group selection treatments

	ALTERNATIVE B						**ALTERNATIVE B-Mod**				**ALTERNATIVE C**			
	4P	**5P**	**4D**	**4M**	**5D**	**5M**	**4D**	**4M**	**5D**	**5M**	**4D**	**4M**	**5D**	**5M**
MT60%			0	0	35	0	0	0	0	0	0	0	0	0
MT50%			0	0	0	0	0	0	6	7	46	28	7	51
MT40%			40	12	0	268	24	151	0	12	0	34	0	126
MT35%			0	207	0	0	0	0	0	0	0	0	0	0
MT25%	14	33	0	0	0	0	0	0	0	0	0	0	0	0
GS			6	26	1	23	6	26	1	23	0	0	0	0
Subtotal	**14**	**33**	**46**	**245**	**36**	**291**	**30**	**177**	**7**	**42**	**46**	**62**	**7**	**177**
Total	**14**	**33**	**618**				**256**				**292**			

Table 2-9 Comparison of the Alternatives

	Alternative A No Action	Alternative B Proposed Action	Alternative B Modified Preferred	Alternative C Noncommercial Funding
DFPZ Construction	0	1814	1814	1814
Temp. road construction	0	0.9	0.3	0.2
Temp Road Reconstruction	0	1.8	1.3	1.2
Existing Landings	0	20	17	6
New Landings	0	29	23	19

Fuels & Fire Behavior				
	Alternative A Existing Condition	Alternative B Proposed Action	Alternative B Modified Preferred	Alternative C
Flame length	2-39 feet	1-2 feet	1-2 feet	1-2 feet
Fire type	Passive	Surface	Surface	Surface
Canopy base height	1-26 feet	7-42 feet	7-42 feet	7-42 feet
Percent change for all alternatives	Canopy Base Height 62-600 percent	Fire Type N/A	Flame Length 0-97 percent decrease	
Landscape Structure by CWHR Size Class 4 & 5				
Basal Area (BA) CWHR 4 BA	245	176	201	229
Basal Area (BA) CWHR 5 BA	274	220	258	241
Trees per acre (TPA) average CWHR 4 TPA	462	66	240	129
Trees per acre (TPA) average CWHR 5 TPA	454	81	421	267

Stand Structure - Tree Size Classes (DBH)								
Tree Descriptions	CWHR 4	CWHR 5	CWHR 4	CWHR 5	CWHR 4	CWHR 5	CWHR 4	CWHR 5
Sapling (0-6”)/TPA	281	304	0	0	125	283	1	145
Poles (6-11”)/TPA	69	56	0	9	31	51	36	42
Small trees (11-24”)/TPA	94	60	32	9	67	55	71	47
Medium trees (24-30”)/TPA	11	19	28	26	11	18	13	17
Large trees (>30”)/TPA	7	14	5.7	13	6	14	8	14
Total non-overlapping canopy/acre	53	51	23.5	40	44	49	46	45

Economic Stability of Rural Communities				
	Alternative A No Action	Alternative B Proposed Action	Alternative B Modified Preferred	Alternative C Noncommercial
Number of direct or indirect jobs	0	92	82	64
Total employee related income	0	$3,973,509	$3,524,345	$2,746,329

Wildlife Habitat		Alternative B	Alternative B-Modified	Alternative C
California Spotted Owl (5,411 acres of suitable habitat within the analysis area)				
Nesting Habitat - 5D/5M acres suitable habitat removed (percent of suitable habitat)acres reduced to below suitable (percent of suitable habitat)	GS MT	24 (0.4) 303 (5.6)	24 (0.4) 25 (0.5)	0 (0) 184 (3.4)

Foraging Habitat - 4D/4M acres suitable habitat removed (percent of suitable habitat) acres reduced to below suitable (percent of suitable habitat)	GS MT	32 (0.6) 259 (4.8)	32 (0.6) 175 (3.2)	0 (0) 108 (2.0)
Northern Goshawk (6,586 acres of suitable habitat within the analysis area)				
Nesting Habitat - 5D/5M/4D/4M acres suitable habitat removed (percent of suitable habitat) acres reduced to below suitable (percent of suitable habitat)	GS MT	56 (0.9) 562 (8.5)	56 (0.9) 200 (3.0)	0 (0) 292 (4.4)
Foraging Habitat - 5P/4P acres suitable habitat removed (percent of suitable habitat) acres reduced to below suitable (percent of suitable habitat)	GSMT	0 (0) 47 (0.7)	0 (0) 0 (0)	0 (0) 0 (0)
American Marten & Pacific Fisher (5,411 acres of suitable habitat within the analysis area)				
Denning/Resting Habitat -5D,4D acres suitable habitat removed (percent of suitable habitat) acres reduced to below suitable (percent of suitable habitat)	GS MT	6 (0.1) 75 (1.4)	6 (0.1) 30 (0.6	0 (0) 53 (1.0)
Forage/Travel - 5M/4M acres suitable habitat removed (percent of suitable habitat) acres reduced to below suitable (percent of suitable habitat)	GS MT	50 (0.9)487 (9)	50 (0.9) 170 (3.1)	0 (0) 239 (4.4)
Aquatic Condition				
Riparian Acres maintained/improve (includes restoration activities) Acres reduced		512 0	529 0	535 0
Threshold Of Concern **(TOC)**	SWS 1 SWS 2 SWS 3	under under under	under under under	under under under

GS=Group Selection; MT=Mechanical Thin; SWS=Subwatershed

Watershed Condition	No.	Alternative A	Alternative B	Modified Alternative B	Alternative C
Subwatersheds below the threshold of concern (TOC) by number	1	Yes at 52%	No	Yes (Projected at less than 80%)	Yes (Projected at less than 80%)
	2	Yes at 62%	No	No	Yes (Projected at less than 80%)
	3	Yes at 48%	Yes at 53%	Yes (Projected at less than 53%)	Yes (Projected at less than 53%)
Subwatersheds approaching the TOC by number	1	No	Yes at 84%	No	No
	2	No	Yes at 84%	Yes (Projected at less than 84% but more than 80%)	No
	3	No	No	No	No

Air Quality				
Based on 1,800 acre project area Total Emissions	Alternative A No Action	Alternative B Proposed Action	Alternative B Modified Preferred	Alternative C Noncommercial Funding
Nitrogen Oxides	0	152.63 tons	195.63 tons	201 tons
Volatile Org. Cmpds.	0	247.48 tons	263.48 tons	270 tons
Particulate Matter 10	0	534.60 tons	594.49 tons	608 tons

2.7 Alternative Considered but not Developed in Detail

The Forest Service has been asked to develop an alternative based on the PSW GTR-220. All action alternatives were developed incorporating concepts of the GTR-220 “An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests” and GTR-237 “Managing Sierra Nevada Forests.” Alternative B (the proposed action) is also intended to meet socioeconomic purposes for harvesting intermediate-sized trees such as generating revenue to help pay for fuel treatment and providing merchantable wood for local sawmills.

In combination with the development and spread of root disease as a result of past fire and suppression and management practices further emphasize the need for action. Alternative C focuses on fuels reduction of surface and ladder fuels but also includes additional fuel reduction such as thinning canopy bulk density, based on north and south-facing aspects.

Management plans should be explicit about maintaining current high-value habitat in sufficient amounts and distribution while at the same time treating other areas more heavily to accelerate developments of desired future conditions. For large-scale assessments of landscapes, it is often difficult to determine the optimal size and distribution of different forest conditions for the local vertebrate community. There are few reference landscapes with active fire regimes, and the spatial configuration of habitat conditions in such landscapes has yet to be examined.

While research can suggest general principals for landscape-scale wildlife management, such as providing for connectivity and a mosaic of forest conditions (Hilty et. Al 2006, Lindenmayer and Fisher 2006, Lindenmayer et. al 2008), specifics are general lacking and will differ with different species and forest conditions. Lacking better information, a prudent approach may be to emulate the variation in forest conditions that could be expected to occur given the influence of local topographical conditions on fire frequency and intensity (North et al. 2010) (PSW GTR-237).

Given this information, the PSW GTR-220 lacks the intent of the purpose and need in its entirety for this particular project.

Chapter 3. Affected Environment and Environmental Consequences

3.1 Introduction

This section summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing the alternatives presented in chapter 2. It also represents the scientific and analytical basis for the comparison of the alternatives by resource in the table 2-2 above. The following information is a summation of project-specific reports, assessments, and input prepared by the Forest Service specialists, incorporated by reference: Biological Evaluation (BE) Biological Assessment (BA) for Botany/Noxious Weeds Risk and Aquatics and Wildlife; Management Indicator Species (MIS) Report; Hydrology Report; Silviculture Report; Soils Report; Economics Report; Air Quality Report; Fire and Fuels Report; Visuals, Lands and Minerals Report, and the Heritage Resource Report. Copies of these reports are available upon request.

3.1.1 Scope of the Analysis

The existing condition describes the baseline condition against which environmental effects can be evaluated and from which progress toward the desired condition can be measured. Environmental consequences form the scientific and analytical basis for comparison of alternatives, including the proposed action, through compliance with Forest Plan standards and a summary of monitoring required by the National Environmental Policy Act of 1969 (NEPA) and National Forest Management Act (NFMA). The discussion centers on direct, indirect and cumulative effects along with irreversible and irretrievable effects, examined for each resource indicator. Effects can be neutral, beneficial, or adverse. These effects are defines as follows:

- Direct effects are caused by the action and occur at the same place and time as the action.

- Indirect effects are caused by the action and are later in time or further removed in distance, but are still reasonable foreseeable actions.

- Cumulative effects are those that result from the incremental impact of the action when added to past, present, and reasonably foreseeable future actions. Each resource section includes a discussion of cumulative effects focused on evaluating the effects of the proposed action in context with relevant effects from past, present, and reasonable foreseeable actions. Past, present, and reasonable foreseeable future actions considered in the cumulative effects analyses will vary for each resource. Relevant actions are those expected to generate effects on a specific resource that will occur at the same time and in the same place as effects from the proposed action. Past activities are considered past of the existing condition and are discussed in the environmental consequences section under each resource.

- Irreversible effects are permanent or essentially permanent resource use or losses. They cannot be reversed, except in the extreme long term. Examples include mineral extraction or loss of soil productivity. Irretrievable effects are losses of productivity or use for a period of time. One example is road construction on suitable timberlands. Timber growth on the land is irretrievably lost while the land is used as a road; however the timber resource is not irretrievably lost because the land could grow trees again in the foreseeable future.

3.2 Vegetation

3.2.1 Introduction

The Forest Service proposes to construct DFPZs to reduce fuel hazards and perform associated road system improvement work on approximately 1,814 acres of forested federal land north and west of La Porte, California. The project would be part of the HFQLG Pilot Project authorized in federal law.

This section describes the the regulary framework, existing conditions, and consequences of implementing the various alternatives on forest health and stand structure attributes of a forested landscape within the Grass Flat Project area.

3.2.2 Analysis Regulatory Framework: Statute, Regulation, Forest Plan, and Other Direction

The Grass Flat Hazardous Fuel Reduction and Forest Health Project is designed to fulfill the management direction specified in the 1988 Plumas National Forest Land and Resource Management Plan (PNF LRMP) (USFS PNF 1988), as amended by the Herger-Feinstein Quincy Library Group (HFQLG) Final Supplemental environmental impact statement (FSEIS) and Record of Decision (ROD) (USFS 1999, USFS 2003), and the Sierra Nevada Forest Plan Amendment (SNFPA) FSEIS and ROD (USFS PSW 2004a, USFS PSW 2004b). Fuel and vegetation management activities are designed to comply with the standards and guidelines as described in the SNFPA FSEIS and ROD (USFS PSW 2004b).

National Forest Management Act:

The National Forest Management Act of 1976, including its amendments to the Forest and Rangeland Renewable Resources Planning Act of 1974 state that it is the policy of the Congress that all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans. Both acts also state “insure that timber will be harvested from National Forest System land only where -

(i) there is assurance that such lands can be adequately restocked within five years after harvest;

(ii) that soil, slope, or other watershed conditions will not be irreversibly damaged;

(iii) that protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat; and

(iv) tthat he harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber (16 U.S.C. 1604 (g)(3)(E)).

National Forest Management Act findings for the Grass Flat Project are discussed in the Grass Flat Project “Silviculture Report” Appendix (on file at the Feather River Ranger District).

Plumas National Forest Land Management Plan (1988) as amended by the Herger-Feinsten Quincy Library Group FSEIS and ROD (1999, 2003) and the Sierra Nevada Forest Plan Amendment FSEIS and ROD (2004):

The Grass Flat Project is designed to fulfill the management direction specified in the 1988 Plumas National Forest LRMP, as amended by the HFQLG FEIS and ROD of 1999 and the SNFPA ROD of 2004. Standards and guidelines for fuels and vegetation management activities for the Grass Flat Project area are shown in Table 2 of the SNFPA ROD.

Table 2 includes direction for designing and implementing fuel and vegetation management activities within each of the various land allocations applied to the HFQLG Pilot Project. The desired condition as described in Alternative 2 of the HFQLG Final Environmental Impact Statement (USFS 1999) is an "all-aged, multistory, fire-resistant forest," of open forest stands dominated by large, fire tolerant trees with crowns sufficiently spaced to limit the spread of crown fire. Riparian ecosystems would be resilient to impacts caused by naturally occurring disturbance processes such as wildfire, flood, and drought.

The 2004 SNFPA provides management direction for the HFQLG Pilot Project Area in appendix E of the Record of Decision (USFS PSW 2004b). Appendix E directs the Plumas National Forest to "implement the HFQLG Forest Recovery Act Pilot Project, consistent with the HFQLG Forest Recovery Act and Alternative 2 of the HFQLG EIS. The HFQLG Forest Recovery Act Pilot Project is designed to test and demonstrate the effectiveness of certain fuels and vegetation management activities in meeting ecologic, economic, and fuel reduction objectives. Fuels and vegetation management activities include constructing a strategic system of defensible fuel profile zones (DFPZs), group selection, and individual tree selection. A management program for riparian areas is also included in the Pilot Project."

3.2.3 Effects Analysis Methodology

Analysis Methodology

Vegetation management activities have localized effects on vegetation attributes such as canopy cover, tree density, and tree size and are generally confined to the treated area. Therefore, the existing conditions, direct, and indirect effects analyses of vegetation resources are geographically bounded to the Grass Flat Project area.

The Grass Flat Project cumulative effects and seral stage diversity analysis is geographically bound to the approximate 11,889 acre sub-watershed area identified in the Cumulative Watershed Effects (CWE) Analysis Area Boundary. Seral stage diversity can be described as the horizontal arrangement of different age groups of vegetation across the landscape. This area in and surrounding the Grass Flat Project area is bounded by Fowler Peak to the north, La Porte Bald Mountain to the south, Tamarack Flat to the west, and Gibsonville Ridge to the east. The desired conditions for maintaining various seral stages by vegetation type, size class, and canopy cover (i.e., CWHR) does not include lands from private property. Therefore, harvest or thinning projects on private property were not considered for seral stage diversity analysis.

The direct, indirect, and cumulative effects analyses are based on a temporal scale. Documented past projects including timber harvesting, wildfires, watershed improvements, and other activities described in this document ranging as far back as 1980 were considered past actions within the analysis area. In a broader sense, current vegetation structure and composition reflects the historical management regimes prior to 1980. This vegetation structure and composition includes attributes of the current landscape including existing vegetation types, fuel treatments, burned areas, past sanitation harvest, and plantations.

The time frame for vegetation cumulative effects is approximately 20 to 25 years. The western slope of the Sierra Nevada in the Plumas National Forest has a high rate of vegetation establishment and growth due to high annual precipitation and highly productive forest soils. Within this time frame, vegetation generally has sufficient opportunity to increase canopy closure, basal area, and tree density to a point where subsequent thinning would be needed again to maintain stand vigor, health, and growth. This time frame is also expected to encompass the time period for DFPZ effectiveness (approximately 10 to 20 years).

Data Sources

In order to ensure that silvicultural prescriptions are consistent with the amended LRMP, field inventories were conducted in 2009, 2010 and 2011 to measure attributes of existing vegetation. Data were used to determine site quality, timber volume, basal area, number of trees per acre, tree growth, species present and tree condition. The extent of each inventory was based on the degree to which proposed activities would reduce canopy closure or basal area. Extensive inventories were conducted only in units proposed for thinning, where proposed activities would be designed to bring canopy cover and basal area closer to LRMP standards and guidelines.

Field inventories were conducted in potential thinning units to measure attributes of existing vegetation. Stands were inventoried using the Common Stand Exam protocols for the Pacific Southwest Region, U.S. Department of Agriculture Forest Service Region 5. These stands are representative of the analysis area and the areas to be treated in all action alternatives. Data was collected on live and dead trees. The following data is recorded for each live tree sampled in variable radius prism plots: species, diameter, crown position, live crown ratio, mistletoe infestation, and defect. In each stand, height and age measurements were recorded.

Thinning units were inventoried using the current Common Stand Exam User's Guide for the Pacific Southwest Region. The Common Stand Exam system is used to collect data from a series of random points located within a number of stands with a possible need for treatment. Each sample point consists of four nested plots: (1) A variable radius prism (30 BAF) plot to gather data on large (greater than 4.9 inches DBH) live trees, (2) a 1/100 acre fixed radius plot for live saplings and seedlings, (3) a 1/4-acre plot for large snags (greater than 14.9 inches DBH and greater than 19.9 feet tall), (4) a 1/4-acre fixed radius plot for canopy cover (tree cover, shrub cover, and total vegetation cover).

Basis for Analysis Methods

The Common Stand Exam data was loaded into the Forest Vegetation Simulator (FVS), a forest growth model that predicts forest stand development. This model was used to predict stand conditions and development after alternative treatments. Additional analyses in the Geographic Information System (GIS) included aerial photo interpretation and Plumas National Forest "Eveg Asveg Combo" timber type coverages (based on a combination of year 1997 and 2000 aerial photographs). These layers were used to determine timber strata, size class, and densities using California Wildlife Habitat Relationships (CWHR) classifications (Mayer and Laudenslayer 1988). The CWHR system classifies vegetative types based on species size, density, and range. CWHR in the existing vegetation layer is derived primarily from CALVEG – a hierarchical classification system of actual vegetation that displays the type and relative cover of conifer and hardwood trees for various mixed conditions. All vegetation information is displayed using the CWHR vegetation typing and serves as the baseline information for acres of each vegetation type in this analysis. The distribution of CWHR size class and density was analyzed relative to the stand-level effects of proposed actions modeled by CWHR size class. Other sources of information used in the assessment of effects were aerial photos, data generated from common stand exam plots, and field reconnaissance.

Assumptions Specific to Vegetation Resource Analysis:

The topography, slope, and access of a unit were used to determine the most appropriate harvest system. For all treatment units in the Grass Flat Project, only ground-based harvest systems would be used. Silvicultural prescriptions were based on a desired future stand condition and utilized stand exam data, Forest Vegetation Simulator projections, aerial photograph interpretation, and field review.

Forest Health Measurement Indicators:

Environmental indicators and measures are used to describe the effects of the Action Alternatives on the vegetative resource. Environmental indicators that will be analyzed in this section are: 1) forest health measured by stand density in terms of basal area and trees per acre, and 2) fire resistant stand structure measured in terms of species composition and distribution of canopy cover and trees per acre by diameter size class. The number and distribution of trees per acre by diameter class is an important unit of measure because it shows the effect of treatments on different size trees. High density stands also slow the rate of fire line construction by hand crews and mechanical equipment. Basal area per acre is "the cross-sectional area of all stems in a stand measured at breast height and expressed per unit land area," in this case, per acre (Helms 1998). Basal area per acre is commonly used as a measure of stand density.

Fire resilent stand structure is measured by evaluating the percent of species composition pre and post-treatment. Species composition is analyzed because silvicultural prescriptions, particularly group selection treatments, may have an effect at the stand level on differing species dependent on shade tolerance and species biology

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The distribution of relative seral stages on the landscape, and the relative distribution of closed-canopy and open canopy stands may be used to describe overall landscape structure on a watershed basis and the level of vegetative diversity and the cumulative effects of activities to forest vegetation on the landscape scale. Landscape structure is measured by calculating the distribution of these seral stages within the vegetation analysis area. The relative distribution of seral stages within the landscape is measured by using CWHR size class as a proxy for seral stage. Table 3.1 displays the CWHR tree size and density class categories. Forest stands were aggregated by CWHR size class because the proposed treatments, stand structure, and effects of treatments on stand structure would not substantially vary by forest vegetation type (as classified by CWHR habitat type).

Table 3-1 CWHR* tree size and density class crosswalk with seral stage and canopy closure condition.

CWHR Tree Size Categories				CWHR Density Class Categories			
CWHR Size Class	**Tree Sizes (average)**	**Description**	**Seral Stage**	**CWHR Density Class**	**Tree Canopy cover**	**Description**	**Canopy Conditions**
1	< 1" DBH	Seedlings, but definite forest habitat	Early Seral	n/a	< 10%		Open canopy Stands
2	1 -6 " DBH	Sapling		S	10 - 24%	Sparse	
3	6 -11" DBH	Pole-sized tree		P	25 - 39%	Open	
4	11 – 24" DBH	Small Tree	Mid-seral	M	40 - 60%	Moderate	Closed-canopy Stands

CWHR Tree Size Categories				CWHR Density Class Categories			
CWHR Size Class	**Tree Sizes (average)**	**Description**	**Seral Stage**	**CWHR Density Class**	**Tree Canopy cover**	**Description**	**Canopy Conditions**
5	> 24" DBH	Medium/Large tree	Later Seral	D	> 60%	Dense	
6	> 24" DBH	Multilayered canopy with dense cover		n/a	> 60%		

**California Wildlife Habitat Relationships*

For alternatives B, B-Modified, and C (also called the Action Alternatives) effects are discussed in terms of the prescriptions proposed for each treatment type. Prescriptions with similar effects are grouped together for the purposes of this analysis. A more detailed description of each prescription is defined in Chapter 2. Prescriptions for treatments are broken down into four groups for this effects analysis: 1) Mechanical thinning, including biomass removal, 2) Group selection, 3) Mastication or hand cut and hand/grapple piling, and 4) Underburning.

There is a description of the existing condition for each indicator, followed by a summary of the direct, indirect, and cumulative effects of the alternatives. Direct effects are likely to be limited to the project implementation phase. Indirect effects would last beyond the implementation period and occur within the temporal bound of the cumulative effects analysis. In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis.

Design Criteria for Mechanical Thinning Treatments

Mechanical treatments are designed to meet the purpose and need for reducing hazardous fuels, improving forest health, and protecting and enhancing habitat for sensitive species. Biomass removal in this project is limited. Alternative B proposes 98 acres to remove biomass, totaling 12 percent of the total thinning area. Alternatives B-Modified and C propose 30 acres and 38 acres of biomass removal, respectively, totaling to less than five percent of the potential thinning area in both alternatives.

In Alternatives B and B Modified a borax compound would be applied to approximately 370 acres within the recreation area and 540 acres outside the recreation area with evidence of annosus root rot (*Heterobasidium annosum*). In these areas, borax would be applied to all harvested stumps ≥ 3 inches in diameter in the recreation area and ≥ 14 inches outside the recreation area.

Alternative B-Modified: Silvicultural prescriptions under Alternative B-Modified were designed to limit effect on canopy cover based off of existing CWHR types. CWHR size class 4 stands would be thinned to 40 percent residual canopy cover, while size class 5 stands would be limited to thin down to 50 percent canopy cover. These canopy restrictions limit the number of acres to thin and still be economically viable; thus, limiting the effectiveness of opening up canopies to reduce crown fuels and intermediate and large-sized tree competition compared to Alternative B. Canopy cover would be reduced by 11 percent, on average, from existing conditions within thinning units. However, canopy cover in CWHR size class 5 stands would only be reduced by four percent, on average.

In addition to mechanical thinning, group selections would also be implemented to introduce more pine species with the same general result and effectiveness as Alternative B.

Alternative C: Treatments and silvicultural prescriptions under Alternative C were designed to meet the purpose and need to reduce hazardous fuel accumulations and are based on slope orientation. Canopy cover reduction would follow Table 2 standards and guidelines as directed under the 2004 SNFPA. South facing warmer slopes would have canopy cover reduced to approximately 40 percent and north and west facing slopes would have canopy reduced to approximately 50 percent, where treatments would focus on reducing surface fuel accumulations and ladder fuels. These treatments would also be compliant with, but generally would not fully implement the standards and guidelines for the Herger-Feinstein Quincy Library Group Pilot Project Area as described in Table 2 of the 2004 Sierra Nevada Forest Plan Amendment ROD (USFS PSW 2004b).

The retention of 50 percent canopy cover for mechanical thinning on north facing slopes under Alternative C would limit opportunities to enhance horizontal and vertical structural heterogeneity. While the mechanical treatments would reduce ladder fuels, the efficacy to reduce stand densities and associated negative impacts of future fires, drought, and insect and disease occurrences would be limited. Canopy cover would be reduced by 13 percent, on average, from existing conditions within thinning units. No group selection would be implemented under this alternative.

Table 3.5 shows the acreage planned for thinning to specific residual canopy covers for Alternatives B, B-Modified, and C.

Table 3-2 Comparison of mechanical treatment acres* planned for the Action Alternatives.

Mechanical Thinning Treatment	Alternative B Acres	Alternative B-Modified Acres	Alternative C Acres
25% Residual Canopy Cover	47	0	0
35% Residual Canopy Cover	207	0	0
40% Residual Canopy Cover	320	187	160
50% Residual Canopy Cover	0	13	132
60% Residual Canopy Cover	35	0	0
Group Select	56	56	0
Total	665	256	298

*All numbers are rounded.

3.2.4 Affected Environment and Environmental Consequences

Effects Common to all Action Alternatives (Alternatives B, B-Modified, and C)

In general, the direct and indirect effects described below would be common to all action alternatives that propose mechanical harvesting as a treatment regardless of silvicultural prescription. All treatments involving mechanical harvesting using ground-based logging systems would share similar effects that include the potential for damage to residual trees; incidental removal of snags and trees greater than 30 inches in diameter; the construction of skid trails, landings, and temporary roads to facilitate logging operations; and the creation of activity-generated slash.

Throughout all treatments, trees greater than 30 inches in diameter would be retained in accordance with the 2004 Record of Decision on the SNFPA Final Supplemental EIS (Table 2)(USDA PSW 2004b), with the exception of the silvicultural prescription of sanitation which removes trees that pose a threat to public safety. In general, trees in the 24- to 30-inch diameter classes and the greater than 30-inch diameter classes would be the favored tree sizes to retain. These larger trees have favorable attributes in terms of fire resistance, desired stand structure, and wildlife habitat. Shade-tolerant species (such as white fir and incense-cedar) would be targeted for removal, particularly in the smaller diameter classes. Shade-intolerant species such as ponderosa pine, Jeffery pine and sugar pine would be retained. In true fir-dominated forest types, species preference would be weighted towards maintaining naturally occurring shade-intolerant species such as ponderosa and Jeffery pine; however, species composition would be maintained at levels appropriate for that ecological forest type.

Existing skid trails, landings, and temporary roads would be used, when available, to facilitate the harvesting and removal of forest products (biomass and sawlogs). Skid trails, landings, and temporary roads could be constructed under all action alternatives to facilitate the removal of forest products when existing infrastructure does not exist. Under the action alternatives, approximately 1.8 miles of existing temporary road would be re-constructed, and 0.9 miles of new temporary roads constructed and would be closed or decommissioned after use.
New construction of skid trails, landings, and temporary roads would require incidental removal of trees beyond those described for silvicultural purposes. This may include incidental removal of trees greater than 30 inches in diameter for operability and safety. However, the location and size of skid trails, landings, and temporary roads, and the trees harvested for the construction of such facilities must be approved and agreed upon by the Forest Service. The removal of trees for operability would be incidental and minimized, and therefore, would have negligible effects on stand structure.

All action alternatives propose to use whole-tree yarding to treat slash generated by harvest activity, with the exception of leaving cull logs 20 inches dbh and above out in the woods for wildlife purposes. The removal of limbs and tops by such methods would greatly reduce activity-generated surface fuels (Agee and Skinner 2005). Underburning would be used, as determined by post-treatment evaluations, to reduce activity-generated and existing fuels.

Treatments and silvicultural prescriptions would implement the standards and guidelines for the Herger-Feinstein Quincy Library Group Pilot Project Area as described in Table 2 of the 2004 Sierra Nevada Forest Plan Amendment ROD (USFS PSW 2004b). Under alternative B and B-Modified, acres of group selection would be less than the amount allowed under full implementation of the HFQLG Pilot project, and group selection and mechanical thinning treatments would generally implement lower upper diameter limits for retention of some intermediate and most large-sized desirable shade-intolerant species.

Affected Environment– Forest Health

The primary pathogen of concern found in the analysis area is *Heterobasidion* root disease, caused by *Heterobasidion occidentale* and *Heterobasidion irregulare*. *Heterobasidion* root disease is known to occur throughout the forests of northern California and southern Oregon (Schmitt et al. 2000) and there are well-documented occurrences in both pine and fir species on the Plumas National Forest and neighboring Lassen National Forest. This root disease is spread via spores infecting fresh wounds or stumps and from root-to-root contact (Sinclair et al. 1987). Stands with repeated entry in the analysis area have a higher incidence of the disease than un-entered stands. Maintaining the existing species composition would not offer the opportunity to reduce the incidence of this pathogen, and disease-created pockets of fir mortality would be left understocked.

Shade-tolerant species currently exist at high densities, while pine species (Jeffrey, ponderosa, and sugar pines) generally occur as overstory trees (greater than 16 inches DBH); the amount of pine regeneration in the understory is much lower relative to shade-tolerant species such as white fir and incense cedar. Existing stand structure and high densities clearly favor the regeneration, growth, and development of shade-tolerant species.

Forest insects and disease currently occur in many stands in the analysis area and is well documented in the Forest Health Evaluation performed for the Litte Grass Valley Reservoir Recreation Area (Cluck and Woodruff 2006). With the exception of white pine blister rust (*Cronartium ribicola*), an introduced disease, forest pathogens are native to forests as part of the natural disturbance regime. However, due to the interaction of past management activities (such as fire exclusion, unnaturally high stocking levels of shade-tolerant species, and heavy public use) as well as climate change trends, populations of insects and disease may increase beyond historic levels associated with forest health.

Environmental Consequences – Forest Health

Alternative A

Direct and Indirect Effects

Under Alternative A, the no action alternative, existing stand conditions would persist and develop unaltered by active management, with the exception of continued fire suppression activities. Wildfire, drought, disease, and insect-related mortality and recruitment would continue to occur. High tree densities would persist under Alternative A, reducing tree growth rates and vigor and increasing risk of mortality due to competition (table 3-6). High densities of small trees may cause competition for soil moisture and nutrients, which could also contribute to increased stress on larger, older trees. In addition, maintaining the existing stand structure would favor the continued natural regeneration of shade-tolerant species such as white fir and incense cedar.

Under alternative A, these areas would continue to be at a high risk for insect and disease infestations as stand growth and vigor continue to decline. As Ferrell (SNEP 1996, volume II, chapter 45, pages 1177–1192) summarizes: “Currently, Sierra Nevada forests have high levels of mortality caused by bark beetles infesting trees stressed by drought, fire, overly dense stands, and pathogens. Fuel loads and fire hazard are high . . . .Mitigative restoration requires thinning overly dense stands, primarily by controlled burning in parks and wilderness areas, combined with mechanical thinning and other selective tree-cutting practices elsewhere.”

Dwarf mistletoe-infested trees in the overstory would continue to infect understory trees and adjacent stands. The rate of spread of dwarf mistletoe would be more rapid through a multistoried stand with many horizontal layers of foliage than through a single-storied stand (Parmeter 1978; Hadfield and Russell 1978). Stand health would continue to decline in overstocked aggregations of trees within moderately stocked and densely stocked stands, eventually resulting in individual tree mortality. Mortality would increase the fuel loading, but endemic mortality would keep a continuous supply of dead trees for wildlife foraging and nesting.

Table 3-3 Basal area (square feet/acre) and trees per acre within potential thinning units.*

CWHR Size Class	Alternative A		Alternative B		Alternative B-Mod		Alternative C	
	Basal Area	Trees Per Acre	Basal Area	Trees Per Acre	Basal Area	Trees Per Acre	Basal Area	Trees Per Acre
CWHR 4	245	462	176	66	201	118	229	129
CWHR 5	274	434	220	81	258	138	241	264

*All numbers are rounded

Alternative B, B-Modified, and C

Direct and Indirect Effects

Mechanical Thinning and Biomass Removal

Thinning from below would remove poor vigor, diseased, and damaged trees. In addition, thinning some of the suppressed, intermediate, and codominant tree classes would help maintain the growth and vigor of codominant and dominant conifers—that is, the older, mature, larger trees would be retained longer in the overstory.

Stand health would be maintained or improved, and individual tree mortality would be reduced. The overstocked stands or aggregations within stands would be thinned in order to reduce stress due to inter-tree competition (table 3-6 above). Stand growth and vigor would be maintained or improved, making stands and aggregations less susceptible to insect attacks (Koehler, Wood, and Scarlett 1978; DeMars and Roettgering 1982).

Group Selection

The effects of the Alternative B and B-Modified are expected to be the same; except for Alternative C where group selection is not proposed. Most of the dying, damaged, insect-ridden, and diseased trees up to 30 inches dbh would be removed in the group selection harvests. If some of the residual overstory trees or trees in the adjacent stands are infected with dwarf mistletoe, then other species types can be planted in the understory, since dwarf mistletoes are host specific.

Mastication or hand cut and hand/grapple piling

Alternative B proposes 314 acres, Alternative B-Modified proposes 357 acres, and Alternative C proposes 269 acres of mastication treatment. Alternative B proposes 705 acres, Alternative B-Modified proposes 1043 acres, and Alternative C proposes 1079 acres of hand cut treatments. The direct and indirect effects of mastication and hand cut treatments are expected to be the same under all Action Alternatives. Mastication would occur in mainly plantations and pole sized stands and would re-arrange shrub fuels and conifer tree ladder fuels less than 10 inches in diameter. Mastication and hand cut treatments would also occur in CWHR 4 and 5 stands not seen fit for mechanical thinning. Post-treatment residual conifer tree spacing would range from 18 to 22 feet, on average. Trees per acre and basal area per acre would be reduced as well.

The removal of competing conifers and brush through mastication would result in better individual tree growth and vigor of remaining conifers. There may also be an opportunity to selectively remove dwarf mistletoe infected trees, which would limit the spread of dwarf mistletoe to adjacent uninfected trees. Thinning (mastication) would reduce the risk of bark beetle mortality in each stand. When periodic droughts and their associated bark beetle epidemics occur, there is a low probability of extensive pine mortality in the thinned stands. Maintaining good stand growth and vigor would reduce the risk of beetle populations increasing and attacking adjacent stands. Because the conifer stands are currently in the most vigorous growth period of their lifespan, stand densities could again approach undesirable densities within 10 to 15 years after treatment.

Underburning

The effects of prescribed fire treatments in all action alternatives are expected to be the same. In addition, all action alternatives propose 107 acres of underburning. Prescribed fire treatments would reduce trees per acre and basal area per acre.

Prescribed fire treatments would reduce trees per acre by causing fire-induced mortality primarily in the 1 to 10 inch diameter classes and some mortality in the 10 to 20 inch diameter classes. Mortality in the larger diameter classes may occur as the result of torching and/or delayed conifer mortality as a result of fire-damage and subsequent bark beetle attack.

Prescribed burning is nonselective and may not remove diseased or dwarf mistletoe infected trees. Within the DFPZs, dwarf mistletoe trees in the overstory would continue to infect the understory trees and adjacent stands.

Affected Environment – Fire Resistant Stand Structure

As with many areas in the Sierra Nevada, the landscape in the analysis area has been heavily influenced over the last 150 years by past management activities that include mining, grazing, timber harvesting, fire exclusion, large high-severity fires. Past harvest activities on the Grass Flat Project landscape were primarily focused on overstory removal and sanitation or salvage harvest, with a shift toward even-aged systems in the 1980s. Currently, shade-tolerant species dominate most of the analysis area stands; however conditions range stand by stand which have varying levels of shade-tolerant versus shade-intolerant species.

As a result of past management activities described above, conditions across the Sierra Nevada have been described as “generally younger, denser, smaller in diameter, and more homogeneous” (McKelvey et al. 1996); this condition is typical of forests in the analysis area. Such conditions are best characterized by California Wildlife Habitat Relationship (CWHR) size class 4 where diameter at breast height (DBH) ranges between 11 and 24 inches. Analysis of CWHR size class distribution for forest types in the analysis area shows a relative overabundance of CWHR size class 4, indicating a departure from desired distribution of size classes (Bald Mountain LA 1998). Because such stand structure has increased vulnerability to high-severity fires, insect outbreaks, and landscape level drought-induced mortality, a homogenous (same species or structure) occurrence of this seral stage across the landscape is unstable (McKelvey and Johnston 1992, Millar et al. 2007). A more diverse distribution of seral stages, characterized by heterogeneous stand structures, may be more resilient to disturbance events such as fire, drought, and insect and disease infestations and more characteristic of desired conditions (Stephens and Fule 2005, Millar et al. 2007, Collins and Stephens 2010).

On a landscape scale, table 3-7 shows existing vegetation type, size class distribution, and canopy cover distribution for the three sub-watersheds containing the Grass Flat Project Area. Over 55 percent of the acres in the analysis area are in the moderate to dense canopy cover classes, which indicates multiple canopy layers and interlocking crowns. In addition, over 75 percent of the analysis area is in the poles to small tree size classes, which also indicate an increased fire hazard risk potential.

Table 3-4 Existing California Wildlife Habitat Relationship (CWHR) Size Class and Density within the Three Grass Flat Analysis Area Sub-Watersheds.

Indicator	Forest Vegetation Data	Total Watershed Acres
Vegetation type diversity	Barren (includes water and wet meadow)	1757
	Montane Riparian	35
	Shrub Types (montane chaparral)	348
	Montane hardwoods	18
	Sierran mixed conifer (including Douglas-fir)	4078
	True Fir (white fir and red fir)	5643
	Pine (Lodgepole)	10
Size Class Distribution	Miscellaneous (barren, water, grassland, shrubs)	2123
	Seedling (less than 1 inch DBH)	0
	Sapling (1–6 inches DBH)	45
	Pole (6–11 inches DBH)	2182
	Small Tree (11–24 inches DBH)	6907
	Medium/Large Tree (> 24 inches DBH)	632
	Multi Layered (Size 5 over 4 or 3; Canopy >60%)	0
Canopy Closure Distribution	NA (0–9%) (barren, water, grassland, shrubs)	2123
	Sparse (10–24%)	643
	Open (25–39%)	695
	Moderate (40–59%)	6649
	Dense (60–100%)	1779

Existing conditions of forested stands within the analysis area range depending on factors such as ownership, past management activities, and CWHR size class and density. In general, forested stands proposed for thinning treatments within the Grass Flat Project are primarily CWHR 4 and CWHR 5 size class stands. The average existing conditions in terms of canopy cover and basal area, along with the range for each attribute are shown in Table 3.8 below for potential thinning units.

Table 3-5 Existing stand attributes by canopy cover, and basal area.*

Treatment Group	Lower Limit Canopy Cover	Upper Limit Canopy Cover	Average Canopy Cover	Lower Limit Basal Area	Upper Limit Basal Area	Average Basal Area
CWHR 4	37	69	53	170	310	245
CWHR 5	28	72	51	135	570	274

*All numbers are rounded.

Trees per acre for each diameter class are shown in Table 3.9 for CWHR size classes 4 and 5.The stands have high densities of trees, particularly in the 1-11 inch diameter class range, and most stands have high densities in the 11-24 inch range. These stands have high accumulations of ladder fuels and vertical continuity with the canopy fuels; in combination with the high surface fuel loads these stands are predicted to have increased susceptibility to higher fire intensity and subsequent tree mortality. These high stand densities also increase stress on larger more desirable retention trees due to increased tree competition for water during extended drought periods.

Table 3-6 Existing trees per acre* by size class for CWHR Size Class 4 and 5 stands in potential thinning units.

	Treatment Group	Sapling 0–6 inches	Poles 6–11 inches	Small Trees 11–24 inches	Medium Trees 24–30 inches	Large Trees Greater than 30 inches	Total
		(diameter at breast height)					
Trees per Acre	CWHR 4	281	69	94	11	7	462
	CWHR 5	304	56	60	19	14	454

*All numbers are rounded.

Species Composition - Historically, stands in the Grass Flat Project area included shade-intolerant species such as Jeffrey and sugar pine that represented nearly 30 percent of the overstory trees (Bald Mountain Landscape Analysis, 1998). Current conditions indicate that these shade- intolerant species represent less than 10 percent of the overall species composition. Table 3.10 defines the current dominant forest types in the Grass Flat Project area.

Table 3-7 Dominant Forest Types within the Grass Flat Analysis Area

Forest Type	Predominate Species	Other Species Present
Mixed conifer -white fir	White fir (***Abies concolor***)	Incense cedar, Douglas-fir, sugar pine, and Jeffrey pine (***Pinus jeffreyi***)
True fir	White fir and red fir (***Abies magnifica***)	Incense cedar and scattered Douglas-fir, sugar pine, and Jeffrey pines. Lodgepole pine (***Pinus contorta***) can be found in wetter locations. There are some wet meadows.

The existing stand structure promotes a low light environment, favoring the regeneration, growth, and development of shade-tolerant species such as white fir, red fir, and incense-cedar. These conifer species together represent over 90 percent of the trees per acre in the project area. There is currently little opportunity for the naturally dominant pine species to reestablish and regenerate themselves without disturbance or naturally created openings. Figure 3.1 demonstrates the dominance of white fir in the species composition for CWHR size class 4 and size class 5.

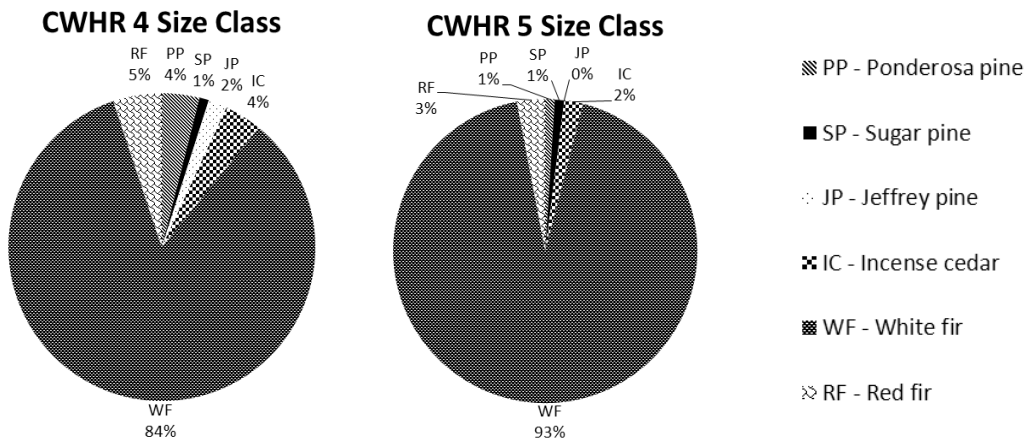


Figure 3.1 Existing species composition by basal area within potential thinning units.

Environmental Consequences – Fire Resistant Stand Structure

Alternative A

Direct and Indirect Effects

Under Alternative A the analysis area would continue to be dominated by closed-canopy mid-seral forested stands. These stands, best characterized by CWHR size class 4 and canopy density classes of Moderate (M) and Dense (D), contribute to landscape homogeneity due to its abundance and connected arrangement. Because such stand structure has increased vulnerability to high-severity fires, insect outbreaks, and landscape level drought-induced mortality, a homogenous (same species or structure) occurrence of these closed-canopy, mid-seral stages across the landscape is unstable and less resilient to the aforementioned forest disturbances (McKelvey and Johnston 1992).

Alternative B, B-Modified, and C

Direct and Indirect Effects

Mechanical Thinning and Biomass Removal

For all action alternatives, mechanical treatments would reduce stand density through thinning and removal of conifers up to 29.9 inches DBH. Trees per acre would be reduced by thinning from below, removing sapling and pole size trees and some co-dominant trees.

Canopy cover would be reduced through mechanical treatments. CWHR 4 stands would receive heavier thinning (removal of more trees and canopy cover) to create open canopy stands and enhance diameter growth of residual trees into CWHR 5. CWHR 5 stands would receive lighter thinning (less removal of trees and canopy cover) to maintain closed-canopy stand conditions of later seral stands while reducing ladder fuels and stand density to reduce negative impacts of future fires, drought, and insect and disease occurrences. However, canopy reduction will vary between the different Action Alternatives. Canopy cover within RHCAs would be maintained for all Action Alternatives.

Alternative B: Basal area per acre would be reduced by 25 percent on average for thinning units proposed under Alternative B. By prescription, basal area reduction would average between 20 and 26 percent. However, dependent on individual stand conditions and CWHR type, basal area will vary.

Insect risk thinning guidelines for the Plumas NF state that the Westside zone would be thinned to 200 square feet of basal area for forest health (Landrum 2004). Average basal area for Alternative B would come close to meeting this target.

Dependent on individual stand conditions trees per acre could be reduced up to 90 percent of current condition. However, on average, mechanical treatments would reduce total trees per acre by approximately 60 to 75 percent. The vast majority of the trees removed would be under 24 inches DBH.

Alternative B-Modified: Basal area per acre would be reduced by approximately 12 percent. Even with these basal area reductions, most stands will retain high relative densities that do not maximize forest health conditions, particularly in CWHR size class 5 stands. Basal area in CWHR 4 stands would come close to meeting the 200 square feet basal area target for reducing insect risk. However, CWHR 5 stands would not meet this threshold.

Trees per acre would be reduced by an average of 28 percent overall size classes. However, trees per acre for CWHR size class 5 stands under Alternative B-Modified would only be reduced by seven percent. The change in basal area and trees per acre in this alternative will be very light in CWHR size class 5 units resulting in very similar stand structure to pre-treatment, thus not achieving the goals of forest health or fire resistance.

Alternative C: Basal area per acre would be reduced by 20 percent on average. On average, stands would retain approximately 235 square feet of basal area. This would not meet the Plumas NF insect risk thinning guide threshold.

Treatments under Alternative C would reduce trees per acre by approximately 57 percent, on average, but would vary depending on the individual stand. On average, approximately 197 trees per acre would be retained, thus consistently have higher tree densities than desired conditions for forest health, and would not resemble forest structure adapted to an active fire disturbance regime.

All Action Alternatives would meet the requirements of retaining 30 percent of the existing basal area for CWHR 4 stands and 40 percent of existing basal area for CWHR 5 stands. Table 3.11 shows average basal area and canopy cover for each alternative broken up by CWHR size class 4 and size class 5.

Table 3-7 Basal area (square feet/acre) and canopy cover within potential thinning units.*

CWHR Size Class	Alternative A		Alternative B		Alternative B-Mod		Alternative C	
	Basal Area	Canopy Cover	Basal Area	Canopy Cover	Basal Area	Canopy Cover	Basal Area	Canopy Cover
CWHR 4	245	53	176	35	201	44	229	46
CWHR 5	274	51	220	40	258	49	241	45

*All numbers are rounded.

Table 3.12 illustrates the average post-treatment stand attributes for mechanical thinning treatments that would be implemented under Alternative B, B-Modified, and C.

Table 3-8 Trees per acre by size class for CWHR Size Class 4 and 5 stands in potential thinning units.

	Alternative	Trees per acre by Size Class					
		Sapling 0–6 inches	Poles 6–11 inches	Small Trees 11-20 inches	Medium Trees 20–30 inches	Large Trees Greater than 30 inches	Total Trees per acre
		(diameter at breast height)					
CWHR Size Class 4							
Before Treatment	A	281	69	94	11	7	462
After Treatment	B	0	0	32	28	5.7	66
	B-Mod	125	31	67	11	6	240
	C	1	36	71	13	8	129
CWHR Size Class 5							
Before Treatment	A	304	56	60	19	14	454
After Treatment	B	0	9	9	26	13	81
	B-Mod	283	51	55	18	14	421
	C	144	42	47	17	14	264

*All numbers are rounded.

Mechanical thinning treatments for all Action Alternatives would utilize species preference guidelines to enhance species composition of the residual stand. Prescriptions that generally retain trees greater than 24 inches DBH would allow for the removal of undesirable trees such as, a shade-tolerant white fir, up to 29.9 inches DBH if it is competing with a desired tree such as shade-intolerant pine or a hardwood tree greater than 30 inches DBH or within proximity of a group selection unit where shade-intolerant regeneration would be emphasized. Mechanical thinning would have little change in shade-intolerant species composition. Shade-tolerant species, like fir, would be targeted, but not enough large shade-tolerant trees would be removed to promote regeneration of many more shade-intolerant species.

Alternatives B and B-Modified: CWHR 4 stands would receive heavier thinning (removal of more trees and canopy cover) to create open canopy stands and enhance diameter growth of residual trees into CWHR 5. Heavier thinning in CWHR 4 stands would reduce ladder fuels and stand density to reduce negative impacts of future fires, drought, and insect and disease occurrences. However, Alternative B-Modified proposes to thin fewer acres to 40 percent canopy cover than Alternative B, thus having a more limited effect on stand structure over the project area. CWHR 5 stands would receive lighter thinning (less removal of trees and canopy cover) to maintain closed-canopy stand conditions of later seral stands. Thinning to 50 percent canopy cover and greater would retain more ladder fuels.

***Alternative C*:** While mechanical thinning treatments would employ species preference guidelines to enhance species composition of the residual stand, mechanical treatments under Alternative C would have lower capacity to affect species composition change because prescriptions that retain trees all trees up to a canopy cover retention of 50 percent would not affect overstory tree composition. Overstory tree composition is important because overstory trees have reached reproductive maturity and will produce the majority of seed in the stands for future regeneration. Mechanical thinning treatments under Alternative C would not remove as many undesirable shade-tolerant trees in stands left at 50 percent canopy cover, and consequently, would retain shade-tolerant trees that would be a future seed source for more shade-tolerant tree regeneration. In addition, Alternative C would not introduce shade-intolerant species as Alternatives B and B-Modified would through group selects.

Group Selection

Alternatives B and B-Modified both would implement 56 acres of group selection harvest as directed by the Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLG Act) (USFS 1999) to "test the effectiveness of an uneven-aged silvicultural system in achieving an uneven-aged, multistory, fire-resilient forest; provide an adequate timber supply that contributes to the economic stability of rural communities; and improve and maintain ecological health of the forest."

The group selection method would create openings in the canopy to mimic gaps caused by natural disturbance events. The group selection system may be used to increase diversity in forest structure on the landscape scale (McDonald and Abbot 1994), as well as promote the regeneration, growth, and development of shade-intolerant species.

"Seedlings of very shade-intolerant species such as ponderosa pine require a minimum of 30 percent full sunlight to survive in the understory" (Oliver and Larson 1996). The amount of sunlight reaching the group is a function of group size relative to the surrounding codominant and dominant tree height on the edge of the group. Consequently, those trees in the center of the group selection receive the most amounts of light and water, while those trees near the edge receive partial shade and must compete with surrounding codominant trees for water resources (York et al. 2003). A range of group selection sizes would be used to most appropriately "fit" the site requirements to encourage the regeneration, growth, and development of shade-intolerant species. Group selection openings would range in size from 0.5 acre to 2 acres, averaging 1.5 acres in size.

Group selection treatments are designed to promote the establishment, growth, and development of a new age class of shade-intolerant tree species such as ponderosa pine, Jeffrey pine, and rust-resistant sugar pine. Group selects under Alternatives B and B-Modified would comprise approximately seven percent of the potential thinning area. Reforestation efforts would replant with a mixture of more shade-intolerant species weighing about 85 percent in pine species. Site preparation and regeneration needs would be evaluated after harvest.

Those group selection units requiring natural and activity slash treatment would undergo "site preparation" via machine piling, brush raking, hand piling, and/or underburning to clear any activity slash and debris that would prevent site regeneration.

Both artificial and natural regeneration would be used to reforest group selection units. A combination of natural and artificial would be used to achieve desired stocking levels, with an emphasis on regenerating shade-intolerant species. Those units requiring artificial regeneration would be planted with a mix of species native to the ecological forest type. Species to be planted would include ponderosa, Jeffrey pine, rust-resistant sugar pine, Douglas-fir, and incense cedar. Natural regeneration would be used for incense cedar, white fir, and red fir species. This regeneration method would have a major beneficial effect on enhancing desired species composition on both the stand and landscape scales.

After establishment of regeneration, release treatments (manual grubbing and/or pre-commercial thinning) would be used to reduce competing vegetation to favor the growth and development of desired species.

Group Selection treatments would reduce trees per acre by greater than 90 percent, on average, and would reduce basal area per acre by 75 percent on average within the immediate one to two acre group.

Species composition of shade-intolerant tree species would be enhanced through 1) the preferential retention of healthy vigorous pine as seed trees, if available on site, and 2) planting a mix of native tree species while emphasizing the shade-intolerant species in that forest type. Group selection treatments would increase relative proportions of desirable shade-intolerant species such as Jeffrey pine and sugar pine and would decrease relative proportions of less desirable shade-tolerant species such as white fir.

Group Selection treatments would enhance landscape structure and heterogeneity by converting mid-seral closed-canopy forest dominated by shade-tolerant species to early seral open canopy gaps which would create favorable conditions for the establishment, growth, and development of shade-intolerant species. Primarily CWHR 4 stands and less desirable areas (in terms of tree size and species composition) within CWHR 5 stands would be converted to areas best characterized by CWHR 1 and 2 stands.

Mastication or hand cut and hand/grapple piling

Alternative B proposes 314 acres, Alternative B-Modified proposes 357 acres, and Alternative C proposes 269 acres of mastication treatment. Alternative B proposes 705 acres, Alternative B-Modified proposes 1,043 acres, and Alternative C proposes 1,079 acres of hand cut treatments. The direct and indirect effects of mastication and hand cut treatments are expected to be the same under all Action Alternatives.

Mastication would occur in mainly plantations and pole sized stands and would re-arrange shrub fuels and conifer tree ladder fuels less than 10 inches in diameter. Mastication and hand cut treatments would also occur in CWHR 4 and 5 stands not seen fit for mechanical thinning. Post-treatment residual conifer tree spacing would range from 18 to 22 feet, on average. Trees per acre and basal area per acre would be reduced as well.

Mastication and hand cut treatments would employ species preferences to retain species native to the forest stand ecological type. Desired shade-intolerant species such as black oak, ponderosa and Jeffrey pine, rust-resistant sugar pine, and Douglas-fir would typically receive preference for retention while allowing for a diverse mix of species occupying the site.

Mastication and hand cut treatments would create open canopy stands within plantations and naturally occurring pole sized (<11 inches DBH) stands. These treatments would enhance the development of CWHR 2 sized stands into CWHR 3 sized stands with Open (P) and Sparse (S) canopy cover (less than 39 percent canopy cover).

Underburning

The effects of prescribed fire treatments in all action alternatives are expected to be the same. In addition, all action alternatives propose 107 acres of underburning. Underburning is nonselective, and it may kill some dominant and codominant trees that may have otherwise been retained in mechanical treatments. Implementation of prescribed burning treatments would have a negligible to minor effect on species composition in underburn units. Localized torching from underburning would occur, thereby creating small openings in the overstory where shade-intolerant species may become established and grow, depending on size.

Prescribed fire treatments would not notably affect species composition. However, prescribed fire treatments are the first step in the process of re-introducing fire into landscapes that have not burned for decades. Multiple entries of prescribed or natural fire may favor fire adapted shade-intolerant species over decades if not a century.

Prescribed fire treatments would not notably affect stand size class and density. Prescribed fire treatments would incur mortality of the smaller diameter trees, primarily those less than 10 inches in diameter with some incidental mortality of larger trees due to torching or post-fire delayed conifer mortality. Canopy cover density could be reduced by isolated torching, however, most tree mortality resulting from prescribed fire treatments would occur in the understory which would not notably affect the overstory canopy cover.

Cumulative Effects on Forest Health and Fire Resistant Stand Structure

On a landscape scale, existing vegetation type, size class distribution, and canopy cover distribution would change very little from mechanical treatments. The area proposed to be thinned in all Action Alternatives is a very small component of the 11,889 acre sub-watershed analysis area. The dominant vegetation type is Sierran mixed conifer of small to medium-large in diameter with dense canopy cover.

The Bald Mountain Landscape Assessment (1998) pointed out several differences between existing condition and desired reference condition for age group and size classes for the dry and moist fir vegetation types that characterize most of the Grass Flat Project Area. Size class 3 size trees (6-11” DBH) were over-represented and size class 4 (11-24” DBH) were under-represented as compared to reference conditions. In the nearly 14 years since the Bald Mountain Landscape Analysis’ completion, size class representation has shifted from CWHR size class 3 to 4 with an overabundance of size class 4 stands. In terms of species diversity, ponderosa pine and sugar pine basal area represented 10 to 25 percent of the composition of the dry and moist white fir vegetation types. White fir represented 65 to 75 percent of the species composition (as a percent of basal area). Under existing conditions, white fir now represents 85 to 95 percent of the species composition.

As shown in table 3.13, existing conditions for the large tree class is adequately represented, the seedling and poles classes are under desired levels, and the small tree size class is over-represented. The proposed fuel treatments of the Grass Flat Project would move some of these classes toward desired conditions (Table 3.13).

Table 3-9 Existing condition and desired condition for tree size class distribution

Size Class	CWHR Size	Desired Size Class Distribution*	Existing Size Class Distribution
Seedling and Sapling (0-6”dbh)	1&2	10-20%	6%
Poles (6-11’dbh)	3	10-20%	7%
Small trees (11-24”dbh)	4	15-30%	63%
Medium –Large trees (>24””dbh)	5	15-20%	24%

*From the Bald Mountain Landscape Assessment (1998)

While existing conditions serve as the baseline for cumulative effects of past activities within the analysis area, present and future projects would have a minor cumulative effect on change in vegetation throughout the analysis area. These effects are best represented by the no action alternative, Alternative A which would not implement any of the treatments proposed under the action alternatives.

Alternative A would largely maintain existing conditions of dense, closed-canopy, mid-seral stands which are susceptible to 1) moderate potential fire behavior due to heavy accumulations of surface fuels in combination with a homogeneous continuity of ladder and canopy fuels, and 2) drought, insect and disease tree mortality. It is important to recognize that while Alternative A maintains existing conditions, these forested landscapes are dynamic, and maintenance of such homogenous conditions would be relatively unstable and pre-dispose this landscape to rapid change due to high severity disturbance events such as fire, drought, and insect and disease occurrences.

Alternative A would not meet the purpose and need and would not reduce hazardous fuel accumulations to improve forest health. The existing forest and landscape structure could lead to a greater potential for large, moderate to high-severity fires in forested areas, including the Wildland Urban Interface, Riparian Habitat Conservation Areas, Protected Activity Centers, and Home Range Core Areas in the analysis area during a wildfire under severe weather conditions.

Alternative A would rely on density-dependent mortality, wildfires, and continued fire exclusion, to shape overall landscape structure. These high stand densities and closed-canopy forests would favor a gradual shift in species composition toward exclusively shade-tolerant species, which would have an adverse effect on species diversity across the landscape. Over the long term, mortality occurring in high-density stands would continue to increase surface fuel loads. These increased surface fuels, combined with continuous ladder and canopy fuels, would continue to hinder suppression effectiveness and would likely maintain stands susceptible to high-mortality fires.

Alternative A would not improve firefighter and public safety, which could lead to potential future injuries or fatalities during wildfire events. The no-action alternative would also not reduce potential tree mortality or protect rare species and associated habitat from the major adverse effects of severe wildfire (Stephens and Moghaddas 2005a; Agee 2002).

Alternatives B, B-Modified, and C implement treatments and prescriptions which, in general, allow greater opportunity to create more open canopy, mid-seral stands while maintaining closed-canopy, late seral stands which serve as habitat for late seral dependent species (table 3-14).

Table 3-10 Comparison of Cumulative Effects: CWHR canopy closure acreages within the analysis area by alternative.

CWHR Canopy Closure	Acres of Sub-watershed Area			
	Alternative A	Alternative B	Alternative B-Modified	Alternative C
NA (0-9%)	2123	2179	2179	2123
Sparse (10-24%)	643	643	643	643
Open (25-39%)	695	916	695	695
Moderate (40-59%)	6649	6419	6630	6695
Dense (60-100%)	1779	1732	1742	1733

Alternatives B and B-Modified also provide for the creation of early seral habitat as displayed by the increases in CWHR size class 1 with the implementation of group selects. Group selects would convert approximately seven percent of potential thinning area into early seral habitat which would provide favorable conditions for the establishment, growth, and development of a new age class of shade-intolerant species which would enhance landscape diversity. However, this effect would come from the conversion of primarily mid-seral stands (CWHR 4) with the rest coming from late-seral stands in CWHR size class 5. Over 50 percent of groups (32 acres) would be placed in CWHR size class 4 and the remaining group selection treatments (24 acres) would occur in CWHR size class 5 under both Alternatives B and B-Modified.

Alternative B would best meet desired conditions for both the fuels reduction and forest health objectives as described in Chapter 1 and would enhance forest resiliency to trends presented by climate change. Particularly, the prescriptions that would be implemented under Alternative B would enhance heterogeneity at multiple scales - both the stand and landscape scale – while reducing fuels and potential fire behavior and improving forest stand structure, species composition, and forest health, in general. Thinning treatments in Alternative B would change CWHR type in approximately one third of the total area thinned. These effects are displayed by the greater reductions in CWHR 4M and 4D, and the greater increase in CWHR 4P. Approximately 28 percent of the total thinning area would be reduced from CWHR 4M to 4P, while five percent of the area would be converted from CWHR 4D to 4M. On the sub-watershed level, however, these changes comprise only three percent of the landscape.

Alternatives B-Modified and C implement treatments and prescriptions which, in general, maintain relatively greater closed-canopy conditions in mid-seral and late seral stands. These effects are displayed by the maintenance of moderate canopy cover in CWHR size classes 4 and 5, and the relatively smaller increases in open canopy stands in CWHR size classes 4 and 5. Alternative B-Modified and C converts three percent and five percent, respectively, of the potential thinning area from CWHR 4D to 4M. Both Alternatives B-Modified and C convert CWHR 5D to 5M on less than one percent of the potential thinning area. In addition, for Alternative C there would be no cumulative addition in early seral conditions as displayed by CWHR size classes 1 and 2. On a sub-watershed level, both Alternative B-Modified and Alternative C change CWHR type on less than one percent of the landscape.

Alternatives B-Modified and C would meet fuel reduction purposes and needs to varying degrees. The high acreage that would be left at or greater than 50 percent canopy would still be leaving ladder fuels.

While treatments under Alternatives B, B-Modified, and C could enhance structural diversity at the stand level depending on individual stand conditions, the capacity of these treatments to enhance heterogeneity and improve species composition are limited by the upper diameter limits and canopy cover restrictions associated with the treatments and prescriptions respective to each alternative. This tempers the efficacy of all Alternatives to enhance heterogeneity and species composition at the landscape scale. Consequently, this also reduces the effectiveness of Alternatives B, B-Modified, and C to meet desired conditions under the forest health purpose and need.

Summary of Cumulative Effects

Past, Present, and Foreseeable Future Actions

Table 3.15 displays the past, present and foreseeable future actions within the Grass Flat Project area and the surrounding areas. The table displays the acres for each project, the type of activity, and the number of aces that are located within the Grass Flat Project area.

Much of the Grass Flat Project area has been impacted by mining and logging over the past 150 years. Past natural and human disturbances are inherently reflected in the condition of the current landscape. For example, pole sized trees likely developed due to disturbance within the last half century, whereas small to medium sized trees most likely grew from disturbances 50 to 150 years ago. Since many of these changes were not recorded or were limited to second hand or unreliable sources, effects of the relevant historic actions are described qualitatively rather than quantitatively.

Nonetheless, the relevant existing impacts related to past natural event (i.e., fires, insect and disease outbreaks) and the lingering effects of past projects were taken into account for the EvegAsveg timber type GIS analysis, which were based on year 2000 aerial photograph interpretation. The aerial photograph interpretation reanalyzed all of size classes (sapling, poles, small trees, etc.) and canopy cover (open, sparse, moderate, and dense) from all of the past actions for each timber or vegetation type within the EvegAsveg coverage area (developed for the Plumas-Lassen Administrative Study). This analysis was used to determine existing conditions for vegetation resources and is available as a GIS shape file or coverage. In addition, past, present, and reasonably foreseeable future actions not captured by the most recent aerial photographs and vegetation analysis are analyzed quantitatively in order to adequately estimate cumulative effects of the actions on vegetation attributes.

Table 3-11 Past, Present, and Foreseeable Projects within the Grass Flat Analysis Area

Past Present and Future Projects	**Time Period**	**Project Level Cumulative Effects**			
Project Name		Species Composition	Canopy Cover	Stand Structure and Tree Size	Basal Area and Trees per Acre
Husky Timber Sale	Past	Cumulative Effects of past projects were taken into account for the EvegAsveg timber type GIS analysis, based on 2010 aerial Photograph interpretation			
Bald Mountain Sale	Past				
Hund Timber Sale	Past				
Mothballs Salvage	Past				
Table Mountain Sale	Past				
Bald Onion DFPZ	Past				
Black Rock Sanitation	Past				
Bald Mountain Project (GS and ITS)	Past				
Chimney Rock Tie Project	Past				
La Porte Hazardous Fuel Reduction	Past				
Lost Creek Hazard Tree Removal	Past	Minimal based on removal less than 5 trees/acre Less than 250 acres equating to 2% of the sub-watershed area.			
Fowler Peak Hazard Tree Removal	Past				
Little Grass Valley Forest Health Thin	Past	Minimal effect based on removal of trees <10.0"dbh			
Silver Tip Hazard Tree Removal	Present	Minimal based on removal less than 5 trees/acre Less than 250 acres equating to 2% of the sub-watershed area.			
Sugarloaf Hazardous Fuel Reduction	Future	Group Selection, ITS and Thinning Less than 70 acres equating to 0.5% of the sub-watershed area.			

Vegetation Attributes and Seral Stage Diversity

One reasonably foreseeable or future project within the Grass Flat Project area, is the Sugarloaf Hazardous Fuel Reduction Project. The present and future projects listed in the Grass Flat Analysis area would have minimal cumulative effects on vegetation attributes (i.e., species composition, canopy cover, seral stage diversity, etc) since less than three percent are within the Grass Flat Project area and the analysis area subwatersheds.

In addition, since less than five trees per acre would have been removed for past hazard tree projects, hazard tree projects have been determined to have little to no direct, indirect, or cumulative effects to vegetation attributes and would not change seral stage diversity classes nor change the size or density classes of the California wildlife habitat relationship (CWHR) vegetation types. The desired conditions for maintaining various seral stages or timber strata by vegetation type, size class, and canopy cover (i.e., CWHR) does not include privately-owned lands. Therefore, harvest or thinning projects on private property are outside the scope of this project.

Treatments in the Grass Flat analysis area would not contribute to significant cumulative changes in seral stage diversity analyzed for the Grass Flat Project. Total area that would change CWHR type in Alternative B comprises only three percent of the sub-watershed analysis area. Alternatives B-Modified and C would change less than one percent of the analysis area. The DFPZ thinning would convert very few stands with dense (greater than 60 percent) canopy cover into stands with moderate (40 to 59 percent) canopy cover. Most of the canopy cover change seen in the DFPZ thinning would be contained within 40 to 50 percent.

DFPZ thinning treatments would result in minimal changes in CWHR within the project analysis area. Hand thinning and tractor piling, biomass removal and underburning and pile burning treatments would not change seral stage diversity in the analysis area.

In conclusion, treatments proposed under the Grass Flat Project may result in minimal changes in seral stage diversity from existing conditions. Seral stage analysis for the Grass Flat Project indicates that thinning from below in the DFPZ would result in minimal changes in overall seral stage diversity as seen. In order to reach the desired targets for each of the seral stages, more thinning would have to occur in the small to large sawtimber with canopy cover greater than 40 percent seral stages. However, this may be unattainable due to the current LRMP amendments related to canopy cover and basal area requirements as listed in the SNFPA, HFQLG Act FEIS, and ROD.

DFPZ Maintenance

In July of 2003, a ROD was signed for the HFQLG FSEIS. It documented the results of an environmental analysis of effects of alternative management strategies for maintenance of DFPZs within the HFQLG Pilot Project area. For the purposes of this EA, DFPZ maintenance is considered outside the scope of this document.

Conifer regeneration could reduce DFPZ effectiveness by creating fuel ladders within 10–20 years after the initial treatment, depending on the site. Even if no maintenance is conducted in these DFPZs in the future, the DFPZs would be effective for many years. In the natural stands, the DFPZs' effectiveness would not be seriously reduced for 10 to 20 years. Even after that time, the DFPZs will retain many beneficial characteristics such as increased overstory crown spacing and reduced ladder fuels that will aid in fighting fire and reducing fire intensity. For example, the proposed action will remove a significant amount of ladder fuel, so even if significant amounts of understory vegetation grow in the treated stands over the next several years, the result will be a net loss in accumulated fuels.

Trends in Climate Change

The majority of scientific research concerning climate trends indicates that climate has been changing likely due to the increase in human activities which emit greenhouse gases such as the combustion of fossil fuels. Trends suggest that the Northern Sierra Nevada may become generally warmer and wetter, with longer periods of prolonged summer drought. While warmer and wetter weather patterns may increase forest growth and carbon sequestration, warmer temperatures in combination with longer periods of prolonged summer drought may likely increase forest insect and disease outbreaks and the occurrence of high severity fire – disturbances which may result in increased carbon losses. Such high severity disturbances could result in conversion of forest to shrub lands in forested ecosystems that are not adapted to such disturbance patterns – which could drastically alter carbon cycles in the short and long term.

Battles et al. (2008) evaluated the impacts of climate change on the mixed-conifer region in California providing insight to forest health and management implications for forest managers. This study found that changes in climate could "exacerbate forest health concerns" by increasing weakened tree susceptibility to mortality as a result of fire, disease epidemics and insect outbreaks and potentially enabling forest insects and disease to expand ranges or increase potential for widespread damage. The authors suggest that forest management strategies that increase species diversity, promote heterogeneity, and create lower density stands would be effective in providing "structures that are more resilient to catastrophic events like fire and epidemics" (Battles et al. 2008).

Current trends have been quantified showing an increase in the proportion of high severity fire in the Sierra Nevada mountain range. High severity patches more than a few acres in size were unusual in fires in the Sierra Nevada before Euroamerican settlement (Show and Kotok 1924, Kilgore 1973, Stephenson et al 1991, Weatherspoon et al. 1992, Skinner 1995, Skinner and Chang 1996, Weatherspoon and Skinner 1996, Safford pers. comm.. 2008). Miller et al. (2009) have also shown that the average size of high severity patches in Sierra Nevada wildfires has increased by about 100% over the last 25 years.

While the occurrence of fire (including low, moderate, and high severity fire) on the landscape is a natural disturbance that is essential to ecosystem function, the large scale of these fires, particularly the vast proportion that burned under high severity, are well outside the natural range of variability in fire size and severity experienced on the Plumas National Forest in the past and are uncharacteristic of the "natural" fire regimes typically described for the dry Sierra Nevada forests (Miller et al. 2009, Safford 2007, Safford et al. 2007, Beaty and Taylor 2007, Moody and Stephens 2002, Beaty and Taylor 2001, Gruell 2001, McKelvey et al. 1996, Weatherspoon 1996, Weatherspoon and Skinner 1996, Skinner and Chang 1996, McKelvey and Johnston 1992, Leiberg 1902.

In addition, recent occurrences of large scale *Heterobasidion* root disease and bark beetle outbreaks have been linked to recent drought periods that have affected areas in the Southern California mountains and in the Lake Tahoe Area (Guarin and Taylor 2005, Macomber and Woodock 1994). Such disturbances that result in abnormally large levels of mortality have the potential to affect fuels dynamics, potential fire behavior, and resulting future forest structure and composition. Such warming trends may lead to the reproductive and overwintering success of forest pathogens and insects, thereby increasing their severity, while prolonged summer droughts, exacerbated by high stand densities, mistletoe and root disease infection, will likely lead to increased moisture stress and decreased health and vigor of forest trees making them more susceptible to mortality from such pathogens and insects (Battles et al. 2008).

3.3 Fire and Fuels

3.3.1 Introduction

The following section describes the current fuel conditions in the Grass Flat Project area, and the potential effects of NFS land activities aimed at reducing wildfire risk to the community of LaPorte and Litte Grass Valley Reservoir Recreation Area, as it pertains to fire behavior and suppression. The proposed Defensible Fuel Profile Zone (DFPZ) treatments are designed to remove surface, ladder and canopy fuels, that result in the desired condition of a fire-resistant DFPZ (1999 HFQLG ROD/FEIS, Appendix J), strategically positioned to increase the connectivity between the Bald Onion, and Sugarloaf DFPZs, and defensible space established by the private landowners.

Although not designed specifically to achieve fuels reduction, the following section also addresses potential effects to fire behavior and suppression, as a result of establishing dispersed Group Selections ─ some dispersed within DFPZ treatment units.

Since the 1990's, there have been many changes to national administrative procedures governing the preparation of projects intended to reduce fuel concentrations and restore healthy ecological conditions on public land. The most recent national direction relevant to this environmental analysis process is the Healthy Forest Restoration Act (HFRA) of 2003 (16 U.S.C at 1611-6591), which references direction under *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Strategy Implementation Plan* (USDA/USDI 2001).

The 2004 Sierra Nevada Forest Plan Amendment (SNFPA) final supplemental EIS Record of Decision (ROD) adopts an integrated strategy for vegetation management that is aggressive enough to reduce the risk of wildfire to communities in the WUI, while modifying fire behavior over the broader landscape. The 2004 SNFPA ROD also provides for the implementation of the 1997 *Herger-Feinstein Quincy Library Group* (HFQLG) *Forest Recovery and Economic Sustainability Act*, which includes strategically placing Defensible Fuel Profile Zone (DFPZ) networks and dispersed Group Selections (GSs).

The following sections provide a detailed description of potential effects to fire behavior and suppression as a result of implementing either: 1) No-action (Alternative A), 2) the proposed action (Alternative B) including DFPZ and GS treatments, 3) the preferred action (Alternative B Modified) including DFPZ and GS treatments; and, 4) the non-commercial funded alternative (Alternative C) including only the DFPZ related treatments.

3.3.2 Analysis Regulatory Framework: Statute, Regulation, Forest Plan, and Other Direction

The Grass Flat Project would contribute to fulfilling the long-term goals of the National Fire Plan designed to protect communities at risk from wildfire on federal lands. The Grass Flat Project would also meet the intent of the 2003 *Healthy Forest Restoration Act* by decreasing the wildfire risk to people, communities, and the environment through the construction of DFPZs, and provide anchor points to initiate fire suppression activities in the event a fire starts outside of the DFPZ.

The Grass Flat Project is designed to fulfill management direction as specified in the 1988 Plumas National Forest Land and Resource Management Plan (LRMP), as amended by the 1999 Record of Decision on the *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act) final environmental impact statement (EIS) and the 2004 Record of Decision on the *Sierra Nevada Forest Plan Amendment* (SNFPA) final supplemental EIS.

The standards and guidelines for fuels and vegetation management activities for the Grass Flat Project area are shown in Table 2 of the 2004 SNFPA Record of Decision. Table 2 includes direction for designing and implementing fuel and vegetation management activities in each of the various land allocations of the HFQLG Pilot Project.

Goals for fire and fuels management from the 1988 Plumas LRMP and the Sierra Nevada Forest Plan Amendment Final Supplement Environmental Impact Statement (SNFPA FSEIS, 2004) and HFQLG Act for WUI are:

- To create defensible space near communities and provide a safe and effective area for suppressing fire.
- To design economically efficient treatments to reduce hazardous fuels conditions.
- To establish and maintain a pattern of area treatments that is effective in modifying wildfire behavior
- Treating fuels in a manner that significantly reduces wildland fire intensity and rate of spread, thereby contributing to more effective fire suppression and fewer acres burned.
- Treating hazardous fuels conditions in a cost-efficient manner to maximize program effectiveness.

These goals also include managing hazardous fuels conditions in and around communities combined with strategic placement of fuels treatments across broad landscapes to modify wildland fire behavior. Goals for fuels treatments include:

- Strategically placing treatment areas across landscapes to interrupt potential fire spread,
- Removing sufficient material in treatment areas to cause a fire to burn at lower intensities and slower rates of spread compared to untreated areas.

3.3.3 Effects Analysis Methodology

Analysis Methodology

The dynamics between vegetation and fire and fuels are inherently linked; vegetation treatments (and absence thereof) have profound effects on fuel loading and fuel arrangement. These elements have the greatest influence on fire behavior. Similarly, fire has a profound effect on vegetation establishment and development. For these reasons, the geographic area used to analyze the direct and indirect effects are the DFPZ and GS unit boundaries.

The geographic area used to analyze the cumulative effects of the fuels treatments covers approximately 12,000 acres, (see EA: Hydrology section). These three sub-watersheds were considered appropriate for this analysis as they encompass all vegetative and fuels treatment areas proposed, along with consequent effects that could occur from the proposed alternatives addressing all land ownerships and administration (i.e. private, federally-administered, etc).

The temporal scale used to analyze the cumulative effects analysis of the fuels treatments, is based on current vegetative landscape features, to aid in characterizing fuel loading and fuel arrangement within the three watersheds. From a broader landscape perspective, the current vegetative structure and composition is assumed to reflect historical management practices (past timber harvests [i.e., plantations composed of various age classes], hazardous fuels reduction treatments, burned areas, road building and urban growth).

Data Sources

The modeling of potential fire behavior was done under 90th percentile weather conditions (Table 3-12) that were calculated using Fire Family Plus (Main et al. 1990) and 20 years of weather from the Pike County Remote Automated Weather Station (RAWS). The Fire Management Analyst (FMA) software program (Fire Program Solution, 2003) was used to model and assess the effects of different treatments on fire behavior by alternative. Tree and crown fuel data were collected utilizing the Region 5 Common Stand Exam protocol (CSE, 2011); information was processed and utilized in the Forest Vegetation Simulator model, whereby tree lists were developed and exported to the FMA program. Fire behavior fuel models were downloaded from the Landfire (2008 1.1.0) website and refined by district fuels personnel. Photo series and ocular observation by District Fuels Officers was used to estimate dead and down woody surface fuel loading.

Basis for Analysis Methods

FMA was utilized to determine stand level existing and post-treatment surface and crown fuel conditions as well as potential fire behavior and effects associated with each alternative. The different vegetation configurations within the project area were assigned fire behavior fuel models (Scott and Burgan, 2005). A general description of the fuel models used in this analysis is summarized in Table X. Fire behavior results displayed in this report were based on aspect, slope, environment, and fuel treatment types. Fire behavior data for all stands modeled can be found in the Grass Flat Analysis File; Fire and Fuels section, available upon request.

Table 1. Fuels models used in direct and indirect effects analysis

****Chain is a measurement of distance; one chain = 66 feet.**

Fuel models are used to predict fire behavior in this analysis. Fuel models TL1, TL3 and TL5 represent desired conditions for forested stands. Timber and slash models that reflect actual Grass Flat Project conditions were used in the Grass Flat analysis.

Cumulative effects fire behavior was modeled using 90th percentile weather using Behave Plus 4.0.0. (Andrews 2007). Modeling was done on slopes 0 to 80 percent in order to get a range of expected fire behavior outcomes on various degrees of slope. Although the project area is mildly steep there are steeper pitches in RHCAs and outside the project area that could burn into the proposed DFPZ. Fuel models for cumulative effects modeling were derived from Landfire 1.1.0, (Scott & Burgan Fire Behavior Fuel Models March, 2011) and crossed checked with the personnel observation and the Plumas National Forest fuel model GIS layer then analyzed using ArcMap 9.2 (ESRI 2006). Fuel models were updated in ArcMap based on current and expected fuel and harvest treatments on private and public lands. See Table 5 for predicted fire behavior across the cumulative effects analysis area.
Sources used to identify fuel and harvest treatments were: FACTs (Forest Service Activity Tracking System), Plumas County timber harvest plans and aerial photo interpretation. Predicted fire behavior results were broken into six groups – grasses, grass shrubs, shrubs, timber litter, timber understory and non-combustible (Scott and Burgan 2005). Fire behavior predictions for fuel models TL1 TL3and TL5 (desired condition) were separated from other timber litter and timber understory fuel models to show acre differences in desired condition.

Assumptions Specific to Fire and Fuels Resource Analysis:

The output data reflects fire modeling assumptions (weather, fuel model characteristics, and spatial variability) and variability within the Common Stand Exam (CSE) plots. Weather data used in fire modeling were obtained from the Pike County Weather Station, which is approximately 16 miles southwest of the Analysis Area. It is assumed Pike County's Remote Automated Weather Station (RAWS) is maintained to National Fire Danger Rating System (NFDRS) standards and weather data is accurate. Weather conditions at the station reflect the "hottest, driest and windiest" weather conditions on an

exposed ridgetop. For stand-level modeling in the Fuels Management Analyst program, wind speeds were adjusted using a wind speed reduction factor (Rothermel 1983).

Table 3-12. Parameters used for stand-level modeling under 90th percentile weather conditions

Weather Parameter	Observations
Dry bulb	92°F
1-hour fuel moisture	4 percent
10-hour fuel moisture	5 percent
100-hour fuel moisture	7 percent
20-foot wind speed	7 mph
Herbaceous fuel moisture	33 percent
Live woody fuel moisture	48 percent

The Feather River Ranger District has detailed information on fire ignitions less than 5 acres since 1970, but only limited information is available for fires before that time. The history of large fires was derived from the Plumas National Forest Geographic Information System (GIS) database that tracks both Forest Service and California Department of Forestry large fires from 1900 to 2009. It is understood that this data does not contain all of the fires that actually occurred due to lack of reporting, differing priorities over the decades, or loss of records. However, there is enough data to demonstrate the continuing influence of wildland fire in and surrounding the approximate 12,000-acre cumulative effects analysis area.

The potential fire behavior and effects of alternatives were modeled pre and post-treatment. Fire behavior predictions are best interpreted relative rather than absolute, research indicates that models used to predict potential fire behavior may, in some instances, under predict potential for crown fire behavior (Cruz and Alexander 2010, Scott and Reinhardt 2001). It is important to note that unanticipated future wildfires, disease outbreaks, or mortality may occur within the project area prior to completion of implementation of this project—these events are not included as part of this analysis.

The BEHAVE model predicts fire behavior only at the flaming front. It assumes that the primary driving force in the flaming front is dead fuel less than one-fourth inch in diameter. It assumes that the residence time of the flame at a given point is a function only of the characteristic surface-area-to-volume ratio of the fuel array. It describes fires that are independent of the source of ignition. Fuel, fuel moisture, wind, and slope are assumed constant.
It is assumed that for hand cut and mastication treatments that there would be a ninety five percent cutting efficiency and that not all small diameter trees would be cut.

Fire and Fuels Measurement Indicators:
The measurement indicators for proposed treatment effects on potential fire behavior and severity include flame length, fire type, and canopy base height. These indicators are described below.

- Flame length (feet)—Flame lengths greater than 4 feet tend to increase fire intensity and the likelihood of torching events and crown fires. Flame length is influenced in part by fuel type and weather conditions. The upper limit for direct action taken by suppression hand crews is generally considered to be 4 feet. The upper limit for direct action taken by mechanized equipment (dozers) is considered to be 6 feet. Flame lengths in excess of these limits usually result in indirect action taken to contain the fire. Desired flame length post treatment is 4 feet or less.

- Fire type (surface, passive crown or active crown fires)—Fire type is described in four ways; only three will be measured in this analysis. The first type is a surface fire, which burns only the fuels at or near the surface without torching the trees above—this is the desired condition. The second type is the passive crown fire, which torches out individual or small groups of trees as the surface fuels burning under them provide the convective heat to ignite the above-ground fuels. The third is the active crown fire in which fire is spread from tree to tree in conjunction with the convective heat of the surface fuels burning under them. The fourth is the independent or running crown fire—this is a very rare occurrence in which the fire is spread from tree to tree independent of the burning surface fuels. This type of crown fire requires extreme weather conditions and contiguous canopy and is not modeled in this analysis.
- Canopy Base Height (feet)—For the purpose of this analysis, canopy base height is the lowest height above the ground at which there is sufficient canopy fuel to propagate fire vertically through the canopy (Scott and Reinhardt 2001). Desired canopy base heights are greater than 15 feet.

3.3.4 Affected Environment

Approximately eighty-five percent of the Grass Flat Project is in the Wildland Urban Interface (WUI) in close proximity to the community of LaPorte and the Litte Grass Valley Reservoir Recreation Area. The Little Grass Valley Recreational Area, a high use recreational area in the summer and winter months, is within the project area.

The Grass Flat Project area falls predominately within the Lower-Montane ecological zone. Elevation ranges from approximately 4,600 feet to 5,700 feet in the treatment units. Tree species in the analysis area include mixed conifer-white fir and true fire stands; predominate species white fir (*Abies concolor*) and red fir (*Abies magnitica*) other species include; incense cedar (*calocedrus decurrens*), sugar pine (*Pinus lambortana*), jeffery pine (*Pinus jeffreyi*) and Douglas-fir (*Pseudotsuga menziesii*).

Historically, fires burned with low to moderate intensity, reducing fuel accumulations and vegetation density (Sugihara et al. 2006). Current fire regimes are removed from the historic reference condition due to fire suppression and past timber management practices. As fire cycles are skipped, fuels accumulate and less fire resistant, shade tolerant tree species grow in forest understory.

Historic records pertinent to the cumulative effects analysis area and surroundings indicate fire will continue to influence the landscape. Between 1900 and 2009, three fires greater than 20 acres were recorded that affected the cumulative effects analysis area. These fires ranged from 31 acres to over 1,480 acres in size, with the largest being the Devils Gap fire that burned in 1999. The Devils Gap fire was the convergence of two lightning fires; passive and active crown fire behavior was evident in the fire area suggesting the potential for similar fire behavior (types) in the future. The Devils Gap fire burned for multiple days costing approximately 3 million dollars to contain.

Fire exclusion, past harvesting practices, and changes in various other land practices have decreased the incidence of historic low intensity fires, allowing for a build-up of surface and canopy fuels (Peterson et al. 2005). Fires burning in dense over-crowded stands, such as the Devils Gap Fire, have greater potential for crown fire. In addition to, the potentially larger more intense fire, impassable roads, distance of travel for second alarm resources, and steep inaccessible canyons make rapid access to fires on the Feather River Ranger District a problem for suppression resources. See Table 3 for a Forest Service history of fires 20 acres or less, listed by fire cause. Lightning is the main cause of all fires in the analysis area, accounting for 52 percent of fires analyzed.

Table 3-13. Fires in analysis area 20 acres or less

Cause	Number of fires
Lightning	5
Equipment use	1
Smoking	9
Campfire	5
Debris	4
Arson	1
Playing with fire	1
Miscellaneous	5
Total	31

The overall conditions in the analysis area are, in part, also described by the Fire Regime Condition Class (Table 4). The current conditions in the analysis area as described above are similar to those conditions which could lead to high-severity fires within the vicinity of the analysis area, such as the 1999 Devils Gap fire. Of particular note, 85 percent of the NFS lands within the analysis area are in condition class 3 where "vegetation composition, structure, and fuels have a high departure from the natural fire regime and predispose the system to high risk of loss of key ecosystem components." (Hann and Strohm 2003).

Table 3-14. Fire Regime Condition Classes within the Grass Flat analysis area

Fire Regime Condition Class	Acres in the Analysis Area	Description
1	0	Vegetation composition, structure, and fuels are similar to those of the natural regime and do not predispose the system to risk of loss of key ecosystem components. Wildland fires are characteristic of the natural fire regime behavior, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are within the natural range of variability.
2	0	Vegetation composition, structure, and fuels have moderate departure from the natural regime and predispose the system to risk of loss of key ecosystem components. Wildland fires are moderately uncharacteristic compared to the natural fire regime behaviors, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are outside the natural range of variability.
3	10,100 (85%)	Vegetation composition, structure, and fuels have high departure from the natural regime and predispose the system to high risk of loss of key ecosystem components. Wildland fires are highly uncharacteristic compared to the natural fire regime behaviors, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are outside the natural range of variability.
9	1,790 (15%)	Agriculture, Barren, Water, or Urban vegetation types.

Due to past fire suppression and the past land management practices, nearly the entire area is currently in Condition Class 3 (Table 4) and thus in dire need of restoration of fire as an ecosystem process. Extensive development of residential homes in the Wildland Urban Interface (WUI) to the South of Litte Grass Valley Reservoir Recreation Area in addition to the number of camp grounds poses a continued risk of human-caused ignitions throughout dry summer months. This ignition risk puts residences on private lands in the analysis area at risk of wildfires that may occur on adjacent NFS lands; likewise, NFS lands are at risk from fires ignited on these private lands. In addition, large undeveloped areas of the forested

wildlife habitat in the analysis area are at continued risk of high-severity fire and drought-related mortality.
Fuel models are mathematical fire behavior models that allow a quantitative basis for rating fire danger and predicting fire behavior (Rothermal 1972). Fuel models are classified into six groups – grasses, grass shrubs, shrubs, timber litter, timber understory and non-combustible (Scott and Burgan 2005). See Table 6 for fuel models that make up the analysis area and predicted fire behavior, assuming 90th percentile weather conditions.

The timber understory (Fuel Model TU05) represents 51 percent of the Grass Flat analysis area, predicted to sustain moderate flame lengths and spread rates. The Fuel Model TU05 represents forests characterized by heavy litter with a shrub or small tree understory, also having the potential to support moderate flame lengths and spread rates. Timber litter Fuel Models TL2, TL6, TL7 and TL8 represent 26 percent of the project area. These Fuel Models typically burn at lower rates with lower flame lengths, however when modeled using the high fire weather conditions resulted in burn intensities exceeding the desired conditions. Less than 6 percent of the project area is made up of grass and shrub fuel models characterized by grass, mixture of grass and shrubs and shrub dominated, likely to sustain fire with low to moderate flame lengths. Fourteen percent of the project area is represented by non-combustibles, such as roads, a body of water or mine tailings. Two percent of the project area is made up of the fuel models that represent the desired condition of fuel models TL1, TL3 and TL5.

Flame Length. The average modeled flame length for the Grass Flat Project area is 16 feet. This is primarily due to heavy surface fuel loads and low canopy base heights which increase potential flame lengths and possible torching (Graham et al. 2004). The slopes in the Grass Flat Project area vary; the majority of the area is less than 35 percent although there are steeper pitches in the RHCAs and adjacent to project units.

Fires burning on steep slopes are problematic for multiple reasons: preheating of fuels increases fire spread; increases spotting from preheated fuels; rolling material may start fire below suppression resources; makes anchor points difficult to establish; and increases probability of injury to fire fighters.

Fire Type. Fire types within the project area vary with topography, elevation, fuel loading and arrangement. Surface fires are generally lower in intensity and easier to suppress—though may still have high mortality rates if fuel accumulations are great. Passive crown fires, which include surface fires that occasional torch individual or clumps of trees, are indicative of higher fire intensity and severity. Active crown fire is spread from tree to tree in conjunction with the convective heat of the surface fuels burning under them. Predicted fire types in the project area are surface, and passive crown fire, although passive crown fire is most prevalent.

Canopy Base Height. The current canopy base height in the project area averages 7 feet. Lower canopy base heights allow for an easier transition of surface fires into passive or active crown fires. Fire suppression, lack of disturbance, and past practices has created dense multilayered understories known as ladder fuels. There has been an overall shift towards an increased proportion of shade-tolerant, less fire-adapted species (true firs) and decreased proportions of shade-intolerant, fire-adapted species, such as Jeffery pine. These species tend to have a lower crown base height than more fire resilient species.

Summary. Fire suppression, lack of disturbance, and past practices has created a dense multilayered understory. Heavy dead and down fuel loading and ladder fuels result in high flame lengths. Modeled wildfire is predicted to burn intensely, with higher incidence of passive and active crown fire. Wildfire continues to be a threat to the community of LaPorte, Litte Grass Valley Reservoir Recreation Area. Under current conditions a high severity wildfire in the project area would have impacts on forest

resources such as; loss of certain wildlife habitat, loss of recreational value, degradation of watersheds and decreased timber values.

3.3.5 Environmental Consequences

Table 3-15. Comparison of Alternatives by proposed treatment areas (stands).

Stands	Alternatives	Fuel Model	Flame Length (feet)	Fire Type	Canopy Base Height (feet)
2, 4, 999	Alt A	SB01	18	Passive Crown Fire	1
	Alt B	TL03	1	Surface Fire	25
	Alt B Mod	TL03	1	Surface Fire	23
	Alt C	TL03	1	Surface Fire	22
43, 973	Alt A	TL05	10	Passive Crown Fire	1
	Alt B/B Mod	TL03	1	Surface Fire	17
	Alt C	TL03	1	Surface Fire	17
29, 33, 17	Alt A	TU05	8	Surface Fire	6
	Alt B/B Mod	TL03	1	Surface Fire	9
	Alt C	TL03	1	Surface Fire	9
107, 922, 967, 973	Alt A	TU05	21	Passive Crown Fire	9
	Alt B	TL03	1	Surface Fire	27
	Alt B Mod	TL03	1	Surface Fire	23
	Alt C	TL03	1	Surface Fire	23
111, 113, 942	Alt A	TL05	14	Passive Crown Fire	2
111, 113, 942	Alt B/B Mod	TL01	1	Surface Fire	7
700, 934, 955, 998	Alt C	TL01	1	Surface Fire	7
	Alt A	TL05	3	Surface Fire	10
	Alt B/B Mod	TL01	1	Surface Fire	22
	Alt C	TL01	1	Surface Fire	22
738, 692, 696	Alt A	TL05	14	Passive Crown Fire	1
738, 692, 696	Alt B	TL03	1	Surface Fire	14
748, 752, 770, 783, 978, 979	Alt B Mod	TL03	1	Surface Fire	13
	Alt C	TL03	1	Surface Fire	13
	Alt A	TU05	39	Passive Crown Fire	13
748, 752, 770, 783, 978, 979	Alt B	TL03	1	Surface Fire	14
886, 890, 983	Alt B Mod	TL03	1	Surface Fire	21
	Alt C	TL03	1	Surface Fire	23
	Alt A	TL05	13	Passive Crown Fire	1
886, 890, 983	Alt B/B Mod	TL01	1	Surface Fire	18
968, 969	Alt C	TL03	1	Surface Fire	18
	Alt A	TL05	2	Surface Fire	26
968, 969	Alt B/B Mod/C	SB01	2	Surface Fire	42
864, 872, 884, 980	Alt A	TU05	30	Passive Crown Fire	3

Stands	Alternatives	Fuel Model	Flame Length (feet)	Fire Type	Canopy Base Height (feet)
864, 872, 884, 980	Alt B/B Mod	TL03	1	Surface Fire	14
	Alt C	TL03	1	Surface Fire	13

*Predicted modeled outputs were derived using FMA plus using stand level data generated from FVS

Alternative A – No action

Direct and Indirect Effects

The No-action Alternative would not meet the purpose of modifying fire behavior to aid suppression, as it would not meet the need to reduce potential flame lengths to 4 feet or less. Since the No-action Alternative would not apply Defensible Fuel Profile Zone associated fuels reduction activities, surface fuel loading and stand densities (ladder fuels) would continue to increase over time, as vegetative debris accumulates. For these reasons, predicted flame lengths would continue to average 16 feet, considered unsafe for direct attack with ground suppression fire fighter modules.

The No-action Alternative would not meet the purpose of reducing hazardous fuels to modify fire behavior to aid suppression, as it would not expedite the need to reduce wildland fire intensity and rate of spread for fewer acres burned; limiting future fire to surface fire types.

Under modeled fire conditions, the project area would continue to be at risk for high intensity passive and active crown fires, typically associated with a higher incidence of mortality of both surface and crown vegetative fuels. Additionally, dense overstocked understories of shade tolerant tree species would persist (refer to EA, vegetation section), allowing for easier transition of surface fires into crown fire types. Fuel modeling predicts these vegetative fuel conditions would sustain passive crown fire types.

Research conducted by Van Wagtendonk (2004) indicates there are landscapes today, where accumulations of dead woody debris and dense stands of shade-tolerant understory trees and shrubs, have made the fuel and vegetation complex nearly homogeneous (same vegetation structure or species composition). He indicates inevitably, these conditions facilitate fire behavior that cannot be suppressed due to higher heat intensities, resulting in large burn areas. As Grass Flat exhibits similar nearly homogeneous vegetative characteristics as described by Van Wagtendonk, is it assumed fire behavior would demonstrate and result in similar undesirable environmental outcomes commonly associated with large size burn areas.

The No-action Alternative would not meet the purpose to modify fire behavior to aid suppression, as it would not meet the need to increase canopy base heights to 15 feet or more. Canopy base heights at the stand level in the Grass Flat Project area average 7 feet. Lower canopy base heights, associated with low hanging tree branches, allow for an easier transition from surface fires into passive or active crown fires. There would be a continued shift towards an increased proportion of shade-tolerant, less fire-adapted species (true fir) and decreased proportion of shade-intolerant, fire-adapted species such as ponderosa pine, which generally feature high canopy base heights (refer to EA, vegetation section for more description of tree characteristics and species composition).

When passive crown fires occur, fire behavior includes torching, of individual and groups of trees, which can result in spotting, making control efforts at the fire head ineffective. Indirectly, embers from torching trees and snags could cause spot fires outside the main fire perimeter, which in turn increases risk to firefighters, and contributes to control problems and potential to increase fire size.

Fire line production rates would remain low. Fire suppression would be difficult and control options could be limited to indirect attack as flame lengths would exceed upper limit thresholds. The upper limit for direct action taken by hand crews is generally considered to be 4 feet, 6 feet is considered the upper limit for direct action taken by mechanized equipment (bulldozers). Flame lengths in excess of these limits usually result in indirect action taken to contain the fire resulting in larger fire size. Large fires generally incur more cost and increase potential loss of forest resources. For these reasons, the rural community of LaPorte would continue to be at risk from wildfire. Based on fuel and fire behavior modeling, the potential for damage to private property and natural resources from wildfire would be high.

Cumulative Effects

The No-Action Alternative would not meet the intent of the 1988 Plumas National Forest LRMP, as amended by the 1999 ROD on the HFQLG Act FEIS and the 2004 ROD on the SNFPA FSEIS, or the 2003 *Healthy Forest Restoration Act*. Surface and canopy fuel loading would continue to increase while canopy base heights would remain low, continuing the threat of wildfire to the community of LaPorte.

Heavy surface fuel loading, low canopy base heights and high canopy cover increase the likelihood that fires could escape initial attack and become large. Larger fires would increase the risk of injuries to both firefighters and the public, as well as increase the potential for residences to be lost or damaged. The potential for high-intensity fire exists in the Grass Flat Project in those areas where there is little heterogeneity (diversity) in the fuel and vegetation complexes.

The DFPZ network would not be completed, which serve as locations for fire fighters to initiate suppression actions. Stands in the area would not be fire resistant, and the ecological characteristics of high frequency, low to moderate severity fire regimes would not be restored.

The Plumas National Forest has a history of large wildfires including the Devils Gap fire in the 1999. The historic record indicates the effects of this fire included damage to critical habitat for threatened and endangered species, timber, plantations and soils, watershed and loss of recreational values. The financial costs of suppression, emergency rehabilitation and restoration of large fires have been high. There is a cumulative impact from the loss and/or damage to property and natural resources and the associated financial costs mitigating these negative effects under this alternative. In a 2009 publication of case studies evaluating the true cost of wildfires found that the actual suppression/rehab costs are a small fraction of the total cost of a wildfire. True costs were found to be 2 to 30 times the reported suppression costs, (Western Forestry Leadership Coalition 2009).

Table 3-16. Range of predicted fire behavior in Grass Flat analysis area by fuel model type (Alternative A)

Representative Fuel Model	Predicted Flame Lengths	Predicted Fire Type	Public and Private Lands	Percent
GR1 &GR2 (grass)	1-6 feet	Surface	37acres	<1 percent
GS1&GS2 (grass/shrub)	3-8 feet	Surface-torching	625 acres	5 percent
SH1, SH2, SH5 & SH7 (shrubs)	3-20 feet	Surface-torching	184 acres	2 percent
SB1 (Slash)	2-4 feet	Surface	50 acres	<1 percent
TL2, TL6, TL7 & TL8 (Timber Litter)	1-7 feet	Surface-torching	3,053 acres	26 percent

TL1, TL3 & TL5 (Timber Litter) Desired Condition	<1-3 feet	Surface	295 acres	2 percent
TU1, TU2 & TU5 (Timber understory)	2-12 feet	Surface-torching	6,030 acres	51 percent
Non-combustibles	0	None	1,614acres	14 percent

***Outputs were modeled using Behave plus using 90 percentile weather conditions, on slopes 0-80 percent.**

Alternatives B, B Modified and C

Direct Effects

Mechanical thinning of mid and overstory trees followed by hand thinning conifers <10.0 inch DBH followed by grapple or hand piling and burning would drop the flame length to 1 foot. The combined treatment of reducing intermediate canopy and surface fuels would result in a surface fire. Post treatment canopy base heights would range from 7 feet to 42 feet, with an overall average of 19 feet in treatment units. Not all of the modeled stands would achieve the desired condition of >15 feet, due to HFQLG direction limiting canopy closure reduction to 40 percent in medium and large tree vegetative types (refer to EA; vegetation section). Suppressed trees would be removed, however; intermediate and large diameter white firs and incense cedars that have high crown ratios, may leave low hanging branches close to the ground that could carry fire upward.

Mastication of trees less than 10.0 inches DBH would decrease flame lengths to less than 4 feet. Modeling indicates a transition from passive crown fire to surface fires. Canopy base heights would increase with mastication up to 42 feet in modeled stands.

Predicted flame lengths after an understory burn would be less than 1 foot. Predicted fire type in prescribe burn units is surface fire. Predicted crown scorch in small diameter trees would contribute to raising the canopy base height to 6 feet, however, predicted canopy base heights are not expected to reach the desired >15 feet, for similar reasons as stated above.

Group Selection (GS) units **(Alternative B and B Modified only)**; although effective in reducing fuel loading, the benefit under Alternative B or B Modified would be limited to the extent of the dispersed approximate 2.0 acre units.

Predicted flame lengths after a group selection cut would be 1 foot. Predicted fire type post group selection cut would achieve desired surface fire types. Canopy base heights would be more than double in 2 of the modeled units. The third unit modeled had a high existing condition canopy base height and is incalculable to the model post treatment.

Indirect Effects

It is the combined effects of the fuels treatments that would have the greatest effect on fire behavior. Mechanical thinning by itself would reduce intermediate ladder and canopy fuels and reduce the chance of active crown fires; it would not necessarily alter surface fuels or surface fire intensity (Agee and Skinner 2005).
The action alternative would increase the likelihood that wildland fires occurring in the treatment units could be successfully suppressed by initial attack resources compared to the no action alternative. The action alternatives would also provide a strategic location for fire suppression resource to indirectly attack a wildfire approaching the DFPZ. This would occur because of 4 factors: (1) opening overstory canopy; (2) reducing ladder fuels; (3) reducing surface fuels, and; (4) strategic location of treatments.

Opening overstory and understory canopy in strategic locations, along roads, ridge tops and near communities would aid fire suppression resources by allowing for a combination of ground and air attack. By reducing the canopy cover, the effectiveness of firefighting aircraft would improve by increasing retardant and water penetration through the canopy to the surface fuels, thereby slowing the fire progression and allowing ground units to be more effective. Aerial suppression methods (retardant or helicopter bucket drops) would be more effective with back up of ground suppression resources (building fire line, back firing or laying hose).

Increasing canopy base height and providing inter-tree crown separation, of canopy fuels, would decrease the chances of torching and active crown fire (Agee 2005). Increases in canopy base height would require a higher flame length and greater wind speed to carry fire into the canopy of remaining trees. By separating overstory, canopy fires approaching the DFPZ would require greater wind speeds and low fuel moisture levels to sustain active crowning. By treating surface and ladder fuels, that generate greater flame lengths, passive crown fire would be mitigated. As ladder and canopy fuels would be reduced within DFPZ treatment units, it is predicted approaching crown fires would drop to the ground, providing suppression resources a tactical advantage.

Thinning of canopy and understory vegetation and prescribed fire can modify understory microclimate that was previously buffered by overstory vegetation (Agee 1996, Scott and Reinhardt 2001, Martinson and Omi 2002). However, when all the effects (reductions in surface fuels, flame lengths, and ladder fuels, and an increase in fire suppression production rates) of the treatments are considered together, the fuel treatment activities would mitigate the effects caused by the possible decreased relative humidity and increased temperature (Rothermel 1983; Agee 1996; van Wagtendonk 1996; Agee et al. 2000). Another benefit of thinning dense stands and leaving larger fire tolerant pine species, would be altering current trends to re-establish more historical fire adapted ecosystems (North et al. 2009).

Hand cutting conifers <10.0 inches DBH, grapple or hand piling and/or prescribe burning would reduce surface fuels to <5 tons per acre of dead woody material <3 inches diameter and increase canopy base heights to approximately 7-42 feet. A reduction in ladder fuels and surface fuels would break up horizontal and vertical continuity of flammable fuels.

The decrease in live and dead fuel loading and continuity of material would result in lower flame lengths, decreases in potential spotting and increase fire suppression production rates. Based on observations on the 2001 Stream Fire (Beckman 2001), the 2006 Boulder Fire, the 2007 Antelope Complex Fire (Fites et al. 2007), and recent scientific literature (Fule et al. 2006, Safford et al. 2009), lighter intensity, hand thinning treatments may not be as effective as mechanical treatments in modifying ladder and crown fuels and resulting fire behavior or tree mortality, dependent on individual stand conditions. Consequently, hand thinning treatments are prescribed for specific stand conditions where removal of smaller diameter material alone may be effective, for example in riparian areas.

These fuels treatments would reduce the likelihood of structures being destroyed or damaged by wildland fires in the community of LaPorte and the Litte Grass Valley Reservoir Recreation Area. Implementing fuel treatments in units that are within 300 feet of structures could prevent intense flaming fronts from reaching structures, in the event of a wildland fire. According to the Structure Ignition Assessment Model (Cohen 1997), intense flame fronts (for example, crown fires) will not ignite wooden walls at distances greater than approximately 130 feet.

Treatments in units that are not immediately adjacent to structures could have an indirect effect on structure protection, by enabling the fire to be controlled at a smaller size, or by requiring fewer resources to work on fire perimeter control, because of the increased fire suppression effectiveness in the treatment areas. This in turn, could allow more resources to be committed to structure protection. The action

alternatives would also create more strategic locations from which suppression resources could establish control points and safety zones, for initial or extended attacks, because of the reduced number of trees per acre in the treatment units (see EA; vegetation section). The proposed fuel reduction treatments along roads, as well as the road improvements themselves, would promote safer travel for both the public and firefighters.

As part of the Grass Flat Project, approximately 800 to 850 acres could be prescribed burned during project implementation; this would include follow-up underburning to other treatments to achieve < 5 tons per acre of dead woody material <3 inch diameter. Existing studies generally agree that mechanical thinning followed by prescribed burning is the most effective at mitigating wildfire severity (Prichard et al. 2010). Prescribed burning is considered effective in mitigating wildfire severity by reducing surface fuels, reducing understory stand densities by killing small diameter trees, and pruning lower limbs of intermediate and large diameter trees through scorch of foliage. Over time, approximately 1-2 years post treatment scorched foliage would drop to the ground, increasing canopy base heights and contributing to surface fuel loading.

Treatment areas that are exclusively treated by understory burning may need additional entries to meet desired conditions. As fire killed trees fall and contribute to surface fuel loading the effectiveness on modifying fire behavior is lessened (Collins et al. 2010). Second prescribed burn entries in underburn only units are expected to occur 5-7 years after initial treatment, to achieve desired fuel conditions.

Prescribed burning is nonselective and may kill some dominant and co-dominant trees, which may have been otherwise retained in more aggressive mechanical treatments. According to the HFQLG FSEIS (p. 19), overall, the overstory canopy would not be affected by underburning, although torching of individual or small groups of trees would occur on up to 10 percent of the burn area where high surface fuel concentrations and ladder fuels occur together. Torching during operations may result in gaps in the canopy typically less than 0.5 acre in size. Localized torching from underburning would occur, thereby creating small openings in the overstory where shade-intolerant species may become established and grow.

Riparian Conservation Habitat Areas (RHCAs) would be treated with hand cut and pile burning and understory burning, whereby fire is ignited uphill of RHCA's so that only low intensity flames creep downhill to mitigate damage to sensitive riparian related resources resulting in low intensity mosaic burning. Low intensity burning in the RHCAs would result in maintaining higher canopy cover and large logs, if fuels have high moisture content (North et al. 2009). Typically the Feather River RD burns during the late fall (after fire season ending rain) and spring months.

Effects of pile burning treatments would be highly localized and dispersed. The effects of pile burning include scorch and subsequent mortality of individual trees; however, this would be a negligible effect due to the relative scale and dispersion associated with the nature of these treatments.

Mastication rearranges hazardous fuel, decreasing ladder fuels, while increasing canopy base heights. Surface fuel loading may increase with mastication; however flame lengths and rate of spreads have been shown to decrease after treatment. In the event of a wildfire, mastication units may still experience higher levels of mortality due to the residual soil heating. Burn severity studies in masticated fuels show the burn severity decreases with reduced fuelbed depth and increase soil moisture (Busse et al. 2005).

The Group Selection (**Alternative B and B modified only**) units would have lower flame lengths after site preparation and replanting than the untreated forested areas. Residual trees greater than 30 inches in diameter within the GS units would have a low chance of mortality during fires, due to their high average canopy base height and relatively low fuel loads in areas that have been prepared for planting. Planted

trees would remain vulnerable to scorch-related mortality several years after initial planting due to their small size. Groups in the Grass Flat Project are imbedded within the DFPZ and would be less vulnerable to damage by wildfire.

Research on GS patches in the Challenge Experimental Forest indicates that in 10 years, there will be significant cover of grasses, herbs, and shrubs, but that the vegetation will have achieved little height growth (McDonald and Abbott 1994; McDonald and Reynolds 1999). That research indicates that small openings, characteristic of group selection, suppressed growth of shrubs due to shading from trees adjacent to the opening (McDonald and Abbott 1994; McDonald and Reynolds 1999). The live fuel moisture of the grasses, herbs, and shrubs would play the biggest role in reducing fire behavior (Agee 1996), in addition to the ratio of live to dead vegetation available to burn. The proportion of dead and live material in the units may affect the way regenerated shrub species may burn. With a relatively low amount of dead surface fuels (5 tons or less per acre) remaining post-treatment, the live fuels in the group selection units may act more as a heat sink rather than a heat source in the event of a wildland fire.

Cumulative Effects

The strategic location of units along roads, ridgelines, previous fuels treatments and adjacent to communities increases the overall effectiveness of DFPZ treatments. Both the strategic DFPZ network of fuel treatments along with non-network fuel treatments follow past forest-level (Olson et al. 1995) and more recent scientific recommendations for fuel treatments (Hessburg et al. 2005; Agee et al. 2000). Specifically, Hessburg et al. (2005) note:

> Currently, dry forest landscapes of the Inland Northwest exhibit high landscape connectivity of conditions that support large and severe fires. To buy time for more thoughtful and carefully planned forest restoration, it makes sense to begin restoration by designing and developing networks of shaded fuel breaks throughout the dry forests (Agee et al. 2000; Arno and Allison-Bunnell 2002).
>
> These networks would provide the advantage of breaking large fire-prone landscapes into smaller and more manageable pieces, which would be of significant benefit, both for restoration and fire suppression efforts. It would be useful to position fuelbreaks adjacent to existing roads so that the fuelbreaks could be revisited at regular intervals, and re-treated to maintain a widely scattered cover of medium and large-sized ponderosa pine (where available) with only light fuels (p. 132).

At the landscape level, these treatments would provide connectivity between the existing fuel treatments of Bald Onion, and Sugarloaf DFPZs. Table 6 shows the changes in predicted fire behavior across the landscape following the Grass Flat Project.

Table 3-17. Predicted Fire Behavior in Grass Flat analysis area post treatment (Alternatives B, B Modified and C)

Representative Fuel Model	Predicted Flame Lengths	Predicted Fire Type	Public and Private Lands	Percent
GR1 &GR2 (grass)	1-6 feet	Surface	36acres	<1 percent
GS1&GS2 (grass/shrub)	3-8 feet	Surface-torching	552 acres	5 percent
SH1, SH2, SH5 & SH7 (shrubs)	3-20 feet	Surface-torching	155 acres	1 percent
SB1 (Slash)	2-4 feet	Surface	342 acres	3 percent
TL2, TL6, TL7 & TL8 (Timber Litter)	1-7 feet	Surface-torching	2,481 acres	21 percent

TL1, TL3 & TL5 (Timber Litter) Desired Condition	<1-3 feet	Surface	1,640 acres	14 percent
TU1, TU2 & TU5 (Timber understory)	2-12 feet	Surface-torching	5,069 acres	43 percent
Non-combustables	0	None	1,614acres	14 percent

***Outputs were modeled using Behave plus using 90 percentile weather conditions, on slopes 0-80 percent.**

Modifying forest structure and treating surface fuels will create fire resilient stands (Pollet and Omi 2002, Graham et al. 2004) and restore the ecological characteristics associated with high frequency, low to moderate severity fire regimes (Kilgore 1976).

Other present and proposed future projects in the analysis area include wildlife, botanical, watershed, recreation, lands, minerals, and special use projects. These projects would not be expected to have a measurable effect on forest structure in the analysis area due to the localized and dispersed nature of scale and intensity of such projects. However, the primary minor adverse effect of these projects, particularly recreation activities, with respect to fire, is increased ignition sources from campfires, vehicles, and other intentional or unintentional ignitions from forest users during summer months.

Present and proposed future fuels and vegetation management projects in the analysis area include the Sugarloaf HFR project, Silvertip Roadside salvage project, Bald Mountain project and private landowner projects. Collectively, these projects represent less than 8 percent of the analysis area, and Forest Service projects represent less than 3 percent of National Forest System Lands.

Small hazardous fuels projects occurring on private lands include hazardous fuels reduction in the form of commercial and non-commercial mechanical thinning, hand thinning, piling and burning, or underburning. These activities would have a beneficial effect on the stand level by maintaining an open understory in these stands, thereby reducing high stand densities of small trees, ladder fuels, and fuel loading, fire risk, and potential fire behavior and effects. These projects are generally smaller in scale and highly localized to the southern portion of the analysis area.

Larger hazardous fuels reduction projects occurring on National Forest System lands such as the Sugarloaf HFR project also employ hazardous fuels reduction in the form of commercial and non-commercial mechanical thinning, hand thinning, piling and burning, or underburning. These activities would also have a beneficial effect on the stand level by maintaining an open understory in these stands, thereby reducing high stand densities of small trees, ladder fuels, and fuel loading, fire risk, and potential fire behavior and effects.

DFPZ Maintenance

In July of 2003, a ROD was signed for the HFQLG FSEIS. It documented the results of an environmental analysis of the effects of alternative management strategies for maintenance of DFPZs within the HFQLG Pilot Project area. The HFQLG FSEIS and ROD, in combination with the original HFQLG Act FEIS and ROD, provide programmatic guidance for DFPZ construction and maintenance in the HFQLG Pilot Project area. The HFQLG FSEIS ROD calls for consideration of all practicable methods of vegetation control for site-specific projects.

If the primary treatments do not achieve DFPZ objectives for desired condition in all treatment units; an underburn would be used as a follow-up treatment to meet short-term objectives. In the long term, the foreseeable maintenance of the DFPZ would consist of prescribed fire, mechanical or hand treatments.

Specific maintenance treatments would be determined based on site-specific analysis of land allocations, slope, vegetation types, and previous underburn treatments.

Even if no maintenance is conducted in these DFPZs, the DFPZs would be effective for 15-20 years. In the natural stands, the DFPZs' effectiveness would not be seriously reduced for 15 to 20 years. DFPZs will retain many beneficial characteristics such as increase overstory crown spacing and reduced ladder fuels that would aid in fighting fire and reducing fire intensity. For example, the proposed action would remove a significant amount of ladder fuel, so even if some amount of understory vegetation grows in the treated stands over the next several years, the result would be a net loss in accumulated fuels.

Summary of Effects across all Alternatives

In conclusion, treatments proposed under the action alternatives in the Grass Flat Project area would decrease the risk of wildfire to the rural community of LaPorte, the Litte Grass Valley Reservoir Recreation Area and forest resources by altering the hazardous fuel conditions and aiding fire suppression. These treatments would increase the ability of fire management personnel to suppress and contain wildfires during initial attack and extended attack operations, while increasing firefighter and public safety.

Table 3-18. Changes in fire behavior; Existing Condition and Action Alternatives*

Indicator	Existing Condition	Alternatives B, B Modified and C	Percent Change
Canopy Base Height (ft)	1-26	7-42	62-600% increase
Fire Type	passive	surface	N/A
Flame Length (ft)	2-39	1-2	0-97% decrease

***modeled using FMA with stand level data.**

Alternative B would reduce canopy cover to 35 to 40 percent in CWHR 4 and 5 stands. Alternative B Modified would reduce canopy cover to 44 to 49 percent in CWHR 4 and 5 stands and Alternative C to 46 to 45 percent in CWHR 4 and 5 stands. All action alternatives would provide for canopy separation. Canopy separation would make aerial retardant penetration more efficient and help reduce an approaching crown fire to a surface fire.

Treating the dense understory canopy would break up vertical and horizontal continuity by removing ladder fuels. Average canopy base heights would be raised to greater than 15 feet. Surface fuel treatments would result in desired flame lengths less than 4 feet. Increases in canopy base height and decreases in predicted flame length would decrease the probability of crown fire.

Compliance with the Forest Plan and Other Direction

Alternative A would not meet the fuels management goals and objectives of the 1988 Plumas LMP, the 2004 HFQLG Act FEIS or the SNFPA FSEIS. Alternative A would not allow for the Plumas National Forest to build Defensible Fuel Profile Zones (DFPZs) to protect communities and forest resources at risk from wildfire.

Alternatives B, B Modified and C would contribute to reaching the HFQLG Pilot Project goal of designing a landscape network of DFPZs. At the landscape level, these treatments would provide connectivity between the existing Bald Onion and Sugarloaf DFPZs.

All action alternatives would fulfill management direction as specified in the 1988 Plumas National Forest Land and Resource Management Plan (LRMP), as amended by the 1999 Record of Decision on the *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act) final environmental impact statement (EIS) and the 2004 Record of Decision on the Sierra Nevada Forest Plan Amendment (SNFPA) final supplemental EIS.

Action alternatives comply with the standards and guidelines for fuels and vegetation management activities for the Grass Flat Project area are shown in Table 2 of the 2004 SNFPA Record of Decision as follows:

- Decrease surface fuel loading (small diameter material less than 3 inches) to 5 tons per acre or less
- Maintain where available 10-15 tons per acre of the largest logs ≥20 inches DBH, 10 feet or greater in length (approximately 8-12 logs)
- Leave 4-6 of the largest snags larger than 15 inches DBH. Consider leaving fewer snags strategically located in treatment areas within the WUI and DFPZ
- Flame lengths less than 4 feet at head of fire burning under high fire weather conditions
- Increase canopy base heights by removing ladder fuels resulting in minimal canopy base height of 15 feet.
- Canopy separation to limit crown fire spread.

The action alternatives would meet the management goals relating to fuels/fire management from the Sierra Nevada Forest Plan Amendment Final Supplement Environmental Impact Statement (SNFPA FSEIS, 2004) and HFQLG act for WUI areas:

- To create defensible space near communities and provide a safe and effective area for suppressing fire.
- To design economically efficient treatments to reduce hazardous fuels conditions.
- To establish and maintain a pattern of area treatments that is effective in modifying wildfire behavior
- Treating fuels in a manner that significantly reduces wildland fire intensity and rate of spread, thereby contributing to more effective fire suppression and fewer acres burned.

3.4 Recreation, Land Uses and Scenery

3.4.1 Introduction

This section discusses the affects to lands and recreation resources from activities associated with the proposed action and alternatives. The analysis includes direct, indirect and cumulative affects to these resources. Recreation resources within the Grass Flat project area are primarily focused on developed recreation sites around the Little Grass Valley Reservoir Recreation Area, the Pacific Crest National Scenic Trail (PCT) and numerous dispersed sites in between the two. The recreation opportunities include lake based recreation – namely camping, swimming, fishing, boating; hiking activities for both pedestrians and equestrians around the lake, on the PCT and connector trails; hunting and snowmobile trails. Additional support features related to recreation use include springs, water tanks and underground distribution lines.

Land uses are those uses permitted via special use authorization, easement, right of way or FERC license. There are a limited number of permitted land uses within the project area boundary, however the Little Grass Valley Reservoir is part of the South Feather FERC licensed project #2088. This project includes the gauging station located on the South Fork Feather River upstream of Little Grass Valley Reservoir, the reservoir and dam.

Other private lands are included in the analysis area. The private land uses include but aren't limited to private cabins, and timber lands, etc. and are not under any form of authorization instrument with the Forest Service. These lands have been included in the analysis due to their proximity adjacent to or within the project area boundary.

3.4.2 Analysis Regulatory Framework: Statute, Regulation, Forest Plan, and Other Direction

Recreation, scenery and land uses were given equal importance for management under several laws, beginning in the 1960's. The laws then provided direction to the Department of Agriculture for land management planning, authorized use of National Forest land for private uses such as driveway, road easements, etc. Laws went further to establish special designations for lands and improvements, and was interpreted and written into Agency policy. These laws and directives are discussed in this section.

Federal Land Policy and Management Act (FLPMA) of 1976(90 Stat. 2743; 43 U.S.C. 1761-1771). Title V of the Federal Land Policy and Management Act (FLPMA) authorizes the Secretary of Agriculture to issue permits, leases, or easements to occupy, use, or traverse NFS Lands. FLPMA direct the United States to receive fair market value unless otherwise provided for by statute and provides for reimbursement of administrative cost in addition to the collection of land use fees (43 U.S.C. 1764(g)). Forest Service directives and handbooks provide direction on implementation of this act.

Organic Administration Act of June 4, 1897, (16 U.S.C. 477-482, 551). This act authorizes the Secretary of Agriculture to issue rules and regulations for the occupancy and use of the National Forests. This is the basic authority for authorizing use of National Forest System lands for other than rights-of-way.

Bankhead-Jones Farm Tenant Act of July 22, 1937, as amended (7 U.S.C. 1010-1012). Title III of this act directs and authorizes the Secretary of Agriculture to develop programs of land conservation and use to protect, improve, develop, and administer the land acquired and to construct structures thereon needed to adapt the land to beneficial use. Under the act, the Department of Agriculture may issue leases, licenses, permits, term permits, or easements for most uses, except rights-of-way.

In response to the requirements of these acts, the Plumas National Forest prepared a **Land and Resource Management Plan (LRMP)** that was signed in 1988. The Forest Plan, as it's commonly referred to, provides direction for management of the Forest resources including lands, recreation, special uses and trails. The On Top project falls within the **Lost Creek (#13), Sawmill (#14) and Little Grass (#15) management units**. Under these units the following recreation, lands and scenery prescriptions apply:

- **Rx-5 Recreation Area Prescription** – this prescription applies to the Lost Creek and Little Grass Valley Management areas. "The purpose of this prescription is to provide attractive, well-maintained landscapes around the major reservoirs and within other areas of major recreation use…..Maintain an ROS class of Roaded Natural…..Maintain high visual quality objectives. Timber is managed to maintain a generally continuous forest cover and to maintain or enhance recreation values.
- **Rx-6 Developed Recreation Site Prescription** – this prescription applies to the Lost Creek and Little Grass Valley Management Areas. Under this prescription, "the purpose is to provide convenient recreation facilities for the public and to preserve or improve the surrounding Forest……Sites include campgrounds, picnic areas, observation sites, boat launches, swimming beaches, trailheads, and documentary, interpretive and information sites." Timber is to be managed to maintain a healthy forest cover
- **Rx10 Visual Retention Prescription** – "Provide for a natural –appearing landscape where management activities are not visually evident. Such areas are seen from key travel corridors, water bodies and other high use areas." For timber harvests or projects, use smaller openings or uneven-aged Silviculture systems.
- **Rx14 Visual Partial Retention Prescription** – "Provide for a nautral –appearing landscape by assuring that management activities remain visually subordinate to the natural landscape. Such areas are generally seen as middleground and background from major recreation areas and of primary or secondary importance."

Further, the project area is classified under ROS classification system as Roaded Natural (RN) which provide indicators for physical settings, social settings and managerial settings.

The regulatory framework that is also relevant and specific to the Proposed Action and the Alternatives as they affect Recreation, Lands and Scenery issues includes:

National Trails System Act of 1968 (16 U.S.C. 1241-1249)
Public Law 90-543, approved October 2, 1968, (82 Stat. 919) provided for establishment of National Recreation and National Scenic trails. Public Law 95-625, approved November 10, 1978, (92 Stat. 3511) amended the Act to create a new category of National Historic Trails, to closely follow original routes of national historic significance. National Recreation Trails may be established by the Secretaries of Interior or Agriculture on land wholly or partly within their jurisdiction, with the consent of the involved State(s), and other land managing agencies, if any. National Scenic and National Historic Trails may only be designated by an Act of Congress. **The Pacific Crest Trail** was established under this Congressional Act.

USDA FS Strategic Plan FY 2007–2012, Goal 4. Sustain and Enhance Outdoor Recreation Opportunities (USDA Objective 6.3)

- **Outcome:** A variety of high-quality outdoor recreational opportunities on the Nation's forests and grasslands are available to the public.

The Forest Service is challenged with sustaining adequate high-quality outdoor recreational experiences to meet the Nation's needs while maintaining the ecological integrity of national forests and grasslands. The Nation's population is projected to increase by nearly 50 percent by the middle of this century. The combination of increasing populations and the continued decline of public access to privately owned forest land creates extensive pressure on public lands to provide more recreational opportunities.

Objective 4.1
Improve the quality and availability of outdoor recreation experiences.

- Performance Measure: Percentage of recreation sites maintained to standard.
- Performance Measure: Percentage of trails that meet national quality standards.
- Performance Measure: Percentage of customers who are satisfied with recreational facilities, services, and settings……

Objective 4.3
Improve the management of off-highway vehicle use.

- Performance Measure: Percentage of NFS lands covered by new motor vehicle use maps reflecting a designated-use system of roads, trails, and areas.

FS Manual 2330- Publicly Managed Recreation Opportunities- The basic recreation policies set forth at FSM 2303 and the following supplementary policies shall govern the development and administration of sites and facilities

1. Use recreation opportunity spectrum guidelines (FSM 2310) when developing sites.
2. Develop sites and facilities that will provide recreation experiences toward the primitive end of the spectrum.
3. Use the land and resource management planning process (36 CFR part 219, FSM 1920, and FSM 2310) to reach decisions to develop recreation sites.
4. Develop sites and facilities to enhance natural resource-based activities normally associated with a natural environment.
5. Establish priorities for the development and management of sites in the following order:
    a. Ensure public health and safety.
    b. Protect the natural environment of the site.
    c. Manage and maintain sites and facilities to enhance users' interaction with the natural resource.

FS Manual 2350- Trail, River, and Similar Recreation Opportunities-

2350.2 – Objectives

1. Provide opportunities for a variety of recreational pursuits, with emphasis on activities that harmonize with the natural environment and are consistent with the applicable land management plan.

2350.3 - Policy

1. Manage trail, river, and similar recreation opportunities and their recreational access and support facilities under the principles enumerated in FSM 2303.

2. Emphasize recreation opportunities and supporting facilities that are consistent with applicable Recreation Opportunity Spectrum classes.
3. Coordinate management of trail, river, and similar recreational opportunities with other related resource management activities to maximize efficiency and integrate management objectives, as appropriate.

USDA Forest Service, Plumas National Forest:

HFQLG/SNFPA Implementation Consistency Crosswalk – For all vegetation management projects the hierarchy for forest plan direction is as follows:

SNF 2004-ROD Appendix A: Management Direction as related to Recreation

This decision clarifies management intent for off-highway vehicles, limits the requirement for limited operating periods to vegetation management activities only, and clarifies how several of the riparian standards and guidelines apply to recreation activities, uses, and projects.

"…... My decision reverses unintended impacts to recreation.

The decision clarifies that standardized limited operating periods for old forest dependent species apply only to vegetation management activities. Similarly, vegetation management standards and guidelines (e.g., canopy cover retention) only apply to mechanical thinning and not to recreation and special use projects. Clarification is made that a landscape analysis is not a pre-requisite for project analysis and implementation. Existing uses in CARs and RCAs will be evaluated at the time of permit re-issuance to correct problems and achieve consistency with the land management plan. These minor changes will reduce the unintended and adverse impacts on recreation users and permit holders."

Minerals

The 1872 Mining Law, as amended, authorized use of Federal lands for mining. The 1955 Multiple Use Mining Act (Surface Use Act) authorized the Forest Surface to manage the surface resources on mining claims, while allowing the claimant to conduct mining related activities.
The PNF Forest Plan general direction is to "Encourage mineral and materials development that reasonably protects surface resources, and provides for land reclamation …"
Mine operators must also comply with all other Federal, State and local regulations, where applicable.

3.4.3 Effects Analysis Methodology

Analysis Methodology

The effects were analyzed geographically, spatially and temporally. The large geographic boundary was considered as the project area boundary, with land allocations overlain to establish the critical features for consideration, i.e. the recreation area boundary, the scenery management allocations, PCT location and buffer, etc. If effects were unavoidable, mitigation measures were developed for implementation.

The analysis area for recreation, lands and scenery is based on the Grass Flat Fuels Reduction and Forest Health Restoration project area. On the north project boundary area, it includes the Pacific Crest Trail and NFS 22N27 road; the east boundary includes the NFS 22N60 road and South Fork Rd. recreation facilities, **excluding** Little Beaver Campground and Kenzie Ravine.

The boundary includes Goat Mountain and the Little Grass Valley Reservoir Peninsula recreation facilities but **excludes** the private lands. The western boundary includes the Black Rock recreation facilities, the drainages that begin near Tamarack Flat and the NFS 22N94 road. The effects were analyzed for a period of 10 years, with short term effects defined as 0-3 years, long term effects 10 years and greater.

Data Sources

Data sources included GIS coverages, Infra and Special Uses Database (SUDS) containing corporate information on developed camping, ROS coverage, land uses, Visual Quality Objectives (VQO's), etc. Local knowledge also supplemented the data sources.

A record search of mining claims within the project area was made on January 31, 2012, using the BLM's LR2000 website.

Recreation Measurement Indicators:

1. Quantity of developed recreation use days affected
2. Number of developed recreation sites affected with closure
3. Miles of trail impacted
4. Qualitative measurement of impacts to the experience, i.e. presence of noise, dust, restricted access, presence of large truck traffic or heavy equipment congestion.

Lands Indicators:

1. Number of days that would restrict access or use
2. Affects to existing uses of National Forest System lands

Scenery Indicators:

1. Degree of deviation from VQO allocation
2. Number of management activities visible from travelways, recreation sites or the PCT.

3.4.4 Affected Environment

Recreation: Recreation opportunities abound in the project area but are primarily concentrated immediately surrounding Little Grass Valley Reservoir and the Pacific Crest Trail and its feeder trails. The heaviest season of use is summer and early fall. The facilities are in poor to moderate repair, shaded by diseased and dying stands of white fir and lodgepole pine. Large logs from fallen hazards litter the ground in the campgrounds.

Evidence of unmanaged human activity is present along stream channels and within the campgrounds as vegetation has been lost, soil has been compacted and numerous foot trails lead from all parts of the campgrounds to beaches and the shoreline. Winter recreation is dominated by groomed snowmobile routes that link the town of La Porte and the private cabins to loops around the lake on snow-covered National Forest System (NFS) roads. Additionally, the presence of the natural forest environment provides dispersed recreation opportunities for hunters, hikers, equestrians, and cultural resources visitors.

Minerals: Twelve claims were identified that could possibly be affected by the project. There is currently no Plan of Operations or Notice of Intent for any of the claims. Information from these sources was cross referenced with the Grass Flat Project map to determine areas of impact. Nine claims were noted that may fall within the project area and three other that may be close to the project area.

Scenic Character: The physical setting is natural in appearance, dominated by an open lake surface with continuous forest canopy and mountainous backdrop, riparian vegetated drainages with clear streams, and summer cabins. Deer, bear, osprey, eagles and water fowl are frequently seen. However, there is significant evidence of human activity measured by the development scale of the recreation area improvements, the number of roads and their paved surfaces, evidence of heavy dispersed recreation use along Black Rock Creek and So. Fork Feather River, past harvest activities along the NFS 22N57 road, the 22N 60 road and on private timber lands.

Developed Recreation:

The following tables list current recreational opportunities within the analysis boundary.

Table 3-19. Recreation and Land Uses

Site Name	Location	Size
Little Grass Valley Reservoir Recreation Area • Black Rock, Tooms and Maidu Boat Ramps & RV camping • Black Rock and Peninsula Tent Campsgrounds • Horse Camp Equestrian Campground • Wyandotte, Little Beaver, Red Feather and Running Deer Campgrounds • Bluewater and Pancake Swimming Beaches • Maidu Amphitheater and Administration Site • South Fork Sanitary Dump Station • Bald Rock PCT Tie Trailhead and snowmobile warming hut • Lakeshore Trail	Surrounded by NFS 22N57 and 22N94 roads (T22N, R9E, Sections 21, 22, 27, 28, 29, 30, 31, 32, 33, 34; T21N, R9E, Sections 3, 4, 5)	4,500 Ac.

Table 3-20 Dispersed Recreation

Site Name	Location	Size
South Fork Feather River campsite	Approximate intersection of NFS 22N68 road with NFS 22N57 road (T22N, R9E, sec 22)	6 Ac.
Overlook campsite	NFS 22N94 road (T22N, R9E, sec 31)	2 ac.
Black Rock Cr. campsite	Intersection of NFS 22N56 and NFS 22N27 roads (T22N, R9E, sec 20)	2 ac.

Table 3-21 Non-Motorized Trails

Trail Name	Trail Number	Length
Pacific Crest National Scenic Trail and Fowler Peak Trailhead	PCT 2000, T22N, R9E, sec 11, 15, 16, 17	
Bald Mountain Trail	8E16	2.2 mi.
Bald Mountain PCT Tie	8E16A	5 mi.
Black Rock Cr. Trail	9E14B	.56 mi.

Table 3-22 Motorized Trails

Trail Name	Trail Number	Length
Little Grass Valley Loop (OSV)		.9 mi..
Black Rock Loop (OSV)		3.02 mi.
Silvertip Loop (OSV)		

Within the project area, there are several Special Use Authorizations (SUAs) for non-federal land uses.

Table 3-23 Land Use and other Special Use Authorizations

Authorization Name	Use Type	Location
SFWP Stream Gauge	Stream Flow Monitoring Station	T23N, R9E, SE ¼ sec 22
SFWP Communications Antenna	Stream Flow Monitoring Station	T23N, R9E, SE ¼ sec 22
Chimney Rock Tie Road Gates- Soper Wheeler	Gates	T22N, R9E, Sec 12, 16
Provost Private Road	Access Road	T21N, R9E, Sec 4
Outfitter Guiding Permit	Fishing and Hunting	
La Porte Snowmobile Club	Poker Run and Special Olympics	

3.4.5 Environmental Consequences

Alternatives A, B, Modified B and C

Direct, Indirect, and Cumulative Analysis

Direct effects within the project area would be the impacts of noise, smoke, dust, truck traffic, facility closures and visible landscape disturbances from project activities. Indirect effects include noise, smoke, dust, truck traffic and scenery impacts from areas within the project boundary, but not those being treated. Cumulative effects that those effects that are based upon previous actions, as well as those actions considered under this analysis.

Table 3-24 Summary of Effects across all Alternatives

Alt A – No Action	Alt B	Alt B, Modified	Alt C
All units will contribute to total loss of forested recreation setting from failing forest health & wildfire – direct & cumulative All units will contribute to loss of recreation opportunities with failing forest health, threat to public health, safety	Units within campgrounds, day use areas, swimming beaches, boat launches will **directly** affect facilities being treated for **short term**. No long term negative effects or cumulative effects so long as mitigation measures practiced. Facilities not being treated, but adjacent will be **indirectly** affected for **short term** but there will be no cumulative effects.	Units within campgrounds, day use areas, swimming beaches, boat launches will **directly** affect facilities being treated for **short term**. **Cummulative** effects will remain because natural regeneration or accelerated growth in campgrounds be slow or non-existent. Facilities not being treated, but adjacent will be **indirectly** affected for **short term** but there will continue to be **cumulative effects** from failure to restore the healthy stand with resilient species and diversity.	**Short term direct** and **indirect** affects during implementation**,** however **long term cumulative** effects due to continuation of forest health decline and loss of large trees. The large tree natural setting will be lost to disease, insects and storm damage. **Long term direct effects** to public health and safety.

Alt A – No Action	Alt B	Alt B, Modified	Alt C
Cummulative effects of no treatment will continue for scenic integrity and scenic stability. Current condition of non compliance with VQO will continue	Very **short term direct and indirect** effects to scenic quality, however **long term positive affects** to scenic integrity and stability – increases in both, therefore stronger, more resilient scenic resource	During implementation there would be **short term direct and indirect** effects, but **cumulative** effects would continue with failure of forest natural restoration processes, regeneration with disease resilient species. Only moderate increase in scenic integrity and stability.	**Short term direct and indirect** effects during project implementation so long as mitigation measures practiced. **Long term cumulative** effects to scenic integrity and stability from loss of large tree character from insects, disease and storm damage. Increase in scenic stability from reduction of hazardous fuels.
All units will contribute to loss of access or land use approved under authorizations.	Very **short term direct** effects to lands access and use. No cumulative effects.	Very **short term direct** effects during implementation, however **long term cumulative** effects due to declining forest health.	**Short term direct** effects to access and land use.
Potential loss of natural setting along PCT from declining forest health and wildfire	Very minimal **short term, indirect** effects to PCT use, setting and quality. No cumulative effects	**Short term indirect** effects, however **long term cumulative** effects from continuation of forest health decline, thus reduction in scenic value and natural forested experience and trail setting.	**Short term indirect** effects, but **longer term cumulative** effects from continuing decline of forest health. Resource would be protected from wildfire threat.

Minerals

The main impacts to mining operations and operators would be smoke, claim access routes that would be used as haul routes, and the potential that the Project surface activities would occur in the same area and same time as a mining operation. These effects would be of short duration and can be minimized by coordination with the mining claimants, planning project activities to have the least effect on the mining operations.

The indirect effects of all action alternatives within the area boundary would be to reduce fuel loading and improve access to the surface. This would have a beneficial effect for mining claimants as it would thereby improve access to subsurface resources. There would be a beneficial effect of reducing the risk of wildfire and aesthetically cleaning up the stands of trees. Road maintenance would also improve mining access. There may be some indirect effect on mining operators as there would be with any forest visitor due to heavy equipment and haul traffic in the area, during the life of the project.

There would be no significant cumulative effects from implementation of the action alternatives. Future fuels reduction projects would serve to reduce hazardous fuel conditions that could threaten mining areas, historic structures and equipment.

3.5 Hydrology

3.5.1 Introduction

Protection of water quality and quantity is an important part of the Forest Service's mission (Forest Service Strategic Plan for 2007 to 2012, July 2007). Management activities on national forest lands must be planned and implemented to protect the hydrologic functions of forest watersheds, including the volume, timing, and quality of streamflow. The Clean Water Act of 1948 (as amended in 1972 and 1987) establishes as federal policy the control of point and non-point source pollution and assigns the States primary responsibility over control of water pollution. The Forest Service is required to protect and enhance existing and potential beneficial uses during water quality planning (California Regional Water Quality Control Board [CRWQCB] 1998). Compliance with the Clean Water Act by national forests in California is achieved under state law (see below). Beneficial uses are defined under California State law in order to protect against degradation of water resources and to meet state water quality objectives. The 1988 Plumas National Forest Land and Resource Management Plan states: "maintain or, where necessary, improve water quality using Best Management Practices (BMPs)." BMPs are procedures, techniques, and mitigation measures that are incorporated in all Plumas National Forest actions to protect water resources and prevent or diminish adverse effects to water quality. Subsequent Forest Plan standards and guides state: "implement BMPs to meet water quality objectives and improve the quality of surface water on the Forest."

This report utilizes the Equivalent Roaded Acres (ERA) model to assess cumulative watershed effects (USDA Forest Service 1988). ERA coefficients are used to estimate the effect of management activities such as timber harvest, pile burning, and underburning comparable to the effect of a road in terms of altering surface runoff patterns and timing. Watersheds and their associated stream systems can absorb some level of land disturbance without causing unacceptable effects to beneficial uses of water. However, there is a point where additive or synergistic effects of land use activities would cause a watershed to become highly susceptible to cumulative effects. For the Forest Service ERA model, the estimated upper limit of watershed tolerance is called the threshold of concern (TOC). The TOC does not represent an exact level of disturbance above which cumulative watershed effects will occur. Rather, it serves as an indicator of increased risk of significant adverse cumulative effects occurring within a watershed. The land management activities proposed under this project have the potential to affect watershed resources in a beneficial, indifferent, or adverse manner, either through direct, indirect, or cumulative effects, as described in detail below.

Table 3-25. Cumulative Watershed Effects (CWE) Subwatershed Description

Watershed Number	Miles^2	Acres	HFQLG Watershed Number	HUC 6 Watershed Number	HUC 6 Watershed Name
1	3.72	2382	110044	180201230601	Little Grass Valley Reservoir
2	10.98	7024	110040	180201230601	Little Grass Valley Reservoir
3	3.88	2482	110040	180201230601	Little Grass Valley Reservoir
Grand Total	**18.58**	**11889**			

3.5.2 Analysis Regulatory Framework: Statute, Regulation, Forest Plan, and Other Direction

Clean Water Act - Clean Water Act of 1948 (as amended in 1972 and 1987) establishes as federal policy the control of both point and non-point pollution and assigns to the States the primary responsibility for control of water pollution.

National Forest Management Act – The National Forest Management Act (NFMA) of 1976 amended the Forest and Rangeland Renewable Resources Planning Act of 1974. This authority requires the maintenance of productivity of the land and the protection and, where appropriate, the improvement of the quality of soil and water resources. The Act specifies that substantial and permanent impairment of productivity must be avoided.

State Water Quality Management Plan - Non-point source pollution on Plumas National Forest has been managed for the past 11 years through the water quality management program contained in *Water Quality Management for Forest System Lands in California* (USDA, 2000). The Best Management Practices (BMPs) contained in that document have recently been improved and replaced by the BMPs presented in a Region 5 amendment to the Forest Service Handbook (see below). The 2000 State Water Quality Management Plan contains the 1981 Management Agency Agreement (MAA) between the California State Water Resources Control Board and the USDA, Forest Service. The State Board has designated the Forest Service as the management agency for all activities on National Forest lands an d the MAA constitutes the basis of regional waivers for non-point source pollution.

Region 5 2011 Amendment to the Forest Service Soil and Water Conservation Handbook - The Pacific Southwest Region (Region 5) of USDA-Forest Service has recently adopted an amendment to the Forest Service Handbook, Section 2509.22, Chapter 10 (Water Quality Management Handbook) (USDA Forest Service 2011). This handbook improves and replaces the Best Management Practices presented in *Water Quality Management for Forest System Lands in California* (see above). The Forest Service water quality protection program relies on implementation of BMPs. Best Management Practices are procedures, techniques, and design features that are incorporated in project actions that have been determined by the State of California to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals. Improvements to Forest Service BMPs, as presented in the 2011 Handbook amendment include more detailed descriptions of individual BMPs (section 12), a requirement that site-specific BMPs be included in timber sale contracts (section 13), and direction that legacy sites (sites disturbed by previous land use that is causing or has potential to cause adverse effects to water quality) within timber project boundaries will be restored or improved. Additionally, the 2011 Handbook amendment establishes an expanded water quality management monitoring program (section 16). BMPs applicable to the Grass Flat Hazardous Fuels Reduction and Forest Health Project are presented in Appendix A.

Section 303(d) of the Clean Water Act - The section requires the identification of water bodies that do not meet, or are not expected to meet, water quality standards or are considered impaired. The list of affected water bodies, and associated pollutants or stressors, is provided by the State Water Resources Control Board (SWRCB). The most current list available is the 2010 Integrated Report on the SWRCB website (SWRCB 2010).

Beneficial Uses Identified by the CA Regional Water Quality Control Board (Central Valley Region) - Beneficial uses are defined under California State law in order to protect against degradation of water resources and to meet state water quality objectives. The Forest Service is required to protect and enhance existing and potential beneficial uses (California Regional Water Quality Control Board [CRWQCB] 1998). Beneficial uses of surface water bodies that may be affected by activities on the Forest are listed in Chapter 2 of the Central Valley Region's Water Quality Control Plan (commonly referred to as the "Basin Plan") for the Sacramento and San Joaquin River basins (CRWQCB 1998). The Basin Plan does not specify beneficial uses for Little Grass Valley Reservoir or South Fork Feather River. The South Fork Feather River flows to Lake Oroville. Beneficial uses for waters of Lake Oroville are specified in the Basin Plan and include contact and noncontact water recreation, wildlife habitat, and coldwater aquatic habitat.

The Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD) - Appendix E of the SNFPA ROD (USDA, 2004) describes management direction applicable to the Herger-Feinstein Quincy Library Group (HFQLG) pilot project area. The ROD directs that Scientific Analysis Team (SAT) Guidelines (Thomas, et al, 1993) be applied to vegetation management projects in the pilot project area per the HFQLG FEIS and ROD (USDA 1999). No standards and guidelines specific to riparian areas, hydrology, or water resources are presented in Appendix E of the SNFPA ROD.

Herger – Feinstein Quincy Library Group (HFQLG) Forest Recovery Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) - The HFQLG ROD changed direction in the Plumas NF LRMP by requiring application of specific SAT guidelines for riparian management. These SAT guidelines include:

- Application of the following minimum buffer widths for riparian protection and delineation of Riparian Habitat Conservation Areas (RHCAs): 300 feet for perennial, fish-bearing streams and lakes; 150 feet for perennial, non fish-bearing streams, ponds and wetlands greater than 1 acre, and lakes; and 100 feet for intermittent and ephemeral streams and wetlands less than 1 acre. The widths provided are for each side of the RHCA

- RHCA widths are to be determined by the greatest extent of (1) the top of the inner gorge, (2) the 100-year floodplain, (3) the outer edge of riparian vegetation, or (4) a distance equal to one or two site-potential tree heights, depending on the feature class. The site-potential tree height for the Feather River Ranger District is 150 feet. This means that on the Feather River District, a 150 foot RHCA buffer width is applied to seasonally flowing streams (intermittent or ephemeral) that have a definable channel and evidence of annual scour and deposition, instead of a 100-foot RHCA buffer.

- Prohibition of scheduled timber harvest in RHCAs except for salvage harvest or to meet SAT guidelines for resource management objectives.

- Management of fire and fuel treatments to meet resource management objectives and minimize disturbance of riparian ground cover and vegetation.

The SAT guidelines include ten Riparian Management Objectives (RMOs) for RHCAs. To describe how this project's proposed timber harvest and fire and fuel treatments meet these objectives, an RMO analysis is provided in Appendix A.

Plumas National Forest Land and Resource Management Plan (LRMP) - Forest Plan standards and guidelines provide the relevant substantive standards to comply with NFMA. The 1988 LRMP (USDA 1988) establishes standards and guidelines for protection and maintenance of Forest watersheds, water quality, and water supply, including:

- Implementation of BMPs.

- Establishment of Streamside Management Zones (SMZs) per guidelines in Appendix M of the LRMP. These guidelines were mostly replaced by the SAT guideline, RHCA width requirements mandated by the HFQLG ROD. However, ephemeral channels without evidence of annual scour and deposition are not addressed by the SAT guideline buffer widths. Therefore, SMZ widths defined in Appendix M of the LRMP are applied to these channels. Recommended SMZ widths for these ephemeral swales range from 0 to 50 feet, depending upon the stability of the swale channel and sideslope.

- Preparation of an SMZ plan for any activities that will occur within an SMZ, including a description of vegetation management objectives, needed erosion control measures, and an analysis of SMZ areas with over-steepened slopes or very high Erosion Hazard Rating (EHR). The SMZ plan for this project is included in Appendix A.

Timber Harvest Activities Waiver Program - On April 28, 2005, the Central Valley Regional Water Quality Board adopted the Conditional Waiver of Waste Discharge Requirements for Discharges Related to Timber Harvest Activities in Resolution R5-2005-0052 (Waiver). The Waiver specifies eligibility criteria and conditions that must be met by dischargers engaged in timber harvest activities on private and National Forest System lands in order to qualify for a waiver of waste discharge requirements. Dischargers submit Waiver Applications prior to commencement of timber harvest activities and Waiver Certifications at the conclusion of those activities. The waiver also imposes conditions and requirements for agency monitoring. Implementation monitoring is required for all projects and consists of non-random pre- and post-winter inspection of project BMPs during the course of timber harvest activities. It would be designed to focus on portions of the project that have the highest risk to water quality. Forensic and effectiveness monitoring are required for Federal projects only if "the discharger's cumulative off-site watershed effects analysis indicates that the project, combined with other Forest Service projects conducted in the watershed over the past 10 years, may cause any watershed or sub-watershed to exceed a threshold of concern" (CRWQCB, 2005). Forensic and effectiveness monitoring consist of winter inspection of sediment sources and BMPs to detect significant sources of pollution, to determine whether project-specific BMPs are effective in protecting water quality, and to assist in evaluating the overall effectiveness of the waiver program in protecting water quality and beneficial uses. Additional monitoring may be required if water quality protection measures fail or there are threats to water quality or beneficial uses from project activities. Detailed monitoring requirements and plans for the Grass Flat Hazardous Fuels Reduction and Forest Health Project are located in Appendix A.

3.5.3 Effects Analysis Methodology

Analysis Methodology

The geographic scope of the Cumulative Watershed Effects (CWE) Analysis includes three subwatersheds ranging from 2382 to 7024 acres in size with a total analysis area of 11,889 acres (Table 1). The South Fork Feather River, a major river within the analysis area, drains all three subwatersheds. The highest point within this area is Grass Valley Bald Mountain at 6255 feet and the lowest elevation is the surface level of Little Grass Valley Reservoir at 5046 feet. Figure A in the appendices depicts the location of the subwatersheds relative to the landscape and surrounding communities. Figure B in the appendices provides a closer look of the subwatersheds and the location of the proposed treatments units.

Hydrologic Measurement Indicators

Water Quality

Measure 1: Equivalent Roaded Acres (ERA)

The Cumulative Watershed Effects (CWE) analysis is based on the guidance from the Forest Service Handbook FSH 2509.22-Soil and Water Conservation, Region 5 Amendment (USDA Forest Service 1988). Effects may be either beneficial or adverse and are a result of combined effects of multiple management activities within a watershed. Beneficial uses for waters in the project watersheds include water recreation, terrestrial wildlife habitat, and cold freshwater habitat.

Among these beneficial uses, aquatic habitat is the most sensitive to adverse water quality effects that could potentially result from land disturbing activities such as those proposed for this project. Alterations to watershed hydrology are believed to be the most probable mechanism for initiating these effects to aquatic habitat (USDA Forest Service 1988). The Region 5 Forest Service Handbook amendment utilizes conceptual site disturbance coefficients called equivalent roaded acres (ERA) to track changes in the hydrologic functioning of watersheds. ERA coefficients are used to compare the effect of management activities (e.g. timber harvest or pile burning) to the effect of a road in terms of altering surface runoff patterns and timing. The sum of these coefficients represents the percentage of watershed in road surface that would produce the same effects as the existing or planned distribution of management activities (Berg et al, 1996). The following land disturbing activities are evaluated in the ERA model for the Grass Flat Hazardous Fuels Reduction and Forest Health Project: roads, landings, off-highway vehicle (OHV) trails, timber harvesting activities on public and private lands, urbanization, and legacy mining disturbance. These land-disturbing effects are assessed for the past 25 years, the present, and the foreseeable future. The analysis is based on geographic and land use information compiled from the Forest Service, CalFire, county databases, aerial photographic interpretation and field observations.

The response of the landscapes to land disturbances is influenced by climate, physiographic, geologic, and ecologic conditions (USDA Forest Service 1990). Therefore, recovery coefficients are assigned based on local conditions. The western slope of the Sierra Nevada within the Plumas National Forest area has a high rate of vegetative establishment and growth due to high annual precipitation and the presence of highly productive forest soils. On the Feather River Ranger District, 25 years is used as the average recovery period for disturbed sites as vegetation management is assumed to have no effect on hydrologic processes after 25 years. Other disturbances, such as roads, mining or urbanization receive no recovery coefficient as they recover more slowly or not at all.

Watersheds and stream channels have a natural capacity to absorb various levels of land disturbance without major adjustment to their function and condition. However, there is point where additive or synergistic effects of land use activities would cause a watershed to become highly susceptible to cumulative effects. This upper estimate of watershed “tolerance” to land use is described as the threshold of concern (TOC). When the sum of disturbances exceeds the TOC, water quality may be impaired for established beneficial uses, such as aquatic habitat. Stream channels and water quality can deteriorate to the point where adjacent riparian areas and wetlands become severely damaged.

Project level TOCs are estimated by considering the sensitivity of each analyzed watershed. Natural watershed sensitivity is an estimate of a watershed’s ability to absorb land use impacts without increasing the effects of cumulative impacts to unacceptably high levels (USDA Forest Service 1988). Watershed sensitivity for watersheds 110040 and 110044 was analyzed for the HFQLG Environmental Impact Statement, considering the following factors: 1) soil erosion potential; 2) potential for high intensity and/or long duration precipitation events, including rain-on-snow; 3) potential for landslides and debris flows; and 4) the percentage of alluvial stream channels in the watershed (USDA Forest Service 1999). Both watersheds 110040 and 110044 rated as high for watershed sensitivity. The TOC generally ranges between 12 percent and 20 percent ERA depending upon the intrinsic sensitivity of the watershed and beneficial uses of water (USDA Forest Service 1988). For this project, the TOC has been conservatively set at 11 percent of the subwatershed area for each of the three analyzed subwatersheds.

The ERA total of each subwatershed, expressed as a percentage of the subwatershed area, is compared to the TOC and reported as a fraction (percent) of the TOC. ERA totals in the range of 80 to 99 percent of TOC are considered to be approaching TOC, while those that are 100 percent or greater equal or exceed the TOC.

The TOC does not represent an exact level of disturbance where cumulative watershed effects will begin to occur. Rather, it serves as an indicator of increased risk of significant adverse cumulative effects occurring within a watershed. If a subwatershed is approaching or above the TOC, a more thorough analysis of the activities planned within the watershed is necessary.

Measure 2: Best Management Practices (BMPs) Effectiveness Evaluations

The Best Management Practices (BMP) Evaluation Program (USDA Forest Service 2002) was developed to reduce the risk to water quality degradation by assessing the implementation and effectiveness of BMPs. The objective of BMPs is to protect water related beneficial uses from nonpoint source containments (USDA Forest Service 2000). Results from the BMP Evaluation Program will be used to assess direct and indirect effects of water quality for the proposed actions. Proper application of BMPs minimizes erosion, such as rilling, and sediment delivery to nearby streams. The BMP Evaluation Program rates two components: the effectiveness of the BMPs and whether or not BMPs were properly implemented.

The effectiveness of BMPs are rated as “pass”, “at risk’, or “fail”. BMPs rated as “pass” or “at risk” will count as effective and go towards calculating percent effectiveness of the BMPs. Standard practice on Plumas NF has been to visit all sites where a BMP evaluation indicated substandard effectiveness, correct the practice on the ground at that location, and consider how the practice may be improved during implementation of future projects.

The monitoring strategy for the 1999 HFQLG FEIS set a target of 85 percent for the number of evaluations that were rated as effective (USDA Forest Service 1999). The recent Region 5 amendment to the Forest Service Handbook for water quality management indicates Forests would strive to achieve BMP effectiveness rates of 90% to 95% (USDA Forest Service 2011). The Region 5 amendment states that BMP monitoring frequency may be reduced for evaluation protocols that rate as at least 95% effective for 5 consecutive years. Additionally, the Handbook amendment states that the Forest Service will work with the California State Water Resource Control Board to revise and improve particular BMPs if effectiveness rates are less than 90%.

Measure 3: Length of Hydrologically Connected (HC) Road Segments

When roads and associated drainage-control features contribute flow directly to a natural waterbody, they become part of the drainage network and are said to be hydrologically connected (HC). Furthermore, many slope disturbances are linked to the road network and roads are often the pathway for transporting pollutants (e.g. fine sediment) from these other types of disturbances. Hydrologically disconnecting roads by installing or improving road drainage facilities is a fundamental practice for eliminating chronic water quality impacts from roads and other disturbances. The San Dimas Technology and Development Center, sponsored by the US Forest Service Engineering Staff, coordinated an ongoing ***Water/Road Interaction Technology Series*** to “identify information and methods on hydrological aspects of developing, operating, and managing forest roads. The effort is designed to 1) help communicate state-of-the-art water/road interaction information effectively among field personnel, 2) identify knowledge gaps, and 3) provide a framework for addressing future research, development, and technology needs on this subject.” D. K. Johansen et al. 1997. ***Relief Culverts,*** part of the ***Water/Road Interaction Technology Series,*** recommended a system for spacing ditch-relief culverts (DRCs) based on road gradient and soil type. Generally, roads with steeper gradients would space their DRCs more closely, with easily erodible soil types commanding even more stringent spacing distances. On the Plumas National Forest, the engineering staff has modified this system for local conditions, and has found an ideal spacing range of 300 to 500 feet between DRC placements for most cases, depending on slope and soil type.

Riparian Habitat Diversity and Health

Measure 1: Meadow and Wetland Vitality

Meadows and wetlands are rich and diverse habitats for many species of flora and fauna. The previous century bore witness to an age of largely unmanaged and unsustainable human use, often resulting in the degradation and destruction of many of these valuable entities. The health of meadows and wetlands are good indicators of overall watershed condition and hydrologic function. Healthy meadows and wetlands filter sediment from water flowing from their vicinity, providing suitably clean water for fish and human use while providing habitat for aquatic species (Ratliff, 1985).

Measure 2: Stream Channel Continuity and Streambank Stability

Streams are one of the most important factors in the hydrologic function of watersheds, as they are the primary means with which surface water is transported and distributed. Headwater streams, defined here as streams near the upper reaches of a watershed, play a definitive role in the quality and quantity of water downstream, as pollutants introduced into the headwaters still retain relatively large concentrations downstream (Alexander et al, 2007). Therefore it is important to minimize the introduction of sediment and pollutants into headwater streams; two ways how this can be achieved is through ensuring stream channel continuity and streambank stability. Riparian vegetation is one of the more prominent factors associated with streambank stability. The presence of riparian habitat along streambanks promotes stability, as the roots of the vegetation helps prevent the soils from eroding into the stream (Castelle et al, 1994). Riparian habitats also provide, among other benefits, shade to moderate water temperature, which encourages aquatic flora and fauna diversity; and large wood recruitment for slowing down velocity, which lessens the amount of sediment transported downstream (Barling and Moore, 1994; Castelle et al 1994). Unstable streambanks are prone to erosion, which causes sedimentation in streams. In extreme cases, mass wasting events such as landslides occurs, destroying relatively large sections of streambank and significantly degrading the water quality. Diverted streams are equally problematic, as they usually indicate a situation where loss of riparian habitat has occurred. This can reduce the quantity of water being delivered downstream if the stream diverted out of the hydrologic network; or increase the amount of sediment and pollutants introduced if the diverted stream reconnects back into the hydrologic network.

3.5.4 Affected Environment

3.5.5 Environmental Consequences

Alternative A – No-action

Direct and Indirect Effects

The Little Grass Valley Reservoir and its vicinity is a popular recreation destination for the public. It also supplies municipal and irrigation water to the surrounding communities. Small, localized sites of continuous degradation of streams and meadows have been observed within the analysis area, with the natural recovery of several sites being inhibited by heavy recreational use. Legacy resource extraction operations such as mining and timber harvests have also left some sites impaired beyond nature's self-recovery capacity, trapping them in a downward spiral of worsening conditions. These historic impacts, thought small, can contribute to the degradation of water quality and its associated beneficial uses if left alone.

Meadow and Wetland Vitality. There are 72 identified meadows and wetlands within the proposed project boundary, which amounts to around 51 acres of total surface area. Wildfire suppression and heavy grazing of the previous century have severely impacted many of these meadows and wetlands by paving the way for the encroachment of conifers, with some historic wetland areas now dominated by coniferous

species (DeBenedetti and Parsons, 1979, 1984; Ratliff, 1985). The conifers out-compete the native flora and overtake their range, resulting in smaller, more homogenous meadows and wetlands with diminished resources and habitat (Lang and Halpern, 2007) to support local fauna populations (Ratliff, 1985).

Stream Channel Continuity and Streambank Stability. The majority of the streams within the analysis area are in good condition. However, due to poor past management practices, the streambanks on two streams within the analysis area have become unstable and erosive (Figure 1), while two other streams are diverted entirely by a poorly constructed legacy road and an old skid trail (Figure 2). There is also one failed (Figure 3) and one failing (Figure 2) stream crossing. The increased discharge of sediment and pollutants from the erosion and diversion of these six streams has detrimental effects on water quality downstream.

Length of Hydrologically Connected Road Segments. There are 32 long (more than 300 feet) stretches of hydrologically connected (HC) road within the analysis area in existence today, with a few of them exceeding 1000 feet in length. The identified HC road segments may further increase hydrologic connectivity if they deteriorate because of use, extreme precipitation events, or inadequate maintenance. Unless acted upon, HC road segments are features that are chronically detrimental to water quality.

Best Management Practices (BMPs) Effectiveness Evaluations. As BMPs are designed to be implemented around management activities, it is not an applicable discussion under the no-action alternative.

Figure 3-2. Location of Proposed Riparian Vegetation Planting.

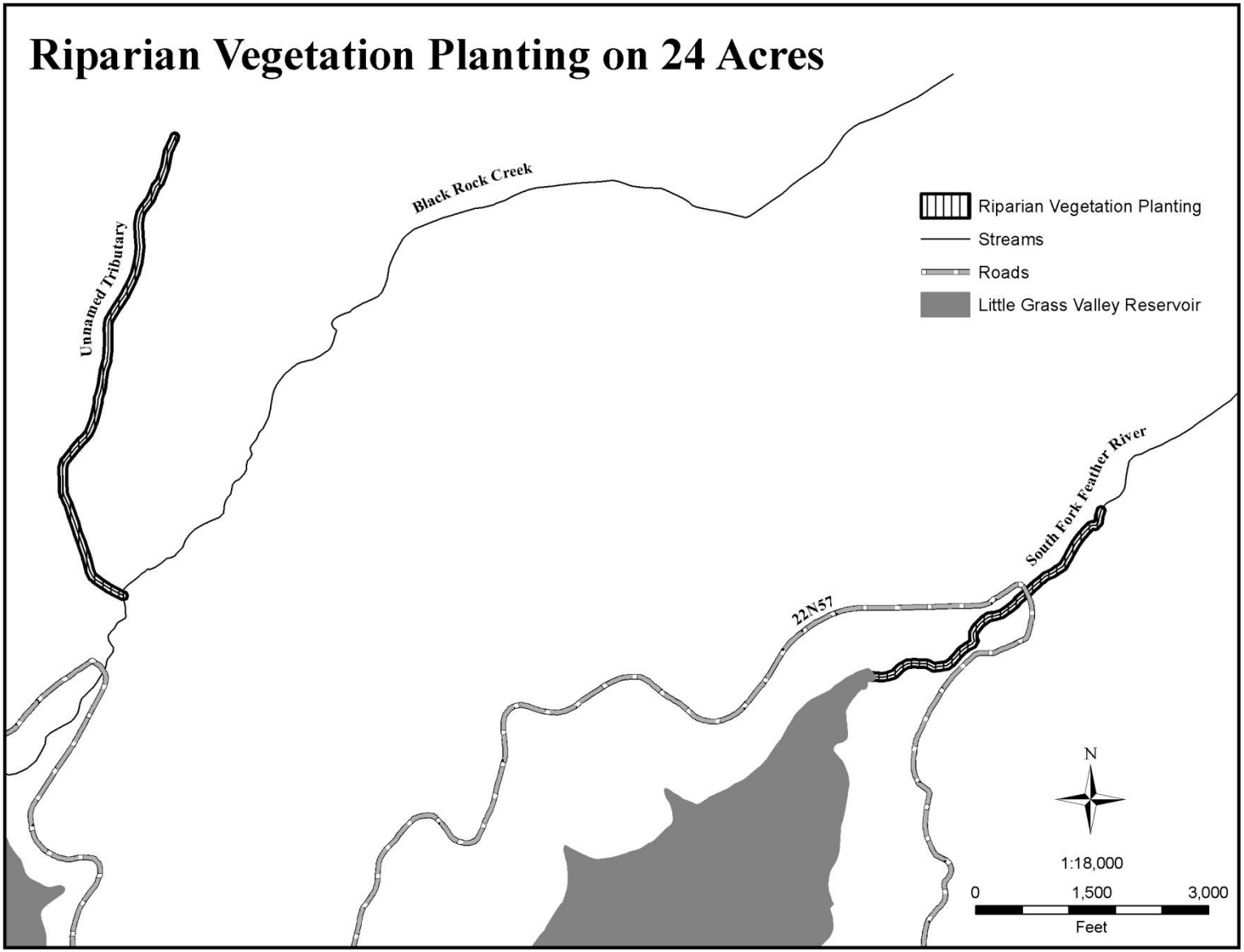


Figure 3-3. Location of Diverted Streams and Failing Culvert.

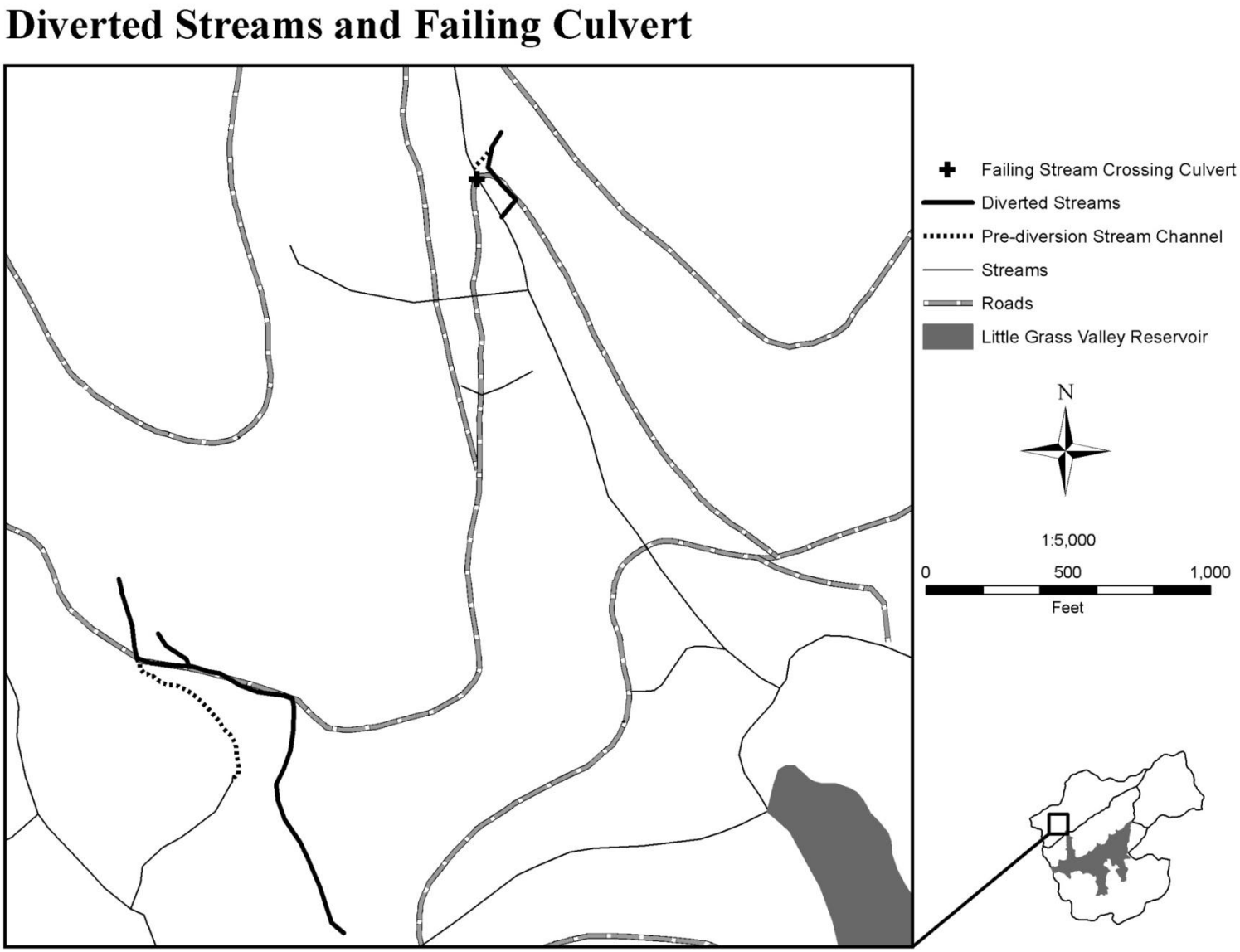
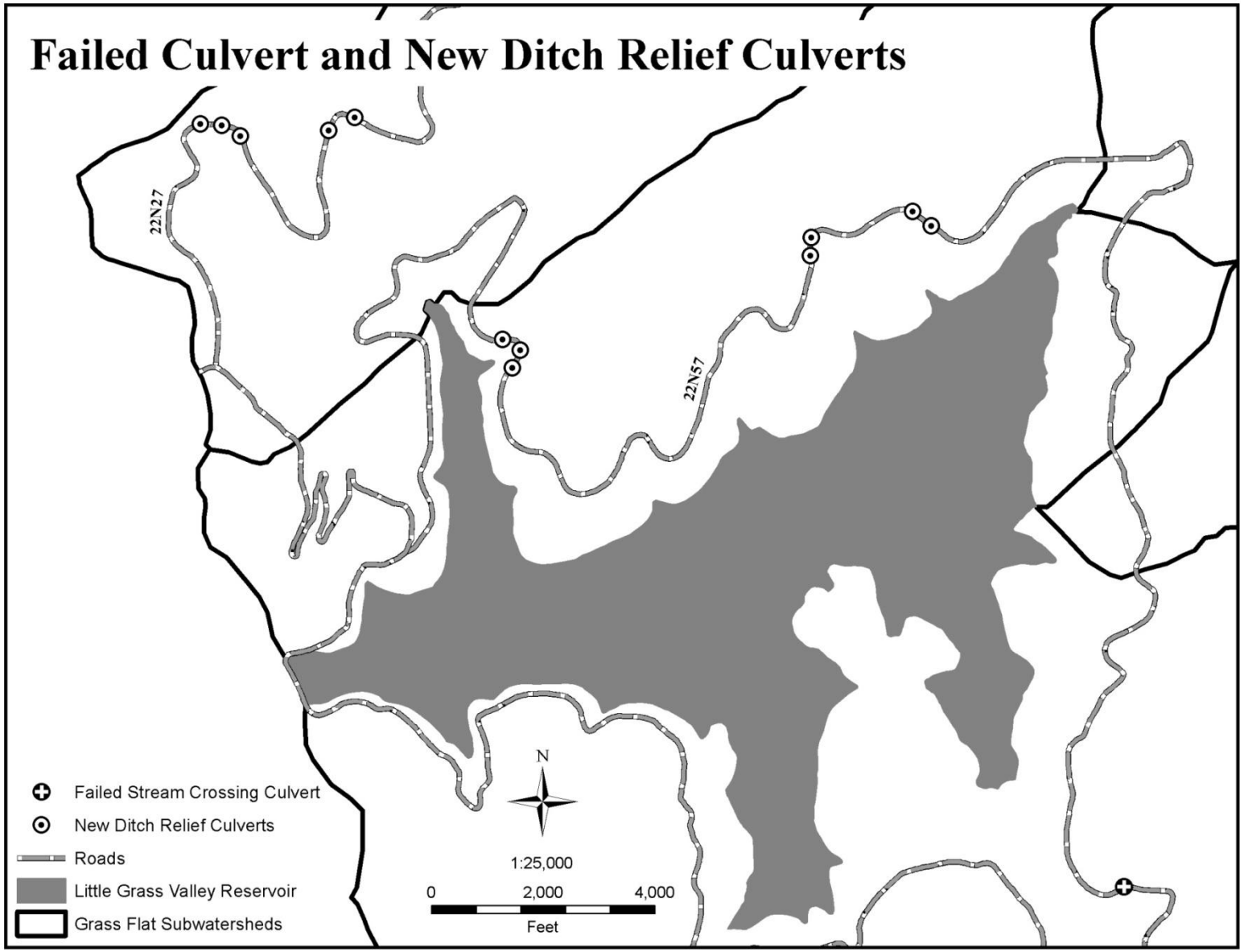


Figure 3-4. Location of Failed Culvert and Proposed New Ditch Relief Culverts.



Cumulative Effects

Equivalent Roaded Acres (ERA). The ERA model analyzed what the existing condition would be for 2013, which is the proposed year of project implementation. It takes into account past, present, and future foreseeable management activities.

Table 3-26 Percent of Disturbance Activities Contributing to the TOC

Percent of Disturbance Activities Contributing to the TOC						
			Forest Service Activities		Private Timber Harvest Activities	
Subwatershed Number	Infrastructure	Urban	Past Activities	Present and Future Forseeable Activities	Past Activities	Present and Future Forseeable Activities
1	45%	0%	15%	19%	19%	2%
2	40%	10%	13%	1%	23%	13%
3	50%	0%	46%	0%	4%	0%
Grand Total	**42%**	**6%**	**19%**	**4%**	**19%**	**9%**

Table 3-27. Percent TOC by Subwatershed

Subwatershed Number	TOC (in terms of acres of ERA disturbance divided by the subwatershed area)	Subwatershed Acres	Total ERA (Acres)	% Disturbed	% TOC	Under, Over or Approaching TOC
1	11%	2382	136.5	6%	52%	Under
2	11%	7024	481.7	7%	62%	Under
3	11%	2482	130.4	5%	48%	Under

For the entire CWE analysis area, the general trend (Table 2) is that infrastructure (roads, trails, landings, mines, and campgrounds) is the main contributor to the cumulative ERA. The percent of TOC for the subwatersheds range from 48 to 62 (Table 3), denoting that the ERA totals for all subwatersheds are below the TOC. ERA modeling for existing conditions indicate that the cumulative effect of past, present and foreseeable future activities within the analysis area have not altered surface runoff patterns and timing enough to affect normal hydrologic functions and disturb the subwatersheds beyond their respective thresholds of concern. Detailed past, present and foreseeable future activities by land ownership can be found in Appendix C.

Alternative B – Proposed Action

Direct and Indirect Effects

The proposed action has potential to affect the hydrologic function of the watersheds within and surrounding the Grass Flat Hazardous Fuels Reduction and Forest Health Project. Thus it is important to prevent or mitigate negative effects on the hydrologic function. The HFQLG FEIS and ROD directed the adherence to Scientific Analysis Team (SAT) guidelines while implementing projects. The SAT guidelines include maintaining standard Riparian Habitat Conservation Areas (RHCAs) and observing ten Riparian Management Objectives (RMOs). Legacy impacts, such as grazing, mining and heavy concentrations of fuels due to fire suppression, have resulted in RHCA conditions that are no longer consistent with the RMOs. Riparian restoration and fuels reduction treatments are proposed to be implemented within the RHCAs and SMZs as a result. The Feather River Ranger District Hydrology Department, in partnership with the Wildlife and Aquatics Department, developed a buffering system specifically geared towards the proposed treatments of the units surrounding RHCAs and SMZs. Table 4 below outlines this system.

Table 3-28. RHCA and SMZ Buffers for Fuels and Timber Operations

Riparian Habitat Conservation Areas (RHCAs): Overall widths, per SAT guidelines, are 150' for non-fish bearing and 300' for fish bearing on each side of stream. **The following buffers by treatments apply to RHCAs, unless otherwise specified below. **All buffers are no-treatment buffers, unless specified otherwise. **Treatments are expected on slopes less than or equal to 35%.
Groups Selection: Maintain the standard RHCA widths.
Mechanical (includes Thin-Handfell and Sanitation): Apply a 50’ buffer for Streamside Management Zones (SMZs), a 75' buffer for all other non-fish bearing streams and a 150' for fish bearing streams.
Mastication: Apply a 25' buffer for SMZs, a 50' buffer for all non-fish bearing streams and a 75' buffer for fish bearing streams.
Handcut/Pile/Burn (HCPB): No buffer on all ephemeral streams, but retain at least 50% canopy cover and all riparian vegetation post treatment. Piles would be at least 25' from edge of stream. Apply a 25' buffer to all other non-fish bearing streams and a 50' buffer to fish bearing streams.
Handcut/Grapple Pile (HCGP): Same as HCPB, but apply a 50' equipment exclusion zone in addition to the buffer for grapple piling. In the case of ephemerals, equipment would be excluded in 50’ zones from the stream edges.
Shoreline: Buffers for all units along the Little Grass Valley reservoir are 75' from vegetation line.
Underburns (UB): Buffer is not necessarily a no-treatment buffer because, while fire ignition would be prohibited within the buffer, fire would be allowed to back into the buffer. On average a 25’ buffer for SMZs, 75' buffer for non-fish bearing streams and 150' buffer for fish bearing streams.
Plantations/Planting: no buffers.
Meadows: No buffers, but no treatments within meadows unless otherwise designated (see Table 5). Overall, treat up to meadow edges.

Meadow and Wetland Vitality. There are approximately 15 acres spread across 12 meadows and wetlands recommended for active restoration, where management activities will be performed within and around the boundaries of the meadows and wetlands to improve their health, reclaim their lost territory and fortify them against future damage. Restoration activities (Table 5) include the removal of encroaching conifers, and on sites within or adjacent to developed recreation areas, the installation of interpretive signs and infrastructure (trail armoring and installation of a bridge) to lessen anthropogenic impacts. There are also 36 other meadows and wetlands, a total of about 19 acres, proposed for passive restoration, where treatment in the form of encroaching conifer removal is implemented up to the outer boundaries of these meadows and wetlands.

Through the use of a Limited Operating Period (LOP) and design features, impacts will be contained to short term minor disturbances from foot traffic and end-line yarding during the implementation of the active restoration. Upon completion of both active and passive restoration, the meadows and wetlands will see an increase in their water storage capacity (Lindquist and Wilcox, 2000), their flora and fauna diversity, and their sediment filtering capacity (Lang and Halpern, 2007; Ratliff, 1985). The restorations will also facilitate the reestablishment of a natural fire regime through the area to help impede conifer re-encroachment in the future (DeBenedetti and Parsons, 1979, 1984). No impacts are expected from implementing the passive restorations.

Table 3-29 Meadow restoration treatments

Hydrologic Feature	Hydrology Name Designation	Acres	Treatment within Meadows and Wetlands	Other
Meadow	021M1	0.64	HCPB conifers < 6" DBH. Hand fell and leave conifers ≥ 6" and ≤ 29.99" DBH within meadow. Hydrology Dept. will mark ***cut*** trees.	Erect Interpretive signs
Meadow	021M2	0.44	Handcut conifers < 6" DBH, then pile and burn outside meadow.	
Alderbog	021M3	5.45	Handcut conifers < 6" DBH, then pile and burn outside alderbog. Hand fell and yard (where feasible) conifers ≥ 6" ≤ 29.99" DBH. Hydrology Dept. will mark ***cut*** trees.	
Meadow	031-109M	0.37	Handcut conifers < 6" DBH, then pile and burn outside meadow. Hand fell and leave conifers ≥ 6" ≤ 29.99" DBH within meadow. Hydrology Dept. will mark ***cut*** trees.	
Meadow	109M	0.30	HCPB conifers < 6" DBH. Hand fell and leave inside meadow conifers ≥ 6" ≤ 29.99" DBH. Hydrology Dept. will mark ***leave*** trees.	Put in small footbridge or armor stream
Meadow	109-922M	0.53	HCPB conifers < 6" DBH. Hand fell and yard conifers ≥ 6" ≤ 29.99" DBH. Hydrology Dept. will mark ***cut*** trees.	
Alderbog	967M1	0.66	HCPB conifers < 6" DBH. Hand fell and yard conifers ≥ 6" ≤ 29.99" DBH. Hydrology Dept. will mark ***cut*** trees.	
Meadow	967M2	0.16	HCPB conifers < 6" DBH. Hand fell and yard conifers ≥ 6" ≤ 29.99" DBH. Hydrology Dept. will mark ***cut*** trees.	
Meadow	966M1	0.13	Handcut conifers < 6" DBH, then pile and burn outside of meadow. Hand fell and leave conifers ≥ 6" ≤ 29.99" DBH within meadow. Botany Dept. will coordinate with Hydrology Dept. to mark ***cut*** trees.	
Meadow	966M2	0.37	HCPB conifers < 6" DBH.	
Meadow	993M	0.46	HCPB conifers < 6" DBH. Hand fell and leave conifers ≥ 6" ≤ 29.99" DBH within meadow. Hydrology Dept. will mark ***cut*** trees.	
Fen	124M	5.04	Handcut conifers < 6", then pile and burn outside fen. Hand fell and yard conifers ≥ 6" ≤ 29.99" DBH. Hydrology Dept. will mark ***cut*** trees.	
	Total Acres	14.56		

Treatments proposed for the 12 Active Restoration Meadows and Wetlands[1]

[1] No large mechanical equipment will be allowed within the meadows and wetlands, logs will be yarded out using end-line yarding.

Stream Channel Continuity and Streambank Stability. Two streams identified as having been diverted from their historic channels are proposed for realignment. Both these streams are fed by springs. One stream is diverted by a legacy road while the other is diverted by an old skid (Figure 2). Two other streams, including the fish-bearing South Fork Feather River, have streambank instability issues and are proposed for streambank stabilization work (Figure 1). Riparian vegetation planting is recommended on 24 acres of bare or sparsely vegetated sections of streambanks on the South Fork Feather River and an intermittent tributary to Black Rock Creek. Two stream crossing culverts are recommended for action: one for removal and one for an upgrade. The stream crossing culvert proposed for removal is on an old decommissioned road (Figure 2) crossing a perennial stream that feeds directly into the reservoir. It is currently undersized, plugged and in danger of failing. If the crossing fails, it will contribute to increased sediment delivery to the stream and reservoir. The stream crossing culvert proposed for an upgrade on the 22N57 road is also undersized and completely buried (Figure 3), causing the ephemeral stream to flow over the road during storm events.

The planting operation on two streams will have negligible negative impacts and will see an immediate improvement to streambank stability upon completion. The realignment and culvert removal and upgrading operations will be subject to temporary disturbances during implementation, but can be readily mitigated through the use of Limited Operating Periods (LOPs) and BMPs. The proposed restorations will improve the current health and condition of the watershed and hydrologic network.

Hydrologically Connected (HC) Road Segments. Currently, 32 HC road segments have been identified with lengths longer than 300 feet. The average length of these HC road segments is about 640 feet, with a few individual lengths exceeding 1000 feet. Installation of 12 additional ditch-relieve culverts (DRCs) are proposed. All 12 additions will be installed where the HC road segments surpasses 1000 feet (Figure 3), and will reduce the average length of HC down to about 460 feet when implemented, which translates to a 27% overall reduction in HC length for the treated road segments. Seven of the 12 DRCs will be installed on three locations along the 22N57 road, which is the main road traveling along the eastern and northern edges of Little Grass Valley Reservoir. The remaining five DRCs will be installed on two locations along the 22N27 road, which travels east-west and is situated further north of the reservoir. Culvert installations, when conducted through the use of LOPs and BMPs, would not significantly impact water quality.

Best Management Practices (BMPs) Effectiveness Evaluations. The proposed action has the potential to directly and indirectly affect water quality and its associated beneficial uses. Providing adequate protection buffers to streams, as well as use of effective nonpoint source pollution prevention measures, would greatly reduce the potential of sediment reaching stream channels within and downstream of proposed treatment units. The BMPs are evaluated annually by the BMP Evaluation Program (BMPEP) to assess their effectiveness.

BMP evaluations conducted on the Plumas National Forest for activities that are pertinent to Alternative B are evaluations T01, T02, T04, E08, E09, E11, E12 and F25 (Table 6), of these, 88% were rated as "effective" between 2007 to 2009 (Table 7) (USDA Forest Service 2009). The 2010 data is currently under evaluation and not yet available. In most cases, BMP evaluations rate a "fail" when sediment is introduced into a stream channel adjacent to a project activity. Of the 12% rated as "fail" between 2007 and 2009, the majority were due to legacy factors associated with the original design or location of Forest roads constructed prior to the development of the 2000 Best Management Practices guide: *Water Quality Management for Forest System Lands in California*. While correction of all of these legacy factors is currently not feasible due to temporal and fiscal constraints, proposed reductions to the HC road segments under Alternative B would correct the worst of the observed legacy factors contributing to water quality impacts in the project area. Due to these BMPs and design features, implementation of the Grass Flat Hazardous Fuels Reduction and Forest Health Project would not result in significant degradation of water quality or impairment of its associated beneficial uses within the project area.

Under Alternative B, approximately 512 acres within RHCAs and SMZs will be treated. The potential for negative direct and indirect effects to water quality will be counteracted through implementation of LOPs, BMPs, design features and mitigations. All units post treatment will have to meet a minimum requirement for effective soil cover ranging between 50-70%, as it is the minimum required to successfully offset the effects and transport of sediment reaching streams or bodies of water due to surface runoff.

Table 3-30. BMP Onsite Evaluation Protocols

BMPEP Onsite Evaluation Protocols	BMPs Evaluated
T01: Streamside Management Zones (SMZs)	▪ SMZ Designation ▪ Stream Course and Aquatic Protection ▪ Slash Treatment in Sensitive Areas
T02: Skid Trails	▪ Tractor Skidding Design ▪ Erosion Control on Skid Trails
T04: Landings	▪ Log Landing Location ▪ Log Landing Erosion Control
E08: Road Surface, Drainage & Slope Protection	▪ Erosion Control Plan ▪ Stabilization of Road Slope Surfaces and Spoil Disposal Areas ▪ Road Slope Stabilization Construction Practices ▪ Control of Drainage ▪ Construction of Stable Embankments ▪ Maintenance of Roads ▪ Road Surface Treatments to Prevent Loss of Materials
E09: Stream Crossings	▪ General Guidelines for Location and Design of Roads ▪ Stabilization of Road Slope Surfaces and Spoil Disposal Areas ▪ Road Slope Stabilization Construction Practices ▪ Control of Road Drainage ▪ Construction of Stable Embankments (Fills) ▪ Stabilization of Road Slope Surfaces and Spoil Disposal Areas
E11: Control of Sidecast Material	▪ Control of Sidecast Material During Construction & Maintenance
E12: Servicing and Refueling	▪ Servicing and Refueling of Equipment
F25: Prescribed Fire	▪ Consideration of Water Quality in Formulating Fire Prescriptions ▪ Protection of Water Quality from Prescribed Burning Effects

Table 3-31. BMPEP Summary of Ratings, 2007-2009. BMPs for Timber Activities Only

	IMPLEMENTATION					EFFECTIVENESS			
Form	**Pass**	**At-Risk**	**Fail**	**Total**		**Pass**	**At-Risk**	**Fail**	**Total**
T01	23	1	0	24		20	3	1	24
T02	27	2	3	32		26	3	3	32
T04	31	1	1	33		31	1	1	33
E08	22	1	1	24		14	4	8	26
E09	21	1	0	22		11	5	7	23
E11	16	0	1	17		16	1	1	18
E12	2	0	0	2		2	0	0	2
F25	25	3	0	28		24	3	1	28
Total	**167**	**9**	**6**	**182**		**144**	**20**	**22**	**186**
# of fails, Implementation =				6		# of fails, Effectiveness =			22
Percent Implemented =				**96.7%**		**Percent Effective =**			**88.2%**

Cumulative Effects

Equivalent Roaded Acres (ERA). For the proposed action, the ERA model analyzed for what conditions would be like upon completion of the project. It adds the effects of the proposed action onto the existing condition.

Table 3-32. Percent of Disturbance Activities Contributing to the TOC

Percent of Disturbance Activities Contributing to the TOC							
			Private Timber Harvest Activities		Forest Service Activities		
Subwatershed Number	Infrastructure	Urban	Past Activities	Present and Future Forseeable Activities	Past Activities	Present and Future Forseeable Activities	Alternative B Prescriptions
1	28%	0%	12%	1%	6%	11%	41%
2	30%	7%	17%	10%	6%	1%	29%
3	45%	0%	3%	0%	40%	0%	12%
Grand Total	**31%**	**5%**	**14%**	**7%**	**11%**	**3%**	**29%**

Table 3-33. Percent TOC by Subwatershed

Subwatershed Number	TOC (in terms of acres of ERA disturbance divided by the subwatershed area)	Subwatershed Acres	Total ERA (Acres)	% Disturbed	% TOC	Under, Over or Approaching TOC
1	11%	2382	220.3	9%	84%	Approaching
2	11%	7024	645.6	9%	84%	Approaching
3	11%	2482	144.2	6%	53%	Under

For the entire CWE analysis area, contributions to the TOC score by the Alternative B prescriptions are varied between the three subwatersheds (Table 8). The contributions towards TOC are largest in subwatershed 1 (where additional ERA due to Alternative B equals 3.5% of subwatershed area), and smallest in subwatershed 3 (where additional ERA due to Alternative B equals just 0.6% of subwatershed area). The overall percent of TOC under Alternative B ranges from 53 to 84 (Table 9) as a result, and while the proposed action caused subwatersheds 1 and 2 to begin approaching the TOC, they are ultimately still below the threshold. Based on the ERA modeling for existing conditions, the cumulative effects of all past, present and foreseeable future activities within the analysis area, coupled with the implementation of the proposed action and applicable BMPs, would not alter surface runoff patterns and timing enough to significantly impact water quality or affect beneficial uses of water within and downstream of the analyzed subwatersheds.

Modified Alternative B – Preferred Alternative

Direct, Indirect and Cumulative Effects

Modified Alternative B was conscripted based on comments and input from the public. In essence, all units and boundaries would stay the same, but the prescriptions were altered to meet certain forest health and economic objectives. There would be fewer acres of groups selection and mechanical thin treatments, fewer new temporary roads and landings, and more acres of sanitation, mastication, HCPB and HCGP treatments; resulting in less higher impact and more lower impact prescriptions on the land than the original Alternative B. All proposed restoration activities under Alternative B would carry over into Modified Alternative B, and due to the smaller no-treatment buffers of the lower impact prescriptions, treatments within RHCAs would increase from 512 acres in Alternative B to 530 acres in Modified Alternative B. The analyses conducted for Alternative B would still apply to Modified Alternative B, as the only difference between the two alternatives is their prescriptions. The cumulative effects of Modified Alternative B are projected to be less than Alternative B. This is because of the overall lower impact treatments prescribed for Modified Alternative B, which have lower total ERA and thus lower % TOC scores.

Alternative C – Non-Commercial Alternative

Direct, Indirect and Cumulative Effects

Alternative C is the non-commercial approach to Alternative B, where the group selection and sanitation prescriptions, as well as active restorations from Alternative B would be dropped. All other proposed prescriptions under Alternative B would still be implemented, but would be rearranged. Under Alternative C, The unit boundaries would stay the same, but the prescriptions would be changed. In general, there are less mechanical thinning units, and more HCPB, HCGP and no-treatment units. Passive restoration would still occur in the form of treating within the RHCAs and treatment up to the outer edges of meadows and wetlands for fuels purposes.
The 15 acres of meadows and wetlands proposed for active restoration would now become passive restoration activities, where treatments would only be implemented up to the outer boundaries. The 24 acres of riparian vegetation planting, the two stream realignments, the culvert removal, the culvert upgrade, and the 12 additional DRC installations would all be dropped; however, treatments within RHCAs and SMZs would increase to 526 acres from the 512 acres in Alternative B due to more HCPB and HCGP prescriptions, which have correspondingly smaller no-treatment buffers. Overall, the impacts of Alternative C on the hydrologic function falls somewhere between Alternatives A and B. Thus portions of the analyses for both Alternatives A and B would apply here with respect to their relevance (Table 10).

Table 3-34. Analyses from Alternatives A and B relevant to Alternative C.

Unit of Measure	Analysis Relevant to Alternative C
Meadow and Wetland Vitality	Alternative B[2]
Stream Channel Continuity and Streambank Stability	Alternative A
Hydrologically Connected Road Segments	Alternative A
BMP Effectiveness	Alternative B
ERA Model	Alternative B[3]

Alternatives B, Modified B and C for Borax

Direct and Indirect Effects

Under Alternatives B, Modified B and C the proposed treatment to deter the spread of Heterobasidion annosum (*annosus*) root disease would be performed by manual application of borax (*sodium tetraborate decahydrate*) to freshly-cut stump surfaces. The application would only occur in thinning and group selection units on freshly-cut conifer stumps that are greater than 14 inches dbh. The average application rate of borax for the project is 1lb/acre. The application of borax would not be allowed within any RHCA or SMZ.

[2] Since active restoration would not occur, only the analysis for passive restoration apply here
[3] Due to the nature of the action, land disturbances resulting from implementing Alternative C would be less than Alternative B, so the % TOC scores would be lower than those of Alternative B.

According to the Human Health and Ecological Risk Assessment for Borax Final Report there is a limited potential to contaminate water (USDA Forest Service 2006). The report goes over two different scenarios for the contamination of water, one being an accidental spill into a small pond and the other a model for determining the concentration of boron (boric acid) in a stream. According to the spill scenario, the concentration of boron can range from about 0.3 to 1.3 mg B/L if 6.25 to 25 lbs of borax is accidently spilled into a small pond; this is within the range of naturally occurring concentrations of boron in water (USDA Forest Service 2006). The other scenario uses GLEAMS (Groundwater Loading Effects of Agricultural Management Systems) modeling to estimate reduction in Borax concentration in a stream due to runoff, sediment and percolation (USDA Forest Service 2006). According to the models assumptions, the runoff water and base flow diluted the concentration of boric acid to very low and essentially negligible values (USDA Forest Service 2006).

Cumulative Effects

It is presently unknown if borax has been applied on private timberlands within the analysis area. Borax was used on a previous hazard tree removal project conducted within a few of the campgrounds surrounding Little Grass Valley Reservoir. However, given the low toxicity and low ambient concentrations of borax that could result from the proposed borax application, it is unlikely that there would be observable cumulative effects from the proposed action in combination with any other use of borax in the area. Expected quantities of boron added to the water via runoff from borax application areas are considerably lower than average background levels in water (USDA Forest Service 2006), therefore there is considered to be no risk of cumulative effects to beneficial uses of water from the proposed borax application.

Summary of Effects across all Alternatives

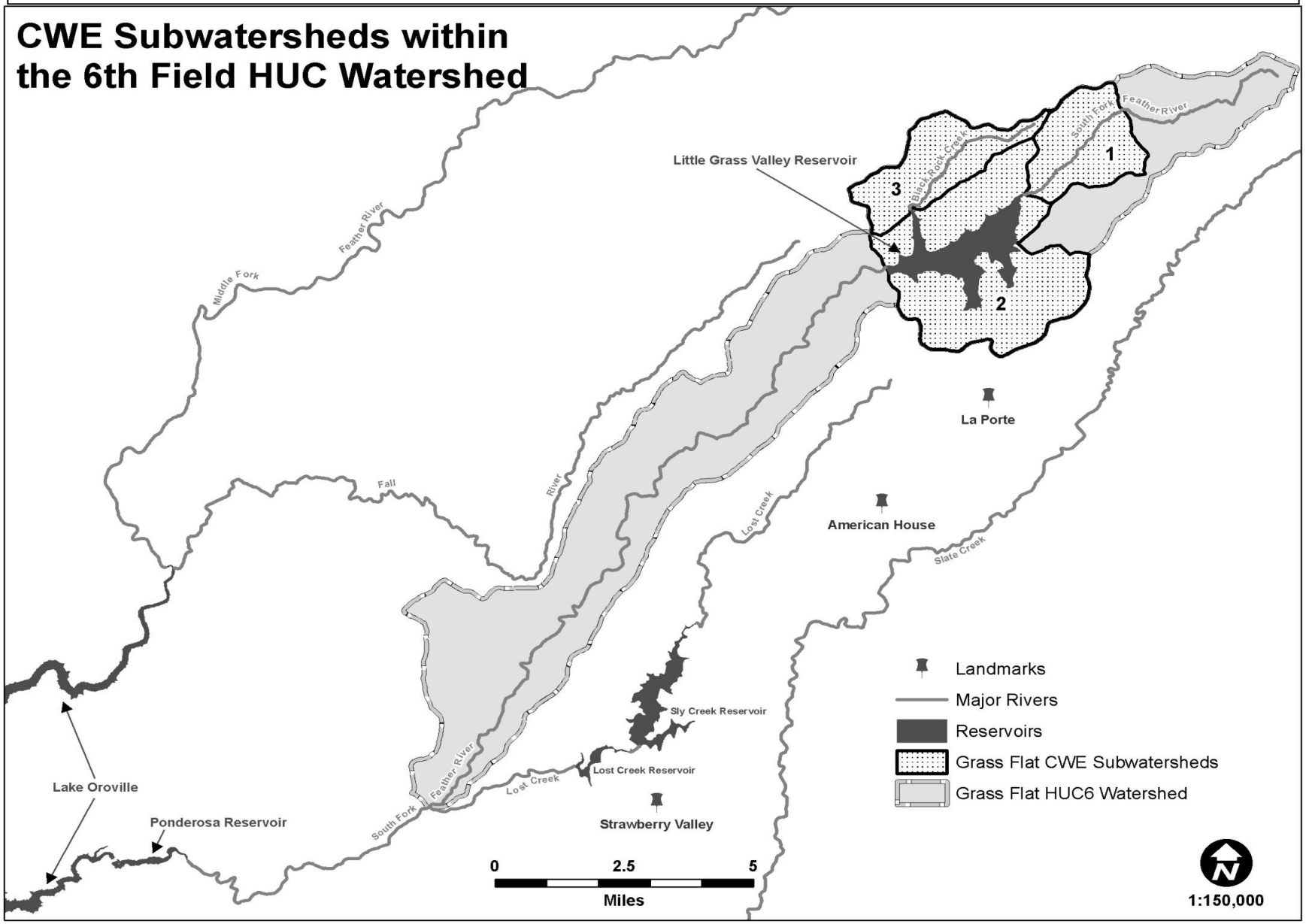
Alternative A. Based on the ERA modeling, as a whole, the subwatersheds are in good health and are functioning properly. There are localized areas of instability and constant degradation, however, which can pose long term threats to water quality, riparian habitat diversity and the well being of the hydrologic network. Under the no-action alternative, no management activities would be conducted, and while not causing any new possible damages to the subwatersheds, the substantial amount of human traffic and recreational use can exacerbate legacy disturbances, potentially becoming larger issues later in time.

Alternative B. The ERA modeling completed for the proposed action does increase the TOC percentage for all three subwatersheds involved, but it would not push the subwatersheds beyond their respective thresholds. The proposed restoration activities would address many of the existing instability and detrimental conditions, thus improving the water quality and riparian habitat diversity of the area. There are also systems in place in the forms of LOPs, BMPs, and design features to prevent management activities from directly and indirectly impacting the water quality, the riparian habitat diversity, and the hydrologic network. Under Alternative B, the proposed management activities are not expected to cause any substantial negative impacts to the hydrological resources in the project area.

Modified Alternative B. This alternative was created based on comments and input provided by the public. To meet certain forest health and economic objectives, the prescriptions for the proposed action were altered and the results unveiled a lower impact solution. A separate ERA analysis was not completed for the preferred alternative; it is deduced that due to the lower impact prescriptions, the TOC percentage values for Modified Alternative B would be lower than the proposed action. The proposed restoration activities under Alternative B would also be proposed under the preferred alternative, thus reaping the benefits those activities have to offer. Like Alternative B, Modified Alternative B would implement all systems in place to prevent management activities from impacting the water quality, the riparian habitat diversity and the hydrologic network, and it is not expected to cause substantial negative impacts to the hydrological resources in the project area.

Alternative C. Since the non-commercial alternative is basically a trimmed down version of the proposed action, a separate ERA analysis was not completed for Alternative C. It is concluded that the TOC percentage values for Alternative C would be lower than the values of Alternative B (due to the absence of the groups selections, sanitations and active restoration activities, as well as less mechanical thinning units) but higher than the values of Alternative A (management activities would still occur). The non-commercial alternative also occupies a place somewhere between Alternatives A and B in terms of direct and indirect impacts to the water quality, the riparian habitat diversity, and the hydrologic network. Table 10 above summarizes which portions of the analyses conducted for Alternatives A and B pertains to Alternative C. Similar to Alternative B, the proposed management activities under Alternative C are not expected to cause any substantial negative impacts to the hydrological resources in the project area. However, the stream channel improvements and treatments for road hydrologic connectivity proposed under Alternative B and the localized water quality and riparian habitat improvements associated with those treatments would not occur under Alternative C.

Figure 3-4. CWE Analysis Map



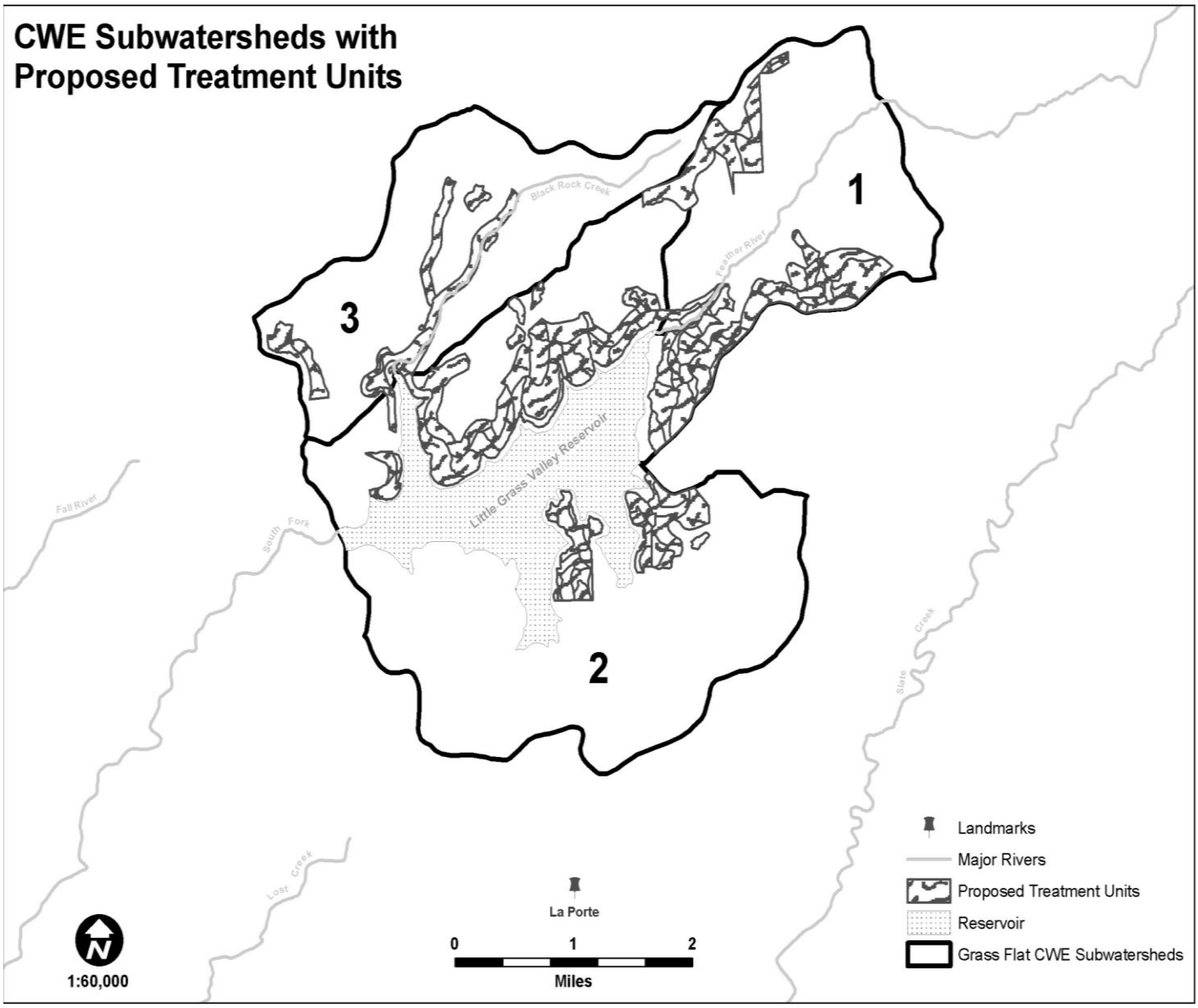


Figure 3-5. CWE Analysis Map with Proposed Treatments

3.6 Aquatics

3.6.1 Introduction

The purpose of the Biological Assessment and Biological Evaluation (BA/BE) is to review the proposed United States Forest Service (USFS) action in sufficient detail to determine if the proposed action, Grass Flat Fuels Reduction and Forest Health Project (Grass Flat Project), will result in a trend toward federal listing of Candidate and Sensitive species, to document effects on Proposed species in order to determine if conferencing is required, and to document effects on Threatened and Endangered species to determine if consultation is required. Refer to the Wildlife section for additional discussion.

The following fish species are not known to be located on the Plumas National Forest: winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Delta smelt, Central Valley steelhead, and Lahontan cutthroat trout. The California red-legged frog, foothill yellow legged frog, western pond turtle are found on the Plumas National Forest but they do not occur within the Grass Flat project area and will not be discussed further in this DEIS. Refer to the Aquatic Biological Assessment and Biological Evaluation for further information concerning the above mentioned species.

The **Mountain yellow-legged frog** is found on the Plumas National Forest, and there is suitable habitat and detections within the Grass Flat analysis area**.** Effects to this species as a result of implementing the proposed Grass Flat Project are analyzed and discussed below.

3.6.2 Analysis Regulatory Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant to the action alternatives (B and C) as they affect aquatic species and habitat includes (refer to Chapter 1 and the Wildlife section in this DEIS, and the Aquatic BEBA 2012 for discussions):

- National Environmental Policy Act (NEPA 1969)
- Endangered Species Act (ESA 1976)
- National Forest Management Act (NFMA 1976)
- Code of Federal Regulations (36, 40 & 50 CFR)
- Forest Service Manual and Handbooks (FSM/H 2670)
- Plumas National Forest Land and Resource Management Plan (LRMP 1988)
- Plumas National Forest FEIS/ROD for the LRMP (1988)
- Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLGFRA), and the Final Environmental Impact Statement (FEIS), Record of Decision (ROD), August 1999.
- Sierra Nevada Forest Plan Amendment: Final Supplemental Environmental Impact Statement Record of Decision (SNFPA FSEIS ROD 2004). 3.6.2 Analysis Regulatory Framework: Statute, Regulation, Forest Plan, and Other Direction

3.6.3 Effects Analysis Methodology

Analysis Methodology

The aquatic analysis area for determining direct, indirect, and cumulative effects on aquatic habitat-dependent species includes **11,889** acres of National Forest System lands and private land. The aquatic analysis area is comprised of **3** subwatersheds ranging from 2,382 to 7,024 acres, and is the same as the Cumulative Watershed Effects analysis area described in the Hydrology section in this document.

Refer to Appendices for a map of the aquatic analysis area. A watershed is a naturally-occurring and easily distinguishable division of landscapes. It is particularly well-suited as a spatial analysis unit when considering direct, indirect, and cumulative effects on aquatic species because these effects generally will not extend beyond the physical boundary of the watershed. The aquatic analysis area includes all subwatersheds within which Grass Flat Project activities are proposed. Because upstream activities can have substantial effects in a given location due to the linkage and movement of water and materials from headwaters to downstream areas, the aquatic analysis area also includes all upstream subwatersheds which are directly connected to subwatersheds containing treatment activities.

The time frame for determining cumulative effects depends on the length of time past effects continue into the future. On the Feather River Ranger District, 25 years is used as the average recovery period for disturbed sites. The western slope of the Sierra Nevada in the Plumas National Forest area has a high rate of vegetative establishment and growth, due to high annual precipitation quantities and the presence of highly productive forest soils. Disturbance from vegetation management is assumed to have no effect on hydrologic processes after 25 years have passed since the last major site disturbance. Other activities, such as mining or urbanization, recover more slowly or not at all.

Data Sources

Several types of data were compiled to provide the basis for understanding the nature and extent of aquatic resources within the Grass Flat project area, and the potential effects of proposed fuels reduction and vegetative treatments on this resource. The following data were compiled to provide a historic overview of species status at a bio-regional geographic scale, to identify major localized use and natural disturbance events, to provide information on previous field survey inventories, and to determine data confidence or accuracy:

- Archival and literature sources including prior fish, amphibian, reptile, and stream survey data from Forest Service aquatic resource records.
- GIS layers of the following information: spatial identification of streams, ponds, wetlands, wet meadows; and designated or important aquatic areas (i.e., RHCA's).
- Site-specific amphibian surveys conducted in 2005 and 2006 using the Fellers and Freel (1995) protocol.
- Resource expert field reconnaissance and observations conducted in 2005 and 2006.
- Equivalent Roaded Area (ERA) as compared to Threshold of Concern (TOC) calculations at analyzed at a subwatershed scale (refer to Hydrology section).
- Riparian Management Objectives (RMOs): The ID team determined that all of the Riparian Management Objectives (RMOs) described in Appendix L of HFQLG FEIS 1999 would be met, and that the quality of riparian ecosystem function and condition would be improved or at least not degraded for each of the proposed treatments that would occur within RHCAs.

Assumptions

The following assumptions are specific to resource analysis for the Mountain Yellow-legged Frog and aquatic (stream and riparian) habitat:

- Aquatic species spend all or significant portions of their life cycles either in or moving through stream and/or riparian habitats.
- Aquatic habitats and associated stream systems can tolerate certain levels of land disturbance. However, widespread or intense land disturbances applied in sensitive areas such as RHCAs can substantially impact the immediate area or downstream channel stability and water quality.

- All subwatersheds currently at or predicted to exceed the Threshold of Concern will have the greatest potential for off-site sediment delivery into streams and water bodies (refer to hydrology section).
- All DFPZ and GS treatments requiring mechanized ground-based equipment will result in the same amount of disturbance effect on aquatic dependent species and habitats, as measured at a subwatershed scale.
- All DFPZ treatments applied manually, such as handcut/pile/burn and underburn, will result in the same amount of disturbance effect on aquatic dependent species and habitats, as measured at a subwatershed scale.

Resource Indicators and Measures

Potential effects common to all aquatic species and habitats (stream and riparian) are discussed for action alternatives and passive recovery under the No-action Alternative. Although habitat requirements vary widely by species, there are habitat components and structures that when altered can have a measureable effect on species. Implementation of an action alternative may affect species differently, positively and negatively, or not at all. Treatment associated effects are discussed specifically for the Mountain Yellow-legged Frog and its habitat within the analysis area. Aquatic (stream and riparian habitat) systems are easily affected by management activities. Individual events or cumulative effects can have severe effects on aquatic life, channel condition, species using riparian habitat and water quality (Menning et al 1996). The indicators are Riparian Habitat Conservation Areas (RHCAs) and the watersheds Threshold of Concern (TOC). The measures used to analyze the effects on riparian/aqautic habitat are based on acres treated and the width of the buffers along the RHCAs. TOC is used as a measurement of the percentage of watershed under, approaching or above TOC. The indicators and measures of the proposed Grass Flat Project to the MYLF are listed in **Table 3.5-1.**

Riparian Management Objectives (RMOs) for RHCAs were developed to manage ecosystems by pulling together individual system components and evaluating all important influences, interconnections, and interactions. Refer to Appendices within this document for the discussion on how the treatments meet the objectives. Watersheds and their associated stream systems can tolerate given levels of land disturbance, but there is a point when land disturbances begin to substantially impact downstream channel stability and water quality. This upper estimate of watershed "tolerance" to land use is called the threshold of concern (TOC). Refer to the Hydrology section within this document for definitions and discussion regarding TOCs, subwatersheds (SWS).

Table 3-35. Indicators and Measures used to analyze effects to the Mountain Yellow-legged Frog.

	Indicators	Measures
SPECIES: Mountain yellow-legged frog (Rana muscosa)	**Treatments within RHCA buffers**	
	RHCAs maintain or improve	Acres
	RHCAs reduced	Acres
	TOC status of subwatersheds	
	Subwatershed 1	Rating
	Subwatershed 2	Rating
	Subwatershed 3	Rating

3.6.4 Affected Environment

Mountain Yellow-legged Frog

Status: The Mountain yellow-legged frog is a USFS Region 5 Sensitive Species. The MYLF is also a federal candidate species for listing by the USFWS under the Endangered Species Act. A candidate species is a species that warrants listing but is precluded due to higher priority actions (Fed. Reg. Vol. 68, No 11, 2283-2303). The PNF LRMP 1988 has general direction requiring the Plumas to improve habitat capability and provide viable populations for all aquatic (stream and riparian) dependent species. The HFQLG FEIS and ROD 1999 and the SNFPA FEISs and RODs 2004 include direction, and standards and guidelines for surveys, limited operating periods (LOPs), Habitat Monitoring, Riparian Habitat Conservation Area (RHCA) buffers and Riparian Management Objectives (RMOs).
Surveys: Amphibian surveys were conducted in 2005 and 2011 within the Grass Flat analysis area and no MYLF were detected. However, there have been incidental detections within the analysis are in South Fork Feather River above LGV reservoir. Also, there were historical detections within the South Fork drainage above LGV reservoir, as a result of surveys for Bald Onion (2005), which overlaps with the Grass Flat analysis area.

Analysis area Occurrence Potential: Suitable habitat for MYLF is perennial and intermittent streams and ponds above 4,000 feet in elevation. All vital life history activities for MYLF, including breeding, foraging, dispersal, and over-wintering, occur in or adjacent to these habitat types (Stebbins 2003, Wengert et al. 2006). Habitat characteristics include gentle gradients; sufficient insolation; some rocky, sandy or silty substrate; and most notably, perennial pools and lack of introduced fish (Williams 2004). The frogs will lay their eggs in June when contiguous pools are present and are found to require one year to mature into adult frogs. Based on observed MYLF habitat use, most frogs occupy the lower portions of the creeks and not headwater areas. Telemetry studies on MYLF completed on the PNF have shown most MYLF stay within 75 feet of the creeks (Wengert et al. 2006).

Land modifying activities conducted by people over the past 155 years have had a significant evident impact on aquatic analysis area streams. Since the 1950's, logging and road construction have been the major land modifying activities affecting streams in the aquatic analysis area. Logging in riparian areas destabilized stream banks and deprived channels of large woody debris, resulting in reduced stream habitat complexity and compromised fishery production. Continuous erosion from gravel and dirt roads, cuts, and drainage ditches continues to provide a steady supply of fine sediment to stream crossings, while the occasional washout or landslide from poorly placed or engineered roads sporadically adds larger sediment inputs. Fine sediment supply and resultant degraded riparian habitats are the most notable biological impacts from the varied land uses in the aquatic analysis area.

Streams and associated swales are the most abundant aquatic habitats. The PNF Geographic Information System shows a total of 84.42 miles of streams (ephemeral, intermittent, and perennial) in the Grass Flat Project aquatic analysis area. This total includes stream reaches through private land within the PNF boundaries. Of this total, the majority consists of ephemeral channels that generally do not exhibit annual scour. Fish-bearing waters are generally perennial, although a small fraction of intermittent waters contain fish at least seasonally or within pools that remain in deeper parts of the channel when flows discontinue. Perennial streams that do not contain fish generally are either too steep to provide suitable habitat, or there are barriers that prevent fish from using otherwise suitable habitat. Barriers can be either man-made (culverts and dams) or natural (cascades or large woody debris jams).

3.6.5 Environmental Consequences

Activities under the action alternatives are proposed to maintain or improve riparian and aquatic habitat. Restoration activities are proposd under Alternatives B and B-Modified to improve riparian and aquatic conditions. The proposed action would adhere to all applicable HFQLG ROD and SNFPA ROD Directions, and Standards and Guidelines. All treatments within RHCAs meet the RMOs and Best Management Practices (BMPs), and have Mitigations such as buffers, LOPs, etc. (refer to appendices within this document). The primary treatments within RHCA zones are handcut/pile/burn and underburn. All three SWS within the aquatic analysis area were examined and all three are "under (>80%)" the TOC. Refer to the Hydrology section within this document.

There are 1,814 acres proposed for treatment under all action alternatives. For the existing condition the majority of units are classified as CWHR 4s and 5s and over half of these units are already at or below 40% and 50% canopy cover, respectively. Alternative B takes the majority of 4s down to 35% canopy cover and 5s down to 40% canopy cover. Under Alternative B-Modified, treatments proposed for units already at 40% for 4s and 50% for 5s was changed from mechanical thin to handcut/grapple pile, handcut/pile, mastication or underburn, which would reduce surface fuels. Under Alternative B and B-Modified, restoration is proposed that would improve hydrologic connectivity and riparian habitat. There would also be sanitation treatment (hazard tree removal) for units within or accessing recreation areas. Alternative C would treat a few more acres than Alternative B-Modified, however, restoration and sanitation activities would not occur.

Direct, Indirect and Cumulative Effects

Mountain Yellow-legged Frog

No Action (Alternative A)

There would be no direct or indirect effects on mountain yellow-legged frogs or their habitat, as no activities would occur.

Under the No-action Alternative, natural succession would continue to modify the condition of aquatic and riparian habitats. Degraded stream channels and mine sites would continue to recover. This would largely have beneficial effects on the habitat quality of streams affected by past land-use activities, especially those that exhibit degraded riparian habitat and decreased levels of in-stream large woody material. New road construction would not happen.

However, vegetation would continue to encroach upon wet meadows, ponds and fens thereby reducing their size and altering their physical characteristics. Unfortunately, in some of the extreme cases, the recovery of degraded streams and mine sites may last for centuries while continuing to cause adverse resource impacts such as chronic fine sediment delivery to stream courses (James 1999).

Treatments to improve stream cannels and road hydrology connectivity, and therefore improvements to localized water quality and riparian habitat improvements associated with those treatments would not occur. There would be no action to reduce the risk of high intensity wildfire and fuels would continue to accumulate.

Action Alternatives: B (Proposed), B-Modified (Preferred) and C (Noncommercial)

Direct effects to MYLF individuals or their habitat by implementation of the action alternatives are expected not to occur or be minimal based on: 1) surveys were conducted within the Grass Flat project area; 2) surveys from previous projects such as Bald Mountain (2004-2005) and Bald Onion (2002-2003) overlap with the project area, 3) if new detections are made, mitigation measures would be applied; 4) mitigation measures such as Limited Operating Periods, no activity between October 15th or the first wetting rain whichever comes first, and March 1st, would be in place to prevent disturbances to breeding or dispersing frogs (refer to Appendices); 5) non-mechanical treatments with historical frog detections will have a biologist on-site during treatment implementation; and 6) apply the PNF Water Drafting Plan (refer to Appendices).

Indirect effects to MYLF individuals or their habitat by implementation of the action alternatives are expected to be low. Refer to design features listed under direct effects above. In addition, indirect effects would be low based on: 1) apply RHCA buffers ; 2) meets all ten RMOs to maintain and improve riparian/aquatic habitat; 3) all three subwatersheds below TOCs; and 4) apply all Best Management Practices (BMPs) that are applicable. Refer to discussion under the California spotted owl for more specific effects of treatments on overall habitat.

Proposed actions may result in a short-term disturbance (expending time and energy escaping from noise and/or activity) but provide improved quality habitat in the long-term and reduce the threat of habitat loss due to fire (natural or human caused).The proposed action has the potential to directly and indirectly affect hydrologic function during implementation of proposed vegetation management activities. However, providing adequate protections (RHCA buffers, LOP, etc.) to headwater streams and higher-order tributary channels would provide protection from direct and indirect effects to streams. Implementation of BMP's would greatly reduce any potential of sedimentation of channels within and downstream of proposed treatment units.

Indicator and Measure #1 - Riparian Habitat Conservation Areas (RHCAs): Riparian Habitat Concservation Area buffers will be flagged on the ground prior to treatment implementation. **Table 3.5-2** is a summary of the total acres within RHCAs and acres treated. There would be 39 acres of restoration within RHCAs under Alternative B and B-Modified: 15 acres of conifer removeal within meadows and wetlands, and 24 acres of planting riparian vegetation along Black Rock Creek and South Fork Feather River. These restoration activitues would not be conducted under Alternative C. **Table 3.5-3.** is a summary of the buffers by treatment types for all action alternatives. Treatments within mastication, handcut/grapple pile, and handcut/pile/burn would be limited to cutting small trees or shrubs 9.9 inches dbh or less. Underburns are proposed for all units but would not be ignited in RHCAs but allowed to burn into the RHCAs. Underburns would primarily remove surface/ground fuels while retaining riparian habitat. No underburns are proposed with creeks or rivers with know historical MYLF detections.

Table 3-36. Acres within RHCA buffers treated by each action alternative.

RHCAs	ALTERNATIVES			
	A	B	B-Modified	C
Acres not treated	680	168	151	155
Acres maintained/improved	0	512	529	525
Acres reduced	0	0	0	0
Total acres	680	680	680	680

Table 3-37. Summary of the RHCA buffers by treatment types for all action alternatives.

TREATMENTS	RIPARIAN HABITAT CONSERVATION AREAS (feet)		
	Ephemeral	**Non-fish Bearing**	**Fish Bearing**
Group Selection	150	150	300
Mechanical Thin	50	75	150
Mastication	25	50	75
Handcut/Grapple Pile	0 (HC); 50 (GP)	25 (HC); 75 (GP)	50 (HC); 100 (GP)
Handcut/Pile/Burn	0	25	50
Underburn	0	0	0

***HC=Handcut; GP=Grapple Pile**

Indicator and Measure #2 - Thresholds of Concern (TOCs): Indirect effects to individual MYLFs or their habitat under the action alternatives could happen but effects are expected to be very low. Modeling of the TOC showed that all three subwatersheds within the aquatic analysis area are below TOC (refer to the Hydrology section within this document). Refer to Table 3.5-4 for a summary of the watersheds and the TOC rating.

Table 3-38. Summary of the TOC rating for the three subwatersheds for each alternative.

SUBWATERSHED	THRESHOLD OF CONCERN			
	A	**B**	**B-Modified**	**C**
1	under	under	under	under
2	under	under	under	under
3	under	under	under	under

***Under= TOC is below 80%**

Cumulative Effects: The cumulative effects of this project on aquatic species include those effects from past, present, and reasonably foreseeable future (PPFF) projects occurring in the Grass Flat Project aquatic analysis area, which includes 11,889 acres of National Forest System and private land. Past activities are considered part of the existing condition and are discussed in the "Affected Environment (Existing Conditions)" and "Environmental Consequences" sections for each resource. Refer to Appendices for a list of the PPFF activities and treatments within the project area.

In order to understand the contribution of past actions to the cumulative effects of the proposed project, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. Existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

Determinations

It is our determination that the proposed activities within the Grass Flat project area may affect individuals, but are not likely to result in a trend for Federal listing or loss of viability for the Mountain Yellow-legged Frog. Direct effects are expected to be unlikely. Indirect and cumulative effects are expected to be low by adhering to management directions, standards and guidelines such as Riparian Management Objectives (RMOs), Riparian Habitat Conservation Areas (RHCAs), Best Management Practices (BMPs), Water Drafting Guidelines, Mitigations, and resource protection and design features.

Table 3-39. Effects determination for the Mountain Yellow-legged Frog, by alternative.

SPECIES	ALTERNATIVES			
Mountain Yellow-legged frog (Rana muscosa)	**A**	**B**	**B-Modified**	**C**
	WNA	MAI	MAI	MAI

WNA = Will Not Affect
MAI = May Affect Individuals, but in not likely to result in a trend toward Federal listing or loss of viability

Compliance with the Forest Plan and Other Direction

If any federally listed species are found at a later date, or if any new information relevant to potential effects of the project on these species becomes available, the project would be stopped and the Section 7 Consultation process would be initiated.

No Action Alternative A: The Grass Flat project area will not affect the Mountain Yellow-legged Frog or their habitats.

Action Alternatives B, B-Modified and C: The proposed activities within the Grass Flat project area may affect individuals, but are not likely to result in a trend toward federal listing or loss of viability for the Mountain Yellow-legged Frog and their habitat.

3.7 Air Quality

3.7.1 Introduction

Prescribed fire is one of the primary activities proposed for the Grass Flat Project that would have a direct impact on air quality. Prescribed burning would be conducted to reduce surface fuel loading and small diameter tree densities over time as trees die and fall. Prescribed burning would be conducted during fall, spring, or winter, the most favorable times in terms of smoke dispersion and environmental conditions for prescribed burning. A secondary source of impacts on air quality would be from dust and internal combustion engine emissions during project activities. Criteria pollutants put off by these activities could have impacts to public health and visibility.

3.7.2 Analysis Regulatory Framework: Statute, Regulation, Forest Plan, and Other Direction

Air quality is managed through a complex series of federal, state, and local laws and regulations. The U.S. Environmental Protection Agency (EPA) has the primary federal role of ensuring compliance with the requirements of the Clean Air Act. The EPA issues national air quality regulations, approves and oversees State Implementation Plans, and conducts major enforcement actions. State and local Air Pollution Control Districts and Air Quality Management Districts (AQMDs) have the primary responsibility of carrying out the development and execution of State Implementation Plans, which provide for the attainment and maintenance of air quality standards.

The original Air Quality Act was passed in 1963. This act was followed by the Clean Air Act and its amendments of 1970, 1977, and 1990. The Clean Air Act is the primary legal instrument for air resource management. It requires the EPA to identify pollutants that have adverse effects on public health and welfare and to establish air quality standards for each pollutant. The EPA has issued National Ambient Air Quality Standards (NAAQS) for sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, lead, and particulate matter (PM) [of 2.5 microns ($PM_{2.5)}$ in diameter or smaller]. If the National Ambient Air Quality Standards are violated in an area for over a period of three years that area may be designated in "nonattainment" for acceptable levels of that pollutant, and the state must develop a plan for bringing that area back into "attainment." Title 17 of the California Air Pollution Control Laws sets similar standard for these pollutants. States may impose stricter standards, but never less stringent than National standards. A conformity determination is needed for areas in nonattainment for criteria pollutants. However the conformity rule published by the EPA on April 5, 2010 included a Presumption of Conformity for prescribed fires conducted in compliance with a state Smoke Management Program (SMP) (pg. 17,264, EPA 2010). The purpose of a SMP is to:

1. Mitigate nuisance smoke and public safety hazards,
2. Prevent NAAQS violation,
3. Protect public health,
4. Address visibility impacts in Class 1 air sheds and
5. Establish procedures and requirements for minimizing emissions.

California has an EPA approved SMP therefore there is no conformity analysis required for the Grass Flat Project.

The 1977 Clean Air Act amendments set up a process to designate Class I and Class II areas for Air quality management. Class I areas receive the highest levels of protection under the Prevention of Significant Deterioration program, which regulates air quality through application of criteria for specific pollutants and use of the Best Available Control Methods.

3.7.3 Effects Analysis Methodology

Analysis Methodology

On the Plumas National Forest, the 1988 Plumas National Forest Land and Resource Management Plan, the 2004 Sierra Nevada Forest Plan Amendment (SNFPA final supplemental EIS), and the 1999 HFQLG Act final EIS provide direction for coordination and cooperation with local Air Quality management Districts.

The following operating procedures are from the HFQLG Act final EIS (1999) and the SNFPA final EIS (2004):

1. Mitigate dust from project activities by including standard dust abatement requirements in sale and project contracts.
2. Conduct prescribed burns when favorable smoke dispersal is forecasted, especially near sensitive Class I areas.
3. Use appropriate smoke modeling software to predict smoke dispersion.
4. Minimize smoke emissions by following Best Available Control Methods.
5. Avoid burning on high visitor use days and notify the public before burning.
   Consider alternative to burning.Incorporate burn plan data into appropriate modeling software. Comply with Title 17 of the 2004 California Air Pollution Control Laws and interim air quality policy and local smoke management programs.Follow the Memorandum of Understanding on prescribed burning with the California Air Resources Board and the USDA Forest Service, Pacific Southwest Region.

The analysis area for direct and indirect effects for air quality is the area potentially affected by smoke emissions, fugitive dust, and emissions from proposed treatments. This includes the project area and Northern Sierra AQMD. See Figure 3-2 for geographic extent of Northern Sierra AQMD.
The analysis area for cumulative effects is the Mountain Counties air basin. This analysis area was chosen because emissions from the project activities are not expected to affect any other air basins. Project activities could occur over the life span of the environmental document, approximately 10 years depending on forest funding.

Figure 3-6 California Air Basins and Counties

Figure 3-7 California Air Quality Districts and Counties

Data Sources

Baseline data on criteria pollutants and air quality for Plumas County was obtained from the California Environmental Protection Agency Air Resources Board website (EPA) and California Air Resources Board website. These websites are updated yearly with air quality information.
The predicted emissions from wildfire, prescribed fire and harvest activities in the proposed project area have been estimated using emission factors from Environmental Protection Agency (EPA) Document 42. Estimated consumed fuel loading, volume of timber removed, estimated miles of road construction, reconstruction and acres treated will be calculated using the emission factors from EPA Document 42 to estimate criteria pollutants.

Basis for Analysis Methods

Common stand exam data was input into the Forest Vegetation Simulator (FVS) program to estimate harvestable timber volumes. Fofem 5.0 (Reinhardt, 2005) was used to estimate consumed fuel load in tons per acre for California white fir vegetation type. Consumed fuel loading was estimated for wildfire, prescribed understory burning and pile burning.

The annual arithmetic averages for national and state ambient air quality standards for PM2.5 are 15.0 ug/m^3 and 12.0 ug/m^3 respectively. The 8 Hour averages for national and state standards for ozone are 0.075 ppm and 0.070 ppm (CARB, 2010). State standards are allowed to be more restrictive than national standards, but never less restrictive.

The air quality analysis for activities associated with each alternative includes identification of adjacent and downwind air basins of concern (nonattainment areas), comparison of the amount of $PM_{2.5}$ and ozone precursors Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOCs) to be produced by fuels treatment and other project activities within the project boundary, and a discussion of the consequences of wildfire produced emissions compared to prescriptive fire, the less emissions produced the better.

Assumptions specific to resource analysis

A primary assumption is that predicted emissions will be generated by wildfire, prescribed fire and harvest activities in the proposed project area. All activities could occur over the life span of the environmental document, approximately 10 years depending on forest funding. Prescribe fire would be implemented in the spring, fall and winter months because these are the best times of year for smoke dispersion and environmental conditions for burning. Each year the burning would take place over a period of months, with treated areas spread throughout the project area.

The following are the assumptions used for determining emissions from timber operations and prescribed burns:

1. The emission factors used to determine effects from the project were taken from EPA Document 42 (EPA 1995) for prescribed burning, and from the *National Environmental Policy Act Air Quality Desk Reference Guide* (CH@M Hill 1995; table 3.3.2-1 for timber harvest operations).
2. All harvest thinning equipment will be diesel powered, and thinning treatments will occur over a three-year period (typical length of a timber contract).
3. Harvest operations include harvesting, processing, skidding, loading, hauling, and road construction and closure.
4. Tractor ground logging systems will be whole tree yarded and de-limb at landing.
5. Slash piles are constructed free of dirt, with 90 percent consumption.

6. Estimated daily burning would be approximately 100 acres. Burning would not be continuous but separated by wet weather patterns and seasons.
7. Predicted weather forecasts are accurate.
8. Measurement Indicators for resource analysis

The air quality analysis for the Grass Flat Project uses one indicator for air quality: criteria pollutant totals required for compliance with federal, state and local laws and regulations. Criteria pollutants used for this analysis are $PM_{2.5}$ and ozone precursors, Nitrogen Oxides (NOX) and Volatile Organic Compounds (VOC). $PM_{2.5}$ has been shown to impact visibility as well as incur health threats to humans. Criteria pollutants in total tons produced will be evaluated for wildfire, prescribed burning (pile and understory burning) and for timber operation to compare the different alternatives analyzed.

3.7.4 Affected Environment

The Grass Flat Project is located in Plumas County, California on the Southern border of the Feather River Ranger District of the Plumas National Forest. Plumas County is within the Mountain Counties Air Basin, so air quality is regulated by the Northern Sierra AQMD.

Climatic conditions in the project area are governed by a combination of large- and small- scale factors. Among the large-scale factors are the latitude, prevailing hemispheric wind patterns, and extensive mountain barriers to the east. Large-scale airflow is generally westerly throughout much of the year. Small-scale or local factors include drainages as well as vegetation cover (Schroder and Buck, 1970).

During the summer, winds over the proposed project area are typically southwest from the Sacramento River Delta. Temperature inversions are rare. When they do occur, they are usually in the early morning, breaking up by mid-morning. Local up-canyon, up valley winds are prevalent during the remaining months with occasional northerly and easterly winds. These surface air flow patterns account for pollution transport between the Sacramento valley and Sierra foothills and mountains.

The community of LaPorte is within the project boundary. The Litte Grass Valley Reservoir Recreation Area that includes summer cabins is also within the project area. Little Grass Valley is a high-use recreation area in both summer and winter months. Other communities near the project area are: American House, 2 miles southwest and Quincy, approximately 16 miles northeast.

Smoke sensitive areas include, but are not limited to schools and hospitals; the closest area is in the community of Quincy. The nearest air quality monitoring stations are in the communities of Quincy, approximately 16 miles northeast, and Portola, approximately 40 miles east. Air quality is considered good throughout most of the year in the project area. Currently air quality designations for Plumas County are in unclassified/attainment for $PM_{2.5}$ and ozone at both state and federal levels.

All baseline data was derived from California Resources Board website. The national and state averages may differ due to different samplers, and slightly different methods used to calculate. Exceeding the national and state standards does not necessarily constitute a violation of the standards (CARB, 2010).

Table 3-40 PM2.5 Annual Averages for Mountain Counties Air Basin

	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	Average
National	10.4	15.2	13	10.9	10.6	11.7	13.3	9.9	15.6	9	11.1	11.9
State	13.8	*	14.2	8.6	10.6	11.7	8.6	9.9	8.1	9	11.1	10.6

* Insufficient data to calculate value.

Table 3-41 Ozone maximum 8-hour average** for Mountain Counties Air Basin

	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	Average
National*	0.096	0.118	0.106	0.115	0.120	0.124	0.122	0.137	0.109	0.113	0.118	0.116
State*	0.096	0.118	0.107	0.116	0.120	0.124	0.123	0.138	0.109	0.114	0.119	0.117

* All concentrations expressed in parts per million (ppm)

**The maximum 8-hour average is the highest 8-hour average ozone concentration in the year, not an overall yearly average. A maximum average greater than or equal to 0.075 ppm or 0.070 ppm is indicative of the severity of the ozone problem in the area and is not necessarily related to a violation of the standard (CARB, 2010)

Visibility concerns include the community of LaPorte and the Litte Grass Valley Reservoir Recreation Area. The community of LaPorte is approximately 2 miles south of the project area. Visibility in both the LaPorte and the recreation area are considered good.

3.2.5 Environmental Consequences

Alternative A (No Action)

Direct and Indirect Effects

Under this alternative, no increase in ozone precursors or $PM_{2.5}$ emission levels would be produced from prescribed burning or harvest operations. Alternative A would not result in a reduction of surface fuels, so the potential for substantial degradation of air quality from future wildfire would not be reduced. Air quality can be severely impacted by particulate matter and other pollutants during large wildfire events. Impacts from the 2007 Moonlight fire on the Plumas National Forest, for example affected air quality over 100 miles away.

An example of the indirect effect of a wildfire was experienced during the 2008 Canyon Complex. The Complex started on June 20, 2008 on the Plumas National Forest, the fires burned through August, 2008. The diurnal wind flow caused smoke to be transported toward Quincy, California in the daytime and down canyon towards Oroville, California at night. During this time period according to the air quality index Plumas County experienced, 5 days in the unhealthy and 1 day in the unhealthy for sensitive groups categories, for $PM_{2.5}$ pollutants. Butte County reported 2 days in the unhealthy and 2 days in the unhealthy for sensitive groups categories for $PM_{2.5}$ pollutants. Given the topography and diurnal wind pattern in the project area similar effects could occur if a large fire started in the Grass Flat Project area.

The no-action alternative would not provide any opportunities for reducing existing forest fuels and the hazard they pose in wildland fires. During the flaming phase of a catastrophic wildfire, air quality degradation can exceed federal and state standards hundreds of miles downwind. The predicted $PM_{2.5}$ from a 2,010 acre (approximate project acreage) wildfire is 905 tons. Predicted ozone precursors, VOCs and NOx from a 2,010 acre wildfire are 546 tons and 193 tons respectively.

Cumulative Effects

Under Alternative A, the project area would be subjected to long-term deposition of surface fuels. Forest fuels would continue to increase with biomass production and would out-produce the decomposition rates in this climate.

The long-term chronic effects of wildfires could be higher $PM_{2.5}$ and ozone emissions that can affect the public welfare and health of asthmatics and others with sensitive respiratory systems.

Sources found to contribute ozone and $PM_{2.5}$ emissions to Mountain Counties Valley air basins include: fuel combustion, industrial processes, on road motor vehicles, other mobile sources, and natural sources, which include wildfires and miscellaneous processes, including but not limited to fugitive dust and managed fires, (retrieved from http//:www.arb.ca.gov, March, 2011).

Alternative B (Proposed Action) and Alternative B Modified (Preferred)

Direct and Indirect Effects

See Table 3-42 and Table 3-43 for the volume of predicted pollutants produced from Alternative B and Alternative B Modified. Alternative B Modified produces more emission than Alternative B because more material is piled and burned in the modified alternative.
The annual predicted criteria pollutant totals for timber operations (emissions from trucks and other equipment) and prescribed fire would vary according to the acres of mechanical treatment performed each day and amount of acres approved by AQMD for burning.

Table 3-42 Harvest emissions for Alternative B and Alternative B Modified

Criteria Pollutant	Alternative B	Alternative B Modified
$PM_{2.5}$	0.60 tons	0.49 tons
NOx	9.29 tons	7.63 tons
VOC	0.57 tons	0.48 tons

Table 3-43 Total prescribed burning emissions for Alternative B and Alternative B Modified

	Criteria Pollutant	Understory Burning	Pile Burning	Total
Alternative B (Proposed Action)	$PM_{2.5}$	320 tons	214 tons	534 tons
	NOx	49 tons	96 tons	145 tons
	VOC	140 tons	107 tons	247 tons
Alternative B Modified (Preferred)	$PM_{2.5}$	318 tons	276 tons	594 tons
	NOx	49 tons	139 tons	188 tons
	VOC	139 tons	124 tons	263 tons

In the event of a wildfire, the stands in the Grass Flat Project area that are treated would have less material to burn producing less particulate matter emissions than untreated areas.

The method of prescribed burning to accomplish fuel load reduction is understory and pile burning (piles created by machine and by hand). Hand piling will be used in sensitive plant habitat, along cut banks, or other steep pitches where mechanical equipment is not capable of maneuvering. Pile burning would be used to reduce both natural and activity-generated fuels.

The objective of pile burning would be to reduce fuel loading while protecting the residual over story trees from damage caused by heat and flames or damage from equipment. Pile burning will produce more particulate matter per acre than understory burning because the standing biomass will be cut and piled producing higher fuel loads. However, piled material is allowed to cure, and a portion of the pile is covered with a water proof barrier, so that piles can be ignited with lower fuel moistures, which ensures complete and efficient consumption.

The release of particulate matter into the air during prescribed burning can have adverse effects on visibility and public health. As described above, the volume of particulate matter is related to which burning method is used and the extent of the burning, typically the Feather River Districts burn no more than 100 acres per day of either piles or understory burning (see Table 3-44 for predicted daily emissions).

Table 3-44 Predicted daily emissions for prescribed burning

Criteria Pollutant	Understory Burning (100 acres)	Pile Burning (100 acres)
$PM_{2.5}$	37.38 tons	18.67 tons
NOx	5.78 tons	9.38 tons
VOC	16.39 tons	8.40 tons

Particulate concentrations are regulated through compliance with the California Air Resources Board (CARB) and local AQMDs. By following the required burn plan and the AQMD requirements for burning it is unlikely that emissions caused by the project would exceed California Air Quality Standards. The Forest is required to notify the AQMD prior to ignition of a prescribed fire; the AQMD in turn gives the Forest approval (or may not approve) to burn a certain amount of acres each day. Notifications of prescribed burning would be made through the North East Air Alliance (NEAA) to share burn information; such as type of burning, acreage, and predicted smoke path. This helps coordinate prescribed burning for multiple land management agencies, private landowners and air quality management districts. The goal of the agencies working together is less smoke impact to the public. Under favorable smoke-dispersal conditions, the smoke from prescribed burns would likely effect visibility and air quality during ignition and for approximately one to three days following ignition.

Another impact of the action alternative would be the emissions and dust caused by project activities. Fugitive dust caused by the use of unpaved roads can produce $PM_{2.5}$ in quantities great enough to impair the visual quality of the air. These affects are localized and can be mitigated by effective dust abatement methods.

Cumulative Effects

The $PM_{2.5}$ and ozone emissions from Alternative B or Alternative B Modified would contribute to criteria pollutant loading locally and regionally. Local effects include cumulative emissions from prescribed burning resulting from past practices, natural surface fuel buildup, and activities on federal, state, and private lands near the Grass Flat Project area. By following an approved smoke management plan the $PM_{2.5}$ and ozone atmospheric concentrations are not expected to exceed national or state standards; however, emissions could exceed CARB standards if (1) weather conditions predicted by CARB meteorologists do not prevail, or (2) emissions do not disperse as predicted, and/or (3) emissions from other Air Quality Management District's adversely impact air quality in local districts. Forest Service and

CARB smoke-dispersal forecasting would be used as part of the burn plan to mitigate effects within the regulatory framework.

Table 3-45 Total emissions for Alternative B and Alternative B Modified

Alternative B (Proposed Action)	Alternative B (Proposed Action	Alternative B Modified (Preferred)
Total $PM_{2.5}$	534.60 tons	594.49 tons
Total NOx	152.63 tons	195.63 tons
Total VOC	247.48 tons	263.48 tons

Alternative C (Non-commercial funding)

Direct and Indirect Effects

See Table **3**-46 for predicted pollutants produced from the mechanical treatment and harvest of Alternative C. There is less particulate matter generated from Alternative C because of the absence of group selections. The annual predicted criteria pollutant totals for timber operations (emissions from trucks and other equipment) and prescribe fire would vary according to the acres of treatment performed each year.

Table 3-46 Emissions from mechanical treatments in Alternative C

Alternative C (Non-commercial funding)	
$PM_{2.5}$	0.40 tons
NOx	6.26 tons
VOC	0.40 tons

Prescribe burn emissions generated in Plumas County (Mountain Counties air basin) can be found in Table 3-40.

Table 3-47 Total prescribed burning emissions from Alternative C

Alternative C (Non-commercial funding)	Criteria Pollutant	Understory Burning	Pile Burning	Total
Mountain Counties	$PM_{2.5}$	301 tons	307 tons	608 tons
	NOx	47 tons	154 tons	201 tons
	VOC	132 tons	138 tons	270 tons

There are slight variations in treatment acreages between the B alternatives and Alternative C because the primary fuels treatment replaces the group selection and there is approximately 50 to 100 acres more of hand cut grapple pile and burn treatment in alternative C.

In the event of a wildfire, the stands in the Grass Flat Project area that are treated would have less material to burn producing less particulate matter emissions than untreated areas.

Depending on market demand biomass may be transported from the area in the form of chips; total biomass removed is estimated at 13,926 bone dry tons or 6.6 tons per acre. Total predicted $PM_{2.5}$ emissions removed from the project area are 99.4 tons. If fuel loading does not meet the desired condition after the biomass removal then an understory burn is prescribed, this is predicted to produce fewer emissions because of the lighter fuel load.

The method of prescribed burning to accomplish fuel load reduction in Alternative C is pile burning (piles created by machine and by hand). Hand piling will only be used along cut banks or other steep pitches where mechanical equipment is not capable of maneuvering. Pile burning would be used to reduce both natural and activity-generated fuels. The objective of pile burning would be to reduce fuel loading while protecting the residual over story trees from damage caused by heat and flames or damage from equipment. Pile burning will produce more particulate matter per acre than understory burning because the standing biomass will be cut and piled producing higher fuel loads. However, piled material is allowed to cure and covered with barrier so that piles can be ignited with lower fuel moistures, which ensures complete and efficient consumption.

The release of particulate matter into the air during prescribed burning can have adverse effects on visibility and public health. As described above, the volume of particulate matter is related to which burning method is used and the extent of the burning. Particulate concentration in the Mountain Counties air basin (see) is influenced by climatic conditions and other emission-generating activities carried out in the air basin. Particulate concentrations are regulated through compliance with the California Air Resources Board (CARB) and local Air Quality Management Districts.

By following the required burn plan and the AQMDs requirements for burning it is unlikely that emissions caused by the project would exceed California Air Quality Standards. The Forest is required to notify the AQMD prior to ignition of a prescribed fire; the AQMD in turn gives the Forest approval (or may not approve) to burn a certain amount of acres each day. The goal of the agencies working together is less smoke impact to the public. Under favorable smoke-dispersal conditions, the smoke from prescribed burns would likely affect visibility and air quality during ignition and for approximately one to three days following ignition.
Another impact of the action alternative would be the emissions and dust caused by project activities. Fugitive dust caused by the use of unpaved roads can produce $PM_{2.5}$ in quantities great enough to impair the visual quality of the air. These effects are localized and can be mitigated by effective dust abatement methods.

Cumulative Effects

The $PM_{2.5}$ and ozone emissions from Alternative C would contribute to criteria pollutant loading locally and regionally. Local effects include cumulative emissions from prescribed burning resulting from past practices, natural surface fuel buildup, and activities on federal, state, and private lands near the Grass Flat Project area.

By following an approved smoke management plan the $PM_{2.5}$ and ozone atmospheric concentrations are not expected to exceed national or state standards; however, emissions could exceed CARB standards if (1) weather conditions predicted by CARB meteorologists do not prevail, or (2) emissions do not disperse as predicted, and/or (3) emissions from other Air Quality Management District's adversely impact air quality in local districts. Forest Service and CARB smoke-dispersal forecasting would be used as part of the burn plan to mitigate effects within the regulatory framework.

Table 3-48 Total Emissions for Alternative C

Alternative C (Non-commercial funding)	Total Emissions
Total $PM_{2.5}$	608.40 tons
Total NOx	207.26 tons
Total VOC	270.4 tons

Summary of Effects across all Alternatives

Alternative A is predicted to create the most $PM_{2.5}$ emissions in the event of a wildfire. Alternative B predicts the least emission because there is more mechanical thinning reducing the amount of material to be burned. The direct and indirect effects of Alternatives B, B Modified and C are similar because air quality regulations limit the amount prescribed burning allowed in the air district at one time.

Table 3-49 Predicted Emissions of Wildfire Compared to Action Alternatives

Criteria Pollutants	Wildfire (2,010 acres)	Alternative B (Proposed Action)	Alternative B Modified (Preferred)	Alternative C (Non-Commercial)
Total $PM_{2.5}$	905 tons	534.60 tons	594.49 tons	608.40 tons
Total NOx	193 tons	152.63 tons	195.63 tons	207.26 tons
Total VOC	546 tons	247.48 tons	263.48 tons	270.4 tons

*Acres treated in the Grass Flat Project boundary are approximately 2,010 acres; this table compares predicted emissions of a wildfire the size of the areas treated.

Forest Plan Consistency

Alternative A is not consistent with the HFQLG Act final EIS (1999) and the Plumas land management plan direction to reduce surface fuel load and decrease canopy cover density to reduce the threat of high intensity wildfires. Large wildfires increase criteria pollutants for short durations and can create visibility and health concerns to the public.

Alternatives B, B Modified and C are consistent with both the HFQLG Act final EIS (1999) and the Plumas land management plan direction of reducing the risk of high intensity wildfire. Both Alternative Bs and C follow the operating procedures in the Plumas land management plan and the HFQLG Act. In the development of treatments, alternatives to burning were considered depending on vegetation, degree of slope and resources of concern.

Other treatment considered to understory and pile burning during the environmental process are mastication, biomass removal, lop and scattering and no treatment. Alternatives were considered if they met the desired condition set by the 1999 HFQLG final EIS ROD as amended by the 2004 SNFPA final supplemental EIS ROD. Mastication was prescribed when slopes were less than 35 percent and impacts by mechanical equipment were deemed acceptable. Biomass removal fluctuates as an option depending on market value of chips, mileage to the closest facility accepting chips, and cost of removal of material (skyline versus tractor). Lop and scattering of material was considered when increases to surface fuel loading did not exceed the desired condition of surface fuel loading of ≤5 tons per acre of dead and down material less than 3 inches in diameter.

3.8 Botanical, Invasive Plants and Noxious Weeds

3.8.1 Introduction

The following section describes the project effects to special botanical resources (especially rare plants) and noxious weeds, in terms of Significant Issues raised in Chapter 1. This section on botanical resources and noxious weeds summarizes the analysis of Threatened, Endangered, Proposed, and Sensitive (TEPS) plant species (the Biological Assessment/Evaluation), Plumas National Forest Special Interest plant list (Watch List species), special habitats, and other botanical resources (the Botany Report), and noxious weeds and other invasive non-native plant species (the Noxious Weed Risk Assessment). Threatened, Endangered, Proposed, Sensitive (TEPS), and Special Interest plant species are generally referred to as rare plants in this section.

- Biological Assessment/Evaluation. A biological assessment/evaluation (BA/E) is prepared to determine if a project may affect any Forest Service Sensitive species or U.S. Fish and Wildlife Service (USFWS) Threatened, Endangered, or Proposed species. The purpose of the botany BA/E is to describe the effects of the proposed project on all Threatened, Endangered, Proposed, and Sensitive (TEPS) plant species of record for the project area. The complete report is available in the project planning files.

- Botany Report. The Botany Report describes the effects of the proposed project on plant species of the Plumas National Forest Special Interest Plant list (Watch List), special habitats, and other botanical resources. The Botany Report includes notes about revegetation with native species. This report is Appendix A to the Biological Assessment/Evaluation.

- Noxious Weed Risk Assessment. The Noxious Weed Risk Assessment is prepared in order to evaluate the effect of the proposed project on California Department of Food and Agriculture (CDFA) listed noxious weeds and other invasive non-native plant species. This report is Appendix B to the Biological Assessment/Evaluation.

- Botany Protection Plan. This report summarizes mitigation measures and project design parameters designed to reduce or eliminate project impacts to botanical resources and noxious weeds. This report is Appendix C to the Biological Assessment/Evaluation.

Four Forest Service Sensitive plant species and six Plumas National Forest Special Interest plant species are found within the project area. Project effects to these ten species are generally minor, if any, due to project design features and the botany protection plan, and will thus be only briefly mentioned in this section. All ten species are discussed and analyzed in detail in the Biological Assessment/Evaluation and Botany Report.

Small occurrences of two noxious weed species of management concern are found within the project area. These species and general management of noxious weeds in project implementation are briefly in this section. The risk of project activities spreading weeds into the project area is discussed along with a summary of standard weed control and prevention measures. A more detailed analysis is presented in the Noxious Weed Risk Assessment.

3.8.2 Analysis Regulatory Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant to the alternatives as they affect rare plants includes:

- Forest Service Manual and Handbooks (FSM/H 2670). Forest Service Sensitive species are plant species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that Sensitive plant and animal species do not become threatened or endangered and ensure their continued viability on National Forests. It is Forest Service policy to analyze impacts to Sensitive species to ensure management activities do not create a significant trend toward federal listing or loss of viability. This assessment is documented in a Biological Evaluation (BE) and is summarized or referenced in this Chapter.

- Sierra Nevada Forest Plan Amendment (SNFPA), Plant Surveys (USDA Forest Service 2004, 2005). Conduct field surveys for Threatened, Endangered and Sensitive plant species early enough in the project planning process that the project can be designed to conserve or enhance Threatened, Endangered and Sensitive plants and their habitat. Conduct surveys according to procedures outlined in the Forest Service Handbook (FSH 2609.25.1.11). The standards and guidelines provide direction for conducting field surveys, minimizing or eliminating direct and indirect impacts from management activities and adherence to the Regional Native Plant Policy (USDA Forest Service 2004).

- Plumas National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 1988). The LRMP provides management direction for all Plumas National Forest Sensitive plants; that direction is to "maintain viable populations of Sensitive plant species" (USDA Forest Service 1988, page 4-34). The LRMP also provides forest-wide standards and guidelines to:

- Protect Sensitive and Special Interest plant species as needed to maintain viability,

- Inventory and monitor Sensitive plant populations on an individual project basis, and

- Develop species Management Guidelines to identify population goals and compatible management activities/prescriptions that will maintain viability.

- Plumas National Forest Interim Management Prescriptions for TEPS and Special Interest Plants (USDA Forest Service 2007). Management guidelines have been developed for each TEPS and Special Interest plant species on the Plumas National Forest. This represents Forest Supervisor's direction to "ensure that these prescriptions are being applied appropriately to ensure compliance with our Land & Resource Management Plan."

- Direction relevant to the alternatives as they affect noxious weeds includes:

- Noxious Weed Assessment (FSM 2900). Evaluate the project effects on California Department of Food and Agriculture (CDFA) listed noxious weeds and other invasive non-native plant species. Assessment is in compliance with the Plumas National Forest Land and Resource Management Plan (USDA Forest Service 1988), the Herger-Feinstein Quincy Library Group Forest Recovery Act Final Environmental Impact Statement (USDA Forest Service 1999), the Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement Record of Decision (USDA Forest Service 2004), and the direction in the Forest Service Manual section 2900, Invasive Species Management (USDA Forest Service 2011; this superseded FSM section 2080, Noxious Weed Management, in December 2011).

- Forest Service Manual. Overall objectives in FSM 2900 involve management of aquatic and terrestrial invasive species based on an integrated pest management approach, prioritizing 1) prevention and 2) early detection and rapid response actions as necessary, as well as 3) control and management and 4) restoration.

  The FSM includes a policy statement calling for a risk assessment for invasive species to be completed for any proposed action. Some FSM 2900 policy statements particularly relevant to project planning are as follows:

1. Determine the risk of introducing, establishing, or spreading invasive species associated with any proposed action, as an integral component of project planning and analysis, and where necessary provide for alternatives or mitigation measures to reduce or eliminate that risk prior to project approval.

2. Initiate, coordinate, and sustain actions to prevent, control, and eliminate priority infestations of invasive species in aquatic and terrestrial areas of the National Forest System using an integrated pest management approach.

3. Ensure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the National Forest System, or to adjacent areas.

4. Use contract and permit clauses to require that the activities of contractors and permittees are conducted to prevent and control the introduction, establishment, and spread of aquatic and terrestrial invasive species.

5. Make every effort to prevent the accidental spread of invasive species carried by contaminated vehicles, equipment, personnel, or materials.

6. Establish and implement standards and requirements for vehicle and equipment cleaning to prevent the accidental spread of aquatic and terrestrial invasive species on the National Forest System or to adjacent areas.

7. Make every effort to ensure that all materials used on the national Forest System are free of invasive species and/or noxious weeds (including free of reproductive/propagative material).

- Noxious Weed Management. The Record of Decision (ROD) for the Herger-Feinstein Quincy Library Group (HFQLG) FEIS and the ROD for the SNFPA amend the management direction in the LRMP for the Plumas National Forest to address management of noxious weeds and invasive exotic weeds (page 2-9 of the HFQLG FEIS and pages 30-31 of Appendix A of the ROD for SNFPA). The noxious weed management standards and guidelines in Appendix A state that a noxious weed risk assessment needs to be conducted to determine the risks for weed spread associated with different types of proposed management activities. A risk assessment was conducted for the HFQLG FEIS and resulted in the following amended direction. Table 2.4 of the HFQLG FEIS states:

  Manage National Forest system lands so that management activities do not introduce or spread noxious or invasive exotic weeds using the following guidelines during site-specific planning and implementation:

1. Inventory. As part of site-specific planning, inventory project areas and adjacent areas (particularly access roads) for noxious and invasive exotic weeds.

2. Control. If noxious weeds are found in or adjacent to a site-specific project area, evaluate treatment options relative to the risk of weed spread without treatment. Evaluate control methods at the site-specific planning level.

3. Prevention/Cleaning. Require off-road equipment and vehicles (both Forest Service owned and contracted) used for project implementation to be weed-free. Clean equipment and vehicles of all attached mud, dirt and plant parts. Use standard timber sale contract clause C6.343-Cleaning of Equipment in timber sale contracts.

4. Prevention/Road Construction. Require all earth-moving equipment, gravel, fill or other materials to be weed-free. Use onsite sand, gravel, rock or organic matter, where possible. Evaluate road locations for weed risk factors.

5. Prevention/Revegetation. Use weed-free equipment, mulches, and seed sources. Avoid seeding in areas where revegetation will occur naturally, unless noxious weeds are a concern. Save topsoil from disturbance and put it back to use in onsite revegetation, unless contaminated with noxious weeds.

6. Prevention/Staging Areas. Do not stage equipment, materials, or crews in noxious weed infested areas where there is risk of spread to areas of low infestation.

3.4.3 Effects Analysis Methodology

Analysis Methodology

The geographic area of analysis for rare plants, noxious weeds, and other botanical resources is restricted to the project area of the Grass Flat Fuels Reduction Project because no direct or indirect effects to rare plants from this project are expected outside of the project boundary. The distribution of each rare plant species extends beyond the project area, and the distribution of each species is different. Most extend beyond the boundaries of the Feather River Ranger District and some extend beyond the Plumas National Forest. These distinct distributions are taken into account in the analysis of impacts to each species. Specifically, a threshold of concern has not been reached for any of the taxa analyzed.

A 20 year time frame was selected for analysis. The western slope of the Sierra Nevada in the Plumas National Forest has a high rate of vegetation establishment and growth due to high annual precipitation and productive forest soils. According to the Grass Flat Vegetation report this means that 20 years is the length of time in which vegetation can increase canopy closure, basal area, and tree density to a point where thinning would be needed again to maintain forest stand vigor, health, and growth. As a result this is the time period in which the forest may return to a condition where treatments such as those planned for

Data Sources

1. All Threatened, Endangered, Proposed, and Sensitive plant species (TEPS), Special Interest plant species, and noxious weeds known or believed to have potential to occur in the analysis area were identified. This process made use of three major data sources: the USDA Forest Service Region 5 Sensitive Species List (USDA Forest Service 2006), Plumas National Forest rare plant records and vegetation maps, and California Natural Diversity Database records (CNDDB 2011). In addition, for Threatened, Endangered, or Proposed plant species the U.S. Fish and Wildlife List for the land area of the Plumas National Forest (USFWS 2011) was reviewed.

2. The project area was surveyed for Threatened, Endangered, Proposed, and Sensitive plant species (TEPS), Special Interest plant species, and noxious weeds in 2010 and 2011 by USFS botanists. Botanical surveys focused on rare species with potential habitat. However, the surveys attempted to

identify all plants encountered in the field (i.e. surveys were floristic in nature). Many species have specific habitat preferences (such as serpentine outcrops or wetlands), and botanists searched for these habitats as well as their constituent species. The project area has been adequately surveyed for TEPS plant species, Special Interest plant species, and noxious weeds.

3. The Feather River Ranger District office maintains files of areas surveyed and plant species identified, plus detailed records of all TEPS, Special Interest, and noxious weed plant species found. Files are also stored in a Geographic Information System (GIS) format at the District office and in the nation-wide Forest Service Natural Resource Information System (NRIS). Location data in GIS for botanical resources were used to analyze proximity to treatment units and associated disturbances such as skid routes and landings. Potential benefits and detriments were determined from survey and GIS data and mitigations measures were subsequently developed.

3.4.4 Affected Environment

Threatened, Endangered, and Proposed plant species. No suitable habitat for Threatened, Endangered, or Proposed plant species is present in or near the project area. Thus, there was no need for formal or informal consultation with the USFWS.

Forest Service Sensitive plant species. Four Sensitive plant species are known from within the project area. These species are shown in Table 3-50.

Table 3-50. Forest Service Sensitive species located within the project area.

Species	Common Name	USFS Status[1]	Global Rank[2] / CA Rank[3]
Botrychium crenulatum	scalloped moonwort	Sensitive	G3 / 2.2
Bruchia bolanderi	Bolander's candlemoss	Sensitive	G 2/ 2.2
Lewisia kelloggii ssp. *hutchisonii*	Kellogg's lewisia	Sensitive	G4 / 3.3
Peltigera hydrothyria	waterfan	Sensitive	G4 / none

[1] USDA Forest Service 2006.
[2] Global Rank: G1- Critically Imperiled; G2- Imperiled, G3- Vulnerable, G4- Apparently secure, G5- Secure; T- Rank applies to a subspecies or variety (CNPS 2011, NatureServe 2011).
[3] CA Rank = California Rare Plant Rank (CRPR) (CNPS 2011): formerly called CNPS List, 1B- Plants Rare, Threatened, or Endangered in California and Elsewhere, 2- Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere, 3- Plants About Which We Need More Information, 4- Plants of Limited Distribution – A Watch List; formerly called CNPS Threat Rank, 0.1- Seriously threatened in California, 0.2- Fairly threatened in California, 0.3- Not very threatened in California.

Plumas National Forest Special Interest plant species. Six Special Interest plant species are known from within the project area. These species are shown in Table 3-51.

Table 3-51. Plumas National Forest Special Interest plant species located within the project area.

Species	Common Name	PNF Special Interest catgory[1]	Global Rank[2] / CA Rank[3]
Botrychium simplex	Little grape fern	Category 1	none
Clarkia mildrediae ssp. *lutescens*	golden-anthered clarkia	Category 1	G3T3 / 4.2
Drosera rotundifolia	round-leaved sundew	Category 2	G5 / CBR
Erigeron lassenianus var. *deficiens*	rayless Lassen daisy	Category 1	G3TNR / under review
Sidalcea gigantea	giant checkerbloom	Category 1[4]	under review
Viola tomentosa	Wooly violet	Category 1	G3 / 4.2

[1] USDA Forest Service 2007. Category 1- Survey and recommend conservation measures; Category 2- Report occurrences and recommend conservation measures.
[2] Global Rank: G1- Critically Imperiled; G2- Imperiled, G3- Vulnerable, G4- Apparently secure, G5- Secure; T- Rank applies to a subspecies or variety, NR- Rank Not Yet Assessed (CNPS 2011, NatureServe 2011).
[3] CA Rank = California Rare Plant Rank (CRPR) (CNPS 2011): formerly called CNPS List, 1B- Plants Rare, Threatened, or Endangered in California and Elsewhere, 2- Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere, 3- Plants About Which We Need More Information, 4- Plants of Limited Distribution – A Watch List; formerly called CNPS Threat Rank, 0.1- Seriously threatened in California, 0.2- Fairly threatened in California, 0.3- Not very threatened in California; CBR- Considered But Rejected.
[4] Hanson 2005. Dropped from the 2007 Plumas National Forest Special Interest list because the species was not yet described – it has been described since then (Clifton et al 2009). Under review for addition to the Special Interest list.

Noxious weed species. Four noxious weed species were located within or adjacent to the project area. These species are shown in Table 3. These species are discussed briefly below. There will be no further discussion of specific species of noxious weeds after this section.

Table 3-52. Noxious weed species located in or adjacent to the project area.

Species	Common Name	CDFA category[1]	Project implications
Cirsium arvense	Canada thistle	B-rated	In hand-cut pile-burn unit, Controlled Area to avoid
Cirsium vulgare	bull thistle	C-rated	not managed
Cytisus scoparius	Scotch broom	C-rated	In mastication unit, Controlled Area to avoid
Hypericum perforatum	Klamathweed	C-rated	not managed

[1] The California Department of Food and Agriculture's noxious weed list (CDFA 2010) divides noxious weeds into categories A, B, and C (CDFA 2011): A-listed weeds are those for which eradication or containment is required at the state or county level; B-listed weeds are those where eradication or containment is at the discretion of the County Agricultural Commissioner; and C-listed weeds require eradication or containment only when found in a nursery or at the discretion of the County Agricultural Commissioner.

Three CDFA C-rated noxious weed species (CDFA 2010) were located within the project area. Bull thistle (*Cirsium vulgare*) and Klamathweed (*Hypericum perforatum*) have scattered occurrences within the project area. However, these two species are not managed on the Plumas National Forest due to their common occurrence and their generally successful control within the state. These two species are not mapped or tracked on the Forest and there will be no control measures for them.

A third CDFA C-rated weed, Scotch broom (*Cytisus scoparius*) was located within a treatment. Only one plant was present and was pulled at the time of mapping. However, the plant was mature, with developing seed pods. Consequently, there is a high likelihood of seeds in the soil. Consequently, a 25 foot radius around the plant will be excluded from project-related disturbances through the use of a Controlled Area.

The CDFA B-rated weed Canada thistle (*Cirsium arvense*) was located in a treatment unit planned for hand-cut pile-burn treatment. This infestation has been hand-pulled once and the infested area will be avoided by project related disturbances.

3.4.5 Environmental Consequences

Forest Service Sensitive plant species. Table 4 shows the acres of each Sensitive plant species that will be affected by project activities. The acreage of each species affected by project activities is very small to none. Also, negative effects from the implementation of either action alternative will be verysmall to none. Within botany CAs there would be no ground disturbance and no burn piles, but hand-thinning may occur and underburns may pass into them.

Table 3-53. Summary of acres of Sensitive plant species within the project area, within treatment units, and within Controlled Areas (CAs).

Species	Acres in Project Area	Acres in Project Units	Acres in Groups	Acres in Controlled Areas (CAs)	Acres subject to ground disturbing activities
Botrychium crenulatum	0.40	0.40	0	0.40	0
Bruchia bolanderi	0.03	0	0	n/a	0
Lewisia kelloggii ssp. *hutchisonii*	3.81	1.04	0	1.04	0
Peltigera hydrothyria	0.10	0.10	0	0.10	0
Total acres	4.34	1.54	0	1.54	0

Plumas National Forest Special Interest plant species. Table 5 shows the acres of each Special Interest plant species that will be affected by project activities. Because the acreages affected by project activities are very small, or none, for most of Special Interest plant species, those species will not be discussed further in this section. For the woolly violet, the one Special Interest species with a greater acreage subject to potential ground-disturbing activities, Plumas National Management Prescriptions (USDA Forest Service 2007) would be implemented. This would occur in the design of protective measures (botany Controlled Areas), and in balancing the potential positive effects to the condition of the species' habitat as a result of Project activities with the potential negative effects of Project activities to some individual plants. See the Botany Report, Appendix A to the Biological Assessment/Evaluation for this Project, for an in-depth analysis.

Within botany CAs there would be no ground disturbance and no burn piles, but hand-thinning may occur and underburns may pass into them.

Table 3-54. Summary of acres of Special Interest plant species within the project area, within treatment units, and within Controlled Areas (CAs).

Species	Acres in Project Area	Acres in Project Units	Acres in Groups	Acres in Controlled Areas (CAs)[1]	Acres subject to ground disturbing activities
Botrychium simplex	0.12	0	0	n/a	0
Clarkia mildrediae ssp. *lutescens*	1.84	1.27	0	1.06	0.21
Drosera rotundifolia	0.19	0	0	n/a	0
Erigeron lassenianus var. *deficiens*	19.79	1.32	0	0.52	0.80
Sidalcea gigantea	0.71	0.71	0	0.71	0
Viola tomentosa	49.85	26.09	0	10.14	15.96
Total acres	72.50	29.38	0	12.43	16.97

Noxious weeds – Anticipated Weed Response Summary. With or without project implementation there is an overall *low potential* for weed spread, although somewhat higher with project implementation and the resulting ground-disturbing activities. However, project implementation with standard noxious weed control and prevention measures in place would result in a greatly reduced risk.

Forest Service Sensitive and Plumas National Forest Special Interest plant species. Various measures, principally botany Controlled Areas (CAs), for the protection of Sensitive and Special Interest plant species have been incorporated into the design of the Grass Flat project. These measures have reduced the potential impacts to Sensitive and Special Interest plant species to the low levels shown in Tables 4 and 5 above.

Botany Controlled Areas (CAs) would be avoided by ground-disturbing project activities. In general, activities within these CAs would be restricted to hand thinning and underburning. No burn piles would be placed within these CAs. The intent of these CAs is to avoid direct damage to plants and the soil structure (habitat) where they grow from the large machinery that will be used to implement many of the project treatments and to avoid the damage to plants that can occur from the intense heat produced by the burning of burn piles. Controlled Areas would be marked with suitable flagging and red Controlled Area tags ("flagged and tagged") prior to project layout and project implementation, and would be included on project layout and sale maps. In most cases, project activities to thin the forest in creation and management of DFPZs would improve habitat conditions for these rare plant species. These botany CAs comprise only minor portions of project planning units.

Noxious weed control and prevention measures. Botany Controlled Areas (CAs) would be established for the two noxious weed sites that are within Project treatment areas. These CAs would be marked with suitable flagging and red Controlled Area tags ("flagged and tagged") prior to project layout and project implementation, and would be included on project layout and sale maps.

Specific management for these CAs would be to keep all project activities out of them to prevent the spread of seed and other propagules to other areas.

It is standard practice on the Feather River Ranger District that the following general prevention measures are regularly implemented. Detailed noxious weed prevention measures are presented in the Biological Evaluation/Assessment Appendix B (Noxious Weed Risk Assessment) and Appendix C (Botany Protection Plan). Prevention measures are summarized here:

- Clean all ground disturbing equipment, such as masticators, harvesters, and other off-road equipment before entering National Forest System land,
- Use weed free fill and mulch, and
- Avoid staging equipment on or immediately adjacent to noxious weed sites.

Summary of Effects across all Alternatives

The Effects Determination discussed here is based on professional experience and judgment, existing information, including existing condition of the analysis area, and the potential impacts of the alternatives. An effects determination is also the culmination of potential direct, indirect, and cumulative effects. The formal process of making an effect determination only applies to Threatened, Endangered, Proposed, or Sensitive species.

Alternative A (no action):

__X__ Will not affect: *Bruchia bolanderi* and *Peltigera hydrothyria.*

Reasons:

- No change to habitat in absence of the Project's forest thinning activities and reduction of wildfire susceptibility.

__X__ May impact individuals but not likely to cause a trend toward federal listing or loss of viability: *Botrychium crenulatum* and *Lewisia kelloggii* ssp. *hutchisonii*

Reasons:

- Habitat becomes less suitable for these species without activities to thin the forest and limit forest encroachment on natural openings.
- Habitat remains prone to catastrophic wildfire.

Alternatives B and C (action alternatives):

__X__ Will not affect: *Bruchia bolanderi* and *Peltigera hydrothyria.*

Reasons:

- No project related activities will impact known occurrences of these rare taxa.

__X__ May impact individuals but not likely to cause a trend toward federal listing or loss of viability: *Botrychium crenulatum* and *Lewisia kelloggii* ssp. *hutchisonii*

Forest Plan Consistency

Implementation of the Grass Flat Fuels Reduction Project will improve habitat for the Sensitive species *Lewisia kelloggii* ssp. *hutchisonii* and for the Special Interest species *Clarkia mildrediae* ssp. *lutescens*, *Erigeron lassenianus* var. *deficiens*, and *Viola tomentosa*. The trade-off between potential impacts to some individual plants, and improving and maintaining suitable habitat for them, is squarely in favor improving and maintaining suitable habitat. Negative effects are decreased through the use of Controlled Areas and project prescriptions; plants are likely to respond positively to project activities that thin the forest.

Noxious weeds. A noxious weed risk assessment has been conducted as outlined in the amendments to the Plumas National Forest Land and Resource Management Plan. Noxious weed prevention measures are implemented as a standard practice on the Feather River Ranger District. Standard management requirements (SMRs) would be incorporated into project design and implementation.

Reasons:

- Adequate surveys have been performed in the Grassflat project area.
- Mitigation measures have been incorporated into the project design and treatment prescriptions to minimize or eliminate negative impacts to these species.
- *Botrychium crenulatum* and *Lewisia kelloggii* ssp. *hutchisonii* will be protected from all ground-disturbing project activities through the use of Controlled Areas or other exclusions; prescribed underburn may affect some plants.

3.9 Economics

3.9.1 Introduction

The social and economic environment of the Plumas National Forest is described in the Forest's 1988 LRMP, as amended by the 1999 HFQLG FEIS and ROD; the 2003 HFQLG FSEIS and ROD; and the 2004 SNFPA FSEIS and ROD.

The HFQLG *Forest Recovery and Economic Stability Act of 1997* requires the Secretary of Agriculture to implement a pilot project on federal lands within the Plumas National Forest, Lassen National Forest, and the Sierraville Ranger District of the Tahoe National Forest in California. The project is designed to maintain ecological integrity, community stability, and forest health. In addition, the Secretary shall use the most cost-effective means in conducting the pilot project.

This economic analysis is not designed to model all the economic factors used in an intensive and highly complex timber sale appraisal process. This economic analysis takes a less complex, but consistent and systematic approach to display the relative differences in financial efficiency (i.e., relevant revenues and costs) between the alternatives being proposed in the environmental analysis.

3.9.2 Analysis Regulatory Framework: Statute, Regulation, Forest Plan, and Other Direction

The geographic boundary for the social and economic analysis for the HFQLG Pilot Project encompasses the counties located within the core and peripheral areas (HFQLG FEIS, appendix S, p. S-7; map 11). The core area of the HFQLG region contains the three counties of Lassen, Plumas, and Sierra. The peripheral area of the HFQLG region contains five counties that surround the core area. These counties are Butte, Nevada, Shasta, Tehama, and Yuba. The focus of the socioeconomic analysis is on 41 communities within the HFQLG region (HFQLG FEIS, appendix T, table T-1). The Grass Flat Project is part of the HFQLG Pilot Project and this economic analysis will be based on the incremental effect of the Grass Flat Project within the HFQLG Pilot Project region.

As stated above, this economic analysis will not revisit the information presented in the HFQLG FEIS, but will focus only on the time frame associated with implementing fuels reduction treatments for the Grass Flat Project. The time frame for completing the timber harvest removal would take approximately 4 to 5 years.

3.9.3 Effects Analysis Methodology

Analysis Methodology

Timber harvest values used in this assessment were based on the California State Board of Equalization, Timber Harvest Values, beginning January 1, 2012 through June 30, 2012. Harvest costs and road improvement costs were developed from the latest timber sale appraisals values. Manual (hand cutting, hand piling, etc.), and prescribed fire (underburning, pile burning) treatments are based on the latest service contract prices, Knutson-Vandenberg (KV) and brush disposal (BD) sale area improvement plans.The Plumas National Forest (the Forest) contributes to the regional economy in two primary ways: (1) through the generation of income and employment opportunities for residents of the immediate area, and (2) through direct and indirect contributions to local county revenues. The Forest also contributes in secondary ways, such as through production of goods and services in local and regional markets. Although some economic effects are dispersed over a broad area, the most substantial impacts are felt locally in Butte, Plumas, Lassen, Sierra, and Yuba Counties. The percentage of Plumas National Forest land in local counties is shown in table 3-70.

Table 3-55. Percentage of Plumas National Forest system lands by county.[a]

County	County Acres	Beckwourth Ranger District (ac)	Feather River Ranger District (ac)	Mount Hough Ranger District (ac)	Total PNF[b] Land in County (ac)	PNF[b] Land within County (percent)
Butte	1,072,708	0	143,517	0	143,517	13.4
Lassen	3,022,136	39,686	0	1,635	41,320	1.4
Plumas	1,672,778	448,365	183,210	579,196	1,210,771	72.4
Sierra	615,514	14,794	33,522	0	48,316	7.8
Yuba	411,695	0	33,734	0	33,734	8.2
Totals	6,794,830	502,844	393,984	580,831	1,477,659	21.7

Notes:
a. Based on Geographic Information System (GIS) data.
b. PNF = Plumas National Forest.

The two employment sectors most related to forest planning processes are the timber industry and tourism. Both, however, are very difficult to quantify in terms of total employment and their relative importance to local economies as state and federal employers generally do not break down employment data into these categories.

Forest contributions to local county revenues come from three sources: (1) Payment in Lieu of Taxes, (2) timber yield taxes, and (3) *Receipt Act* payments or payments from the *Secure Rural Schools and Community Self-Determination Act* of 2000. Of these, *Receipt Act* or *Secure Rural Schools and Community Self-Determination Act* payments are by far the most significant, in terms of total contributions to each county, and therefore are most likely to be affected by Forest land management decisions.

Payment in Lieu of Taxes. Payments in Lieu of Taxes are administered by the Bureau of Land Management and apply to many different types of federally-owned land, including National Forest System lands. Payments in Lieu of Taxes payments compensate counties for the loss of property tax revenues due to non-taxable federal land within the county. Payments are made annually and are based on local population, Federal acreage in the county, and other federal payments during the preceding fiscal year. The minimum payment is 75 cents per entitlement acre. The funds may be used by the county for any purpose. The Forest has no control over the disbursement of these funds, and the amount disbursed every year is unaffected by Forest land management decisions.

Timber Yield Taxes. The second source of revenues to local government is the timber yield tax, administered by the State Board of Equalization. This tax is not paid by the Forest. Instead, it is paid by private timber operators, based on the amount of timber harvested in a given year on both private and public lands. The tax is 2.9 percent of the value of the harvested timber. The taxes are collected by the State, and approximately 80 percent is returned to the counties in which the timber was harvested. Decisions about the amount of timber to be offered for sale each year on the Forest can affect the amount of revenues disbursed to the counties.

Receipt Act. *Receipt Act* payments are distributed pursuant to the *National Forest Management Act* (Public Law 94-588). Under this law, 25 percent of National Forest revenues are allocated to the State in which the Forest is situated. The amount returned is based on the National Forest acreage within each county. According to State law, *Receipt Act* funds must be divided evenly between public schools and

public roads of the county or counties in which the National Forest is located, and may not be spent on anything else.

Receipt Act payments are based on 25 percent of the total revenues collected from timber, grazing, land use, recreation, power, minerals, and user fees. Within the eleven western states, however, payments are based on 50 percent of revenue from grazing. Historically, at least 90 percent of total revenues have come from timber sale receipts. As a result, the amount of money available for distribution each year fluctuates widely, depending on the amount of timber harvested on National Forests.

Secure Rural Schools and Community Self-Determination Act. Congress passed the Secure Rural Schools and Community Self-Determination Act in 2000, offering counties an alternative to the Receipt Act. Under the Receipt Act, a state's three highest payment amounts between 1986 and 1999 are averaged to arrive at a "compensation allotment" or "full payment amount." A county may choose to continue to receive payments under the Receipt Act or to receive its share of the state's full payment amount under the Secure Rural Schools and Community Self-Determination Act. Full payment amounts for Butte, Lassen, Plumas, Sierra, and Yuba Counties for years 2001-2011 are shown in table 3-71.

Table 3-56**.** Secure Rural Schools and Community Self-Determination Act full payment amounts to counties for years 2001 - 2011.

Year	Butte	Lassen	Plumas	Sierra	Yuba	Totals
2001	$866,419	$3,751,241	$7,024,648	$1,788,350	$231,268	**$13,661,926**
2002	$873,350	$3,781,250	$7,080,847	$1,802,657	$233,118	**$13,771,222**
2003	$883,830	$3,826,626	$7,165,816	$1,824,289	$235,915	**$13,936,476**
2004	$895,320	$3,876,372	$7,258,972	$1,848,005	$238,982	**$14,117,651**
2005	$915,912	$3,965,528	$7,425,928	$1,890,509	$244,479	**$14,442,356**
2006	$925,071	$4,005,183	$7,500,187	$1,909,414	$246,924	**$14,586,779**
2007	$923,173	$3,996,963	$7,484,795	$1,905,495	$246,417	**$14,556,843**
2008	$832,565	$3,604,665	$6,750,168	$1,718,472	$222,231	**$13,128,101**
2009	$749,308	$3,244,198	$6,075,151	$1,546,625	$200,008	**$11,815,290**
2010	$675,302	$2,923,783	$5,475,136	$1,393,872	$180,254	**$10,648,347**
2011	$536,109	$2,321,134	$4,346,602	$1,106,567	$143,100	**$8,453,512**

Counties can receive variable, revenue-dependent payments under the Receipt Act or receive stable funding for local schools and roads under Secure Rural Schools and Community Self-Determination Act. The legislation promotes local involvement, decisions, and choice by creating well-balanced resource advisory committees that recommend forest projects to the Secretary of the USDA, or advise counties on county project proposals. Counties that elect to receive the full payment amount under Secure Rural Schools and Community Self-Determination Act and receive more than $100,000 are required to allocate 15 to 20 percent of their funding to projects under Title II or Title III.

Like traditional 25 percent funds, Title I funds are expended for public school and roads. Title II funds are allocated for projects on federal lands or projects that benefit federal lands. Resource Advisory Committees are established to determine Title II fund distribution. Title III funds are allocated for county projects that include search and rescue, community service work camps, easement purchases, forest-related education opportunities, fire prevention and county planning, or cost-share for urban community forestry projects. Secure Rural Schools and Community Self-Determination Act Title I, II, and III funds for 2011 for the five counties containing Plumas National Forest System lands are shown in table 3-72.

Table 3-57**.** Secure Rural Schools and Community Self-Determination Act Title I, II, and III payment amounts to counties for year 2011.

County	Full Payment Amount	Title I Funds	Title II Funds	Title III Funds
Butte	$536,109	$428,887	$69,694	$37,528
Lassen	$2,321,134	$1,972,964	$185,691	$162,479
Plumas	$4,346,602	$3,694,612	$347,728	$304,262
Sierra	$1,106,567	$940,582	$127,255	$38,730
Yuba	$143,100	$121,635	$0	$21,465
Total	**$8,453,513**	**$7,158,680**	**$730,368**	**$564,464**

Authority for the Forest Service to make the payments under the Secure Rural Schools and Community Self-Determination Act (SRSCSD) expired at the end of fiscal year (FY) 2006. Public Law 110-28, the Iraq Accountability Appropriations Act of 2007, was signed into law on May 25, 2007 and extended provisions of the Act for one more year. The proposal to utilize land sales to partially fund Secure Rural School payments was not included in the President's FY 2009 Budget request to Congress.

On October 3, 2008, the Secure Rural Schools and Community Self-Determination Act of 2000 was reauthorized as part of Public Law 110-343. The new Secure Rural Schools Act has some significant changes. To implement the new law, the Forest Service requested states and counties to elect either to receive a share of the 25-percent rolling average payment or to receive a share of the Secure Rural Schools State (formula) payment. A county electing to receive a share of the State payment that is greater than $100,000 annually was required to allocate 15 to 20-percent of its share for one or more of the following purposes: projects under Title II of the Act; projects under Title III; or return the funds to the Treasury of the United States. The Act terminated in September 30, 2011, and if funds not obligated by September 30, 2012 they must be transferred to the Treasury.

Congress is currently in the process of extending the county payments for another year. If the Secure Rural Schools Act is not renewed, payments to counties would revert to the old systemin which counties receive 25 percent of timber revenues. The result could be reduced payments to counties.

3.9.4 Affected Environment

Recreational and Tourism

Recreation opportunities in the forest areas surrounding the town of La Porte contribute to the economic vitality of the community and Plumas County in general. These opportunities are seasonal in nature, but occur year-round and take advantage of the natural forest and lake settings, the presence of historic and cultural remnants and unique scenery. Recreation opportunities include camping, fishing, boating, hiking, mountain bike and OHV trails, scenic auto tours, hunting, snowmobiling and cross country skiing.

Several major recreation features exist within the project area boundary that contribute significantly to the Forest, town and county in significant fashion. The first feature is Little Grass Valley Reservoir, a recreation area with 8 campgrounds and more than 300 campsites, three boat ramps, two swimming beaches and hiking trails (table 3-73). The recreation area is open for approximately 4 months and

generates in the range of $130,000-$160,000 in recreation fee revenue annually. Ninety five percent (95%) of the fee collected will stay on the District to manage and improve the facilities.

Table 3-58. Little Grass Valley Reservoir Campgrounds and Number of Camp Sites.

Little Grass Valley Reservoir Campgrounds	Number of Camp Sites
Horse Camp	10
Black Rock Tent	20
Running Deer	40
Red Feather	60
Little Beaver Campground	120
Peninsula Tent	25
Wyandotte	28
Toom's Vehicle Camp	20
Totals	323

The next major recreation feature contributing economically to the Forest, town and county, is the Pacific Crest Trail that has regional and national significance to the backcountry and scenic hiking constituency including equestrians. The town is used as a resupply location for through-hikers what need food, supplies and a shower.

The forest road network surrounding the reservoir and extending east toward Onion Valley provide the foundation for the winter snowmobile program. This program leverages $22,000 of State of California OHV funding, Feather River Ranger District appropriated funds with generous volunteer labor hours and private equipment contributions.

Further contributions to the Forest budget, town of La Porte and Plumas County, include the revenues and taxes paid by outfitter guides that have special use authorizations to operate fishing and hunting guide services at Little Grass Valley Reservoir and in the general forest surrounding the lake and La Porte. Again, 95% of the fee collected from the guides, stays on the Feather River District and Plumas National Forest.

Little Grass Valley Reservoir and the surrounding historic mining sites draw tourism visitors who also choose to stay in cabins and the hotel in La Porte, contributing to the local economy by purchases of gasoline, groceries, meals at restaurants, and accommodations. These expenditures again, contribute to Plumas County's tax revenue stream.
Over the past 15-20 years, the revenue also contributed income to Plumas County in the form of transit occupancy tax (TOT). TOT is tax generated from overnight visitor stays in commercially operated hotels, motels, campgrounds, etc. Beginning in 2012, the Forest will be operating the facility and the revenue generated will be spent on salaries for management staff, staff housing, operating expenses and specific site improvements.

3.9.5. Environmental Consequences

Relative to the local economy, there is a potential to harvest 1.0 - 3.8 million board feet (mmbf) of timber over several years as part of the Grass Flat Project. Plumas County can expect to receive 25 percent of the revenues generated from this fuels reduction project through the Receipt Act or receive full payment from the Secure Rural Schools and Community Self-Determination Act. Approximately 100 percent of the Grass Flat Project area is located within Plumas County. Employment opportunities would be created from the fuels reduction activities. Furthermore, indirect and induced economic employment and monies

would be generated when income received by contractors and the timber industry is re-spent within the local economy.

Economic consequences are a measure of the overall value of the four alternative management scenarios considered in this analysis. The level and mix of goods and services available to the public varies by alternative, resulting in a range of impacts on the social and economic environment. The impacts discussed in this section include estimated government expenditures and revenues, as well as monetary impacts on local communities.

Direct monetary impacts are discussed in terms of net cash value to the U.S. Treasury, including the costs associated with implementing the treatments and direct, indirect, and induced job opportunities. In general, the monetary value of proposed alternative depends on the amount and method of timber harvest and the acreage planned for fuels reduction treatments. Fuels reduction treatment costs that exceed harvest revenues would be financed through appropriated funds. Fuel reduction treatments would be implemented through service contracts.

Employment—Employment opportunities can have direct, indirect, or induced effects on the local economy. Direct effects are associated with the primary producer. For example, the manufacturing of lumber from the Grass Flat Project has a direct effect on employment opportunities. Indirect effects account for employment in service industries that serve the lumber manufacturer. These industries may include logging, trucking, fuel supplies, etc. Induced effects are driven by wages. Wages paid to workers by the primary and service industries are circulated through the local economy for food, housing, transportation, and other living expenses. The sum of direct, indirect, and induced effects is the total economic impact in terms of jobs. This typically ranges from 10 to 15 jobs per mmbf harvested.

Revenue to the Government—Net revenue is the difference between the revenues generated by an alternative and the costs required to implement the alternative. In this analysis, revenues come from harvest of timber, and when appropriate, chips or fuelwood.

Payments to Counties—Local counties receiving payment through the *Receipt Act* rather than the *Secure Rural Schools and Community Self-Determination Act* would share part of the revenues generated from the timber harvest. Actual payment amount depends on estimated stumpage value and the price bid by the purchaser awarded the timber sale contract.

Treatment Costs—Treatment or management costs include those costs associated with timber harvesting, biomass removal, road improvements, fuels treatments, and mitigation measures requirements, as well as costs of resource enhancement measures not associated with the sale of timber. Costs vary widely depending on the amount of mechanical, manual, or thermal treatments prescribed; the board feet of sawlogs or tons of biomass removed per acre; and the accessibility of the treatment units.

Non-Priced Costs and Benefits—It would be noted that all costs and values are not represented in the economic analysis. Calculations do not include costs and values for those items that cannot be estimated in dollar terms. The economic analysis does not take into account non-priced benefits such as improved long-term wildlife habitat, improved watershed conditions, and reduced fire hazard. Examples of costs not estimated in dollar terms are the reduction in scenic value in the early years of fuels treatments, air pollution due to wildfire, or reestablishing a forest following a stand-replacing wildfire.

For a detailed discussion of these non-priced benefits and costs, refer to the appropriate resource section in this document. These non-priced benefits and costs will be considered along with the net economic value of each action alternative in order to make a judgment as to which treatment option offers the best overall mix of costs and benefits to society.

No Action Alternative A

Direct and Indirect Effects - Economic Stability

This alternative would not improve forest health, reduce critical fuel loadings or harvest any timber. No funds would be generated for the Treasury or returned to local counties. No additional employment opportunities or wages paid to the primary and service industries employees would be circulated through the local economy.

Under the no-action alternative, fuel reduction activities would not take place. In addition, dense standing trees and high fuel loading in the Grass Flat Project area would continue to pose a high fire hazard to the surrounding areas. If the no-action alternative were implemented, additional money would be needed to remove hazard trees that pose a safety concern for camp sites, conduct any fuel reduction treatment, as well as possible elevated fire suppression costs would a wildfire occur in the Grass Flat Project vicinity.

Alternatives B, B-Modified, and C

Direct and Indirect Effects on Economic Stability

Table 3-74 summarizes the economic impacts of alternatives in terms of employee jobs and employee related income on the local economy.

Fuel reduction, thinning, and group selection treatments for alternative B, would directly generate 43 full-time employment opportunities, compared to 37 for alternative B-Modified or 28 for alternative C. There is no group selection harvest in alterantive C. All action alternatives would create additional employment opportunities in service industries (such as logging supply companies, trucking companies, and fuel suppliers) that serve the timber industry. There would also be an induced effect driven by wages. Wages paid to workers by the primary and service industries would be circulated through the local economy for food, housing, transportation, and other living expenses.

The sum of direct, indirect and induced effects is the total economic impact in terms of jobs. In addition to the direct employment that would result from the timber harvest and fuel reduction treatments in the action alternatives, there would be some additional benefits to the local economy as wages earned by those employees are spent on living expenses. Alternative B would generate an estimated 92 direct, indirect, and induced jobs, compared to 82 by alternative B-Modified, or 64 by alternative C

Table 3-59. Comparison of Employment and Income by Alternative.

Revenue/Cost/ Employment	Alternative A	Alterntive B	Alternative B-Modified	Alternative C
Direct jobs	0	43	37	28
Indirect jobs	0	49	45	36
Total direct and indirect jobs	0	92	82	64
Total employee related income	0	$3,973,509	$3,524,345	$2,746,329

Net harvest revenues for sawlog thinning options would generate $17,823 for alternative B, $59,836 for alternative B-Modified, and a negative $94,452 for alternative C (table 3-75). Implementation of fuel reduction treatments such as mastication, grapple piling, and hand cutting for alternative B would cost $710,777, compared to $791,064 for alternative B-Modified or $1,103,702for alternative C.
The project value for all alternatives is negative, with alternative B having the least negative value. However, the economic analysis does not take into account non-priced benefits such as reduced fire hazard and potential losses to property and other resources (botany, heritage, wildlife, and so forth) as described in this document.

Table 3-60. Comparison of Economic Revenues and Costs by Alternative.

Revenue/Cost/ Employment	Alternative A	Alterntive B	Alternative B-Modified	Alternative C
Sawlog and biomass harvest revenues	$0	$594,588	$395,763	$100,031
Harvest costs	$0	-$576,765	-$335,926	-$194,483
Net harvest revenues	$0	$17,823	$59,836	-$94,452
Non-harvest costs (DFPZ construction)	$0	-$728,600	-$850,900	-$1,009,250
Total project value	$0	-$710,777	-$791,064	-$1,103,702

During project implementation, economic impacts will affect campground revenues in the summer only. Snowfall and snow depths prohibit project activity during winter months. The snowmobile program would continue to operate and the revenue generated would continue as well with no impacts to the program or revenue generated from tourism during the winter months.

During late summer and early fall implementation, project activities within the recreation area will be scheduled as late in the season as possible, preferably after labor day. If conducted after Labor Day, impacts to campgrounds and revenues will amount to approximately $4,500 to $5,500 per week which equates to 60 campsites filled at only 30 to 40 percent capacity. However this loss of capacity can be accommodated at the other open campgrounds. No impacts to private sector revenues would occur as a result of these operations.

Economic impacts to the forest, local community and county would increase dramatically, if conducted during the summer peak season. Average daily revenue for a 60 site campground is approximately $1,400 per day. Loss of revenue for a week is in the range of $5,800 to $7,500. These projections would represent losses from only the immediately affected campground, however additional losses are expected in adjacent campgrounds due to noise, congestion and loss of peaceful setting. Projected campground revenue losses would be in the estimated range of $12,000 to $15,000 per week.
Private revenues would increase 1,000 percent over winter revenues (telecommunication with La Porte Store). It is assumed that similar increases occur with cabin rentals, restaurants and gasoline sales. Obviously, project work conducted during the peak summer season would impact private ventures in similar fashion and scope to the forest revenues losses at the affected and adjacent campgrounds.

Alternatives A, B, B-Modified, and C

Cumulative Effects on Economic Stability

The no-action alternative would have a negative cumulative impact on local industries dependent on Forest Service contract work or a steady supply of timber, as well as counties that use the timber yield taxes to fund county programs. These local industries would lack opportunities or business that would be provided from fuels reduction, site preparation or timber harvest activities associated with the Grass Flat Project. The local economy also would not benefit from associated employment, such as in food, lodging, and transportation businesses.

Throughout northern California, cumulative years of reduced timber harvesting activities (including those on federal lands) have resulted in the loss of infrastructure (i.e., local mill closures) to complete such activities. Loss of this infrastructure could significantly reduce or eliminate future economic and environmental opportunities generated by the removal of forest products from national forest lands. Fuel reduction activities in the creation and maintenance of DFPZs would not occur thereby further negating opportunities for long-term employment and rural community stability.

The cumulative effects of the action alternatives (B, B-Modified, and C) would include increased overall economic activity in the HFQLG Pilot Project area. Though it is not a requirement, it is assumed in this analysis that most products from HFQLG projects will be processed locally due to high hauling costs of products and equipment. Likewise, it is also assumed most employment will be derived from Butte, Lassen, Plumas, Sierra and Yuba counties. The Grass Flat timber sale revenues and service contract employment would complement all other HFQLG-funded projects across the forest. Economic goals for the project as a whole across the Pilot Project area are discussed in the HFQLG FEIS. There are no irreversible or irretrievable effects on the economic environment.

Summary of Cumulative Effects on Economic Stability

This economic analysis is focused on those revenues and treatment costs associated with implementing fuel reduction treatments within the Grass Flat Project area.

Implementation of the no-action alternative would have a negative impact on local industries dependent on service contracts or a steady supply of timber, as well as counties that use timber yield taxes to fund county programs. Loss of infrastructure (i.e., closure of local mills or biomass plants) would continue with no timber harvests. If the no-action alternative were implemented, additional funds would be needed in order to conduct fuel reduction treatments.

Cumulative effects would also include the economic benefits of reducing potential of uncontrollable wildfire through thinning treatments. Although it is difficult to predict exact costs of future wildfires, not knowing future fire weather conditions, fire start locations, and so forth, the investment of doing fuels activities has been shown to be positive in time with the onset of future wildfire. Mason et al. (2006) estimate approximately 70 percent positive benefit to cost ratio for fuels reduction activities.

3.10 Heritage

3.10.1 Introduction

The National Environmental Policy Act (NEPA) requires the Federal Government to preserve important historic and cultural aspects of our national heritage. To accomplish this, federal agencies utilize the Section 106 process associated with the National Historic Preservation Act (NHPA). The NHPA sets forth a framework for identifying and evaluating historic properties, and assessing effects to these properties. This process has been codified in 36 CFR 800. In order to help streamline the above mentioned regulatory framework the Forest Service in California has developed a Programmatic Agreement between the California State Historic Preservation Office and the Advisory Council on Historic Preservation (USFS 2001).

3.10.2 Analysis Regulatory Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant and specific to the Alternatives as they affect cultural resources includes:
National Historic Preservation Act (NHPA). The Forest Service is directed to identify, evaluate, treat, protect, and manage historic properties by several laws. In 1966, Congress declared it to be our National policy that the federal government "administer federally owned, administered, or controlled prehistoric and historic resources in a spirit of stewardship for the inspiration and benefit of present and future generations" (*National Historic Preservation Act* [NHPA] (16 USC 470-1(3)).

- The NHPA of 1966 performs three actions: 1). It extends the policy in the *Historic Sites Act of 1935* (49 Stat. 666; 16 U.S.C. 461-467) to include resources that are of State and local significance; 2). It expands the NRHP, and; 3). It establishes the Advisory Council on Historic Preservation (ACHP) and State Historic Preservation Officers.
- NHPA Section 106 directs all federal agencies to take into account effects of their undertakings (actions, financial support, and authorizations) on properties included in or eligible for the National Register. The ACHP regulations (36 CFR 800) implement NHPA Section 106. NHPA Section 110 sets inventory, nomination, protection, and preservation responsibilities for federally-owned historic properties.
- Executive Order 11593: *Protection and Enhancement of the Cultural Environment*, issued May 13, 1971, directs federal agencies to inventory cultural resources under their jurisdiction, to nominate to the NRHP all federally owned properties that meet the criteria, to use due caution until the inventory and nomination processes are completed, and to assure that federal plans and programs contribute to preservation and enhancement of non-federally owned properties.
- Region 5 Section 106 Compliance Programmatic agreement (36 CFR 800.14(b)) provide procedures for complying with 36 CFR 800. In California the Forest Service has developed a Programmatic Agreement between the California State Historic Preservation Office and the Advisory Council on Historic Preservation that developed standard resource protection measures for projects on National Forest System lands (USFS 2001).
- The National Environmental Policy Act (NEPA) requires the Federal Government to preserve important historic and cultural aspects of our national heritage. To accomplish this, federal agencies utilize the above mentioned Section 106 process associated with the National Historic Preservation Act (NHPA).

3.10.3 Effects Analysis Methodology

Analysis Methodology

The current project area has been surveyed on thirty-five occasions the first occurring in 1975 and the last in 2010. The combined coverage of these surveys covers all treatment areas and areas of potential ground disturbing effects (such as landings, water holes and logging systems) within the project area.

The archaeological surveys within the project area have recorded twenty-six sites, located in or near project units. Seven of the sites are historic, eighteen are Native American and one site has both historic and Native American artifactszz777. None of these sites have been evaluated for the National Register of Historic Places (NRHP), thus all will be treated as potentially eligible for the Register.

As set forth in the Region 5 Section 106 Compliance Programmatic Agreement, (USDA 2001), archaeological sites that have been evaluated against and found to be significant under the National Register of Historic Places Criteria or sites that have not yet had their significance determined, must be protected from project activities and potential damage that could be inflicted by the implementation of the project.

- Direct Effect is or could be caused by proposed hazardous fuels reduction and vegetative treatments or the consequences of such action, including physical damage resulting from tree felling and use of heavy equipment (crushing and/or displacement) and prescribed burning (scorching and cracking caused by excessive heat).
- Indirect Effect to sensitive archaeological resources could occur, particularly where artifacts lie in proximity to proposed treatment areas.

3.10.4 Affected Environment

Prehistoric Background

9000 BC to 6000 BC is the first period that shows evidence of use for the northern Sierra and Southern Cascade Mountains. This period is represented in the Sierra Cascade area by unprovenienced fluted points recovered in Big Meadows (Pippen & Hattori 1980), a Parman point near Lake Davis and Great Basin Stemmed points at Bucks Lake (Kowta 1988). Two possible Parman points were identified at Dead Man's Cave on Mill Creek (Greenway 1982). The Deadman deposit was mixed and was poorly dated possibly indicating that these two points were not Parman points. Two projectile points from CA-PLU-607 resemble the Great Basin Stemmed series (Greenway 1985). Recently, a possible Parman point was found at CA-TEH-1766 in Battle Creek Meadows (Dougherty 2003). Fluted points are associated with the Clovis Tradition, while the Parman and Great Basin Stemmed points are thought to belong to Western Pluvial Lakes Tradition. Both of these represent nomadic life ways and are represented by shallow sites indicative of temporary camps (Kowta 1988: 50-58).

6000 BC to 3000 BC also has scant evidence of occupation. Stemmed points recovered from around Eagle Lake may possibly date to this period. Northern Side-notched points found at Bucks Lake, and Pinto points recovered at Lake Davis and Bucks Lake may also represent this occupation. These points are believed to belong to the Great Basin Archaic Tradition. It has been hypothesized that the use of the Pinto points reflects the exploitation of Mountain Sheep. A seed processing technology may have been initiated during the Milling Stone horizon circa 6000 BC (Kowta 1988: 58-66).

3000 BC to AD 500 is the first major occupation of the area, referred to as the Martis Tradition. Projectile points associated with the Martis Tradition belong primarily to the Elko and Martis series. Sites associated with the Martis Tradition include winter villages, summer base camps, temporary campsites, bedrock milling stations and biface quarry sites (Kowta 1988: 67-132).

In the Oroville area, the Mesilla Complex is identified as belonging to this period dating between 1000 BC and AD 1. Though little is known about the subsistence patterns of this complex, it is believed to be a local variation of the wider Martis Tradition based on the similarity of artifacts (Kowta 1988: 91-97). The Bidwell Complex that extended from AD 1 to AD 800 follows the Mesilla Complex. Little is known about this complex either, though it may be a continuation of the Mesilla complex and acts as a transition period to the Sweetwater Complex.

The Bidwell Complex appears to mark the end of the Martis Tradition in the Oroville area (Kowta 1988: 101-103).

AD 500 to AD 1200 is the Early Kings Beach phase, a continuation of the Martis Tradition, adding changes in technology. The use of manos and metates continue in this phase with the addition of hopper mortars, bedrock mortars (BRM's) and pestles. Atlatl use changes to bow and arrow resulting in smaller projectile points represented by the Rose Spring, Eastgate and Cottonwood Series. These points are manufactured primarily from obsidian and cryptocrystalline silicates (CCS) rather than basalt (Kowta 1988: 133-134). A dryer period in the region results in prehistoric populations concentrating around Lake Tahoe for fishing, in eastern California for raw material resources (CCS and obsidian) and the western Great Basin for Pinion gathering (Kowta 1988: 138-144, 197). Kowta associates this contracting population as the ancestors of the ethnographic Washoe. The resulting void was filled by the intrusion of Maiduian speakers from the south in the Oroville area, circa AD 800. The Maidu arrival has been referred to as the Sweetwater Complex.

The Sweetwater Complex is characterized by the presence of anomalous extended burials and unusual mortuary gifts, coupled with fatal arrow wounds, indicates cultural intrusion and conflict (Kowta 1988: 152). During the Sweetwater Complex, which extends from about AD 800 to AD 1600, populations increased and procurement shifted to a technology associated with acorn exploitation. Shell beads indicate the formation of exchange networks and an increase in luxury goods. The Sweetwater complex overlaps the Late Kings Beach. Maiduian Speakers were moving into the area by AD 1000.

The Sweetwater Complex was followed by the Oroville Complex, lasting from AD 1600 to AD 1850. This period saw two house types, a small residential conical bark house and a large dance house. Steatite vessels are replaced by coiled basketry although steatite cooking slabs, arrowshaft straighteners and pipes are still used (Kowta 1988: 152).

AD 1200 to AD 1850 is the Late Kings Beach Phase. The main point types during this period are the Desert Side-notched, which ranged from AD 1200 to historic times and the Cottonwood Series, which started in the Early Kings Beach Phase around AD 900 and lasted to historic times. The Late Kings Beach phase is largely seen as a continuation of the Early Kings Beach Phase (Kowta 1988: 134).

Post AD 1850. Ethnographically, the area was occupied by three California Penutian speaking groups. These groups were the Konkow, Mountain Maidu and the Nisenan. Although these groups are all considered to be Maidu (they shared many common traits) there were several differences between these three groups. To obtain more information on these tribes consult the Handbook of North American Indians, California volume 8 (Heizer 1978) or the Handbook of the Indians of California (Kroeber 1925).

Historic Background

The historic period for the project area started with the 1849 Gold rush. It is this event that pushed Euro Americans into the project area. The gold rush caused a mass migration into the area with many communities established due to mining. During the late 19th century placer mining gave way to hydraulic and hard rock mining. By the early 20th century many of the communities that sprung up around the gold mines were abandoned or only had small populations remaining. Other activities slowly replaced gold mining in the project area; these activities included ranching, logging, agriculture and tourism.

3.10.5 Environmental Consequences

The four alternatives are discussed below. This discussion will take into account all direct, indirect and cumulative impacts to cultural resources.

Alternative A – No Action

This alternative would not change any of the existing conditions as they occur today. There would be no direct impacts or indirect impacts to cultural resources under this alternative, since there would be no ground disturbing activity. The cumulative effect of this alternative would be one of a slightly increased risk of a wildfire due to fuel build up in the project area. Wildfires can have multiple effects to cultural resources. They can lead to erosion problems due to reduced vegetation and loose burned soils. Cultural features made from combustible materials can burn, while features made from material such as rock, can crack and even explode due to the extreme heat that wildfires are capable of producing. Artifacts at sites can also be affected by fire, obsidian artifacts can loose hydration rings and can even melt, bone and wood artifacts burn, glass and ceramic artifacts explode or melt. Some metal artifacts will melt or fall apart (Solomon 2000 and 2002). While there are no direct and indirect impacts of this alternative, the cumulative impact of a slightly increased fir risk can be seen as a negative impact to cultural resources.

Alternative B – Proposed Action

Archaeological sites within alternative B would be in units treatments for mechanical tree removal, underburing and Hand cutting and pile burning, Hand cutting and grapple piling and Mastication. There are a variety of risks associated with these actions.

The direct and indirect effects of using equipment for timber harvesting, grapple piling and mastication is that the cultural resources can be damage if equipment is used within the boundaries of these sites. The burning of piles can also damage cultural resources if the piles are created and burned on sites. Underburing can do the same amount of damage as a wildfire if allowed to be more than a low intensity burn (Solomon 2000 and 2002). These direct and indirect effects can be mitigated by the standard resource protection measures (USDA 2001). If these mitigation measures are followed there will be no direct or indirect effects to cultural resources.

The cumulative effect of alternative B will be a slightly reduced wildfire risk. This would be considered positive since it is decreasing to chances of a wildfire and the damage that they do to sites.

Alternative Modified B

Archaeological sites within alternative Modified B would be in unit treatments for mechanical tree removal, underburing and hand-cutting and pile burning, Hand cutting and grapple piling and Mastication. There are a variety of risks associated with these actions.

The direct and indirect effects of using equipment for timber harvesting, grapple piling and mastication is that the cultural resources can be damage if equipment is used within the boundaries of these sites. The burning of piles can also damage cultural resources if the piles are created and burned on sites. Underburing can do the same amount of damage as a wildfire if allowed to be more than a low intensity burn (Solomon 2000 and 2002). These direct and indirect effects can be mitigated by the standard resource protection measures (USDA 2001). If these mitigation measures are followed there will be no direct or indirect effects to cultural resources.

The cumulative effect of alternative Modified B will be the same as alternative B that of a slightly reduced wildfire risk. This would be considered positive since it is decreasing to chances of a wildfire and the damage that they do to sites.

Alternative C – Noncommercial

Archaeological sites within alternative C would be in units treatments for mechanical tree removal, Hand cutting and pile burning, Hand cutting and grapple piling and Mastication. There are a variety of risks associated with these actions.

The direct and indirect effects of using equipment for timber harvesting, grapple piling and mastication is that the cultural resources can be damage if equipment is used within the boundaries of these sites. The burning of piles can also damage cultural resources if the piles are created and burned on sites (Solomon 2000 and 2002). These direct and indirect effects can be mitigated by the standard resource protection measures (USDA 2001). If these mitigation measures are followed there would be no direct or indirect effects to cultural resources.

The cumulative effect of alternative C would be a slightly reduced wildfire risk. This would be considered positive since it is decreasing to chances of a wildfire and the damage that they do to sites.

Under alternative B or C cultural resources would be protected from all project activities using the *standard resource protection measures* set forward in the Regional 106 Compliance Programmatic Agreement, (USDA 2001). All sites will be considered potentially eligible for the National Register and therefore will be protected until such time as an eligibility determination is made.

Sites within unit 7 would be afforded protection using the following *standard resource protection measures* set forward in the Regional 106 Compliance Programmatic Agreement, (USDA 2001).

- Within site boundaries felled trees may be removed using only hand bucking and carrying
- No skidding or tracked equipment shall be allowed within historic property boundaries
- All activities must be monitored by qualified heritage specialists at time of tree removal.

Sites within units 33 thru 909 would be afforded protection using the following *standard resource protection measures* set forward in the Regional 106 Compliance Programmatic Agreement, (USDA 2001).

- Flag and avoidance of sites.
- A map showing the location of all sites in the project area will be provided to the Forest Service project manager.
- Sites will be monitored during and after the project.
- If additional heritage resources are identified during project activities, all work shall stop in that area until the District Archaeologist assesses the situation.
- Historic sites within burn units must have fire lines placed around them so they are not burnt over.
  Linear sites may be crossed or bounded in areas where their features or characteristics clearly lack historic integrity.

Summary of Effects Analysis Across All Alternatives

The overall effects of the four alternatives are about the same. For alternative A there are no direct or indirect effects but a slightly negative cumulative effect due to a slightly increased probability of a wildfire occurring in the project area. For alternative B, Modified B and C there is a greater risk of direct and indirect effects, due to the possibility that cultural resources might be damaged. The possibility of resource damage in greater in alternatives Modified B since more sites are at risk in this Alternative (see table ?). This probability of damage can be eliminated by the use of standard resource protection measures (USDA 2001).

The cumulative effects for alternatives B, modified B and C, is a slightly reduced likely hood of the cultural resources being damaged by wildfire. Alternative C gives the greatest benefit for archaeological resources with the least risk to site damage.

Table 3-61 Alternative B and C actions

Unit Treatments	Alternative B	Modified B	Alternative C
Mech Thin	**5**	**1**	**3**
Mast	**2**	**5**	**2**
HCGP	**4**	**7**	**5**
HCPB	**7**	**8**	**5**
UB	**3**	**8**	**0**

3.11 Soils

3.11.1 Introduction

The purpose of the soils effects analysis is to determine the direct, indirect, and cumulative effects of the Grass Flat Hazardous Fuels Reduction and Forest Health Project on the soil resource, specifically productivity for plant growth, soil hydrologic function, and filtering and buffering function. The land management activities proposed under this project have the potential to affect the soil resource in a beneficial, indifferent, or adverse manner.

3.11.2 Analysis Regulatory Framework: Statute, Regulation, Forest Plan, and Other Direction

The Multiple-Use, Sustained Yield Act of 1960

This act states that the National Forests are to be administered for outdoor recreation, range, timber, watershed, wildlife and fish purposes. The Act directs the Secretary of Agriculture to manage these resources in the combination that will best meet the needs of the American people. Sustained yield is defined as achieving and maintaining into perpetuity a high-level periodic output of renewable resources without impairment of the productivity of the land.

National Forest Management Act

The National Forest Management Act (NFMA) of 1976 amended The Forest and Rangeland Renewable Resources Planning Act of 1974. As described in Forest Service Manual chapter 2550.1 (USDA 2010), this authority requires the maintenance of productivity of the land and the protection and, where appropriate, the improvement of the quality of soil and water resources. The Act specifies that substantial and permanent impairment of productivity must be avoided.

Plumas National Forest Land and Resource Management Plan (LRMP)

Forest Plan standards and guidelines provide the relevant substantive standards to comply with NFMA. Soil management standards and guidelines are not applied to administrative sites or dedicated use areas, such as roads or recreation sites (USDA 2010). The 1988 LRMP (USDA 1988a) establishes standards and guidelines to prevent significant or permanent impairment of soil productivity, including:

- During project activities, minimize excessive loss of organic matter and limit soil disturbance according to Erosion Hazard Rating (EHR):
    - Low to Moderate EHR, conduct normal activities;
    - High EHR, minimize or modify use of soil disturbing activities;
    - Very High EHR, severely limit soil-disturbing activities.
- Determine adequate ground cover for disturbed sites during project planning on a case-by-case basis. Suggested levels of minimum effective cover are (these suggested levels have been selected as the ground cover standard for the Grass Flat Hazardous Fuels Reduction and Forest Health Project):
    - Low EHR, 40 percent;
    - Moderate EHR, 50 percent;
    - High EHR, 60 percent;
    - Very High EHR, 70 percent.
- To avoid land base productivity loss due to soil compaction, dedicate no more than 15 percent of timber stands to landings and permanent skid trails.

Permanent landings and skid trails do not exist within the project area and the Grass Flat Hazardous Fuels Reduction and Forest Health Project does not propose such permanent features.

National Forest Service Manual for Soil Management

Forest Service Manual 2550 (USDA 2010) establishes the management framework for sustaining soil quality and hydrologic function while providing goods and services outlined in Forest land and resource management plans. Primary objectives of this framework are to inform mangers of the effects of land management activities on soil quality and to determine if adjustments to activities and practices are necessary to sustain and restore soil quality. Soil quality analysis and monitoring processes are to be used to determine if soil quality conditions and objectives have been achieved.

Forest staff determines soil quality indicators and measures that are appropriate for the proposed activities. Most soil quality indicators are observations and measurements taken at the soil surface and in the upper mineral soil since this region of the soil profile strongly influences soil hydrology and long term soil productivity. Forest staff is directed to estimate the type, amount, and degree of change to soil indicators that the proposed activity may produce by using appropriate analysis methods, scientific literature, past monitoring results, and knowledge of local site and soil characteristics. In most cases, qualitative estimates of the effects of management activities on soils are considered sufficient to meet analysis objectives.

The major objective of soil quality monitoring is to ensure that ecologically sustainable soil management practices are being applied. Soil quality monitoring is to be used to validate and refine management decisions. The focus of project level monitoring is observation and documentation of the implementation of soil protection prescriptions.

3.11.3 Effects Analysis Methodology

Analysis Methodology

One hundred and fourteen discrete treatment units exist within the Grass Flat Hazardous Fuels Reduction and Forest Health Project. Field survey of existing soil condition occurred in 67 of these units. Since several treatment units are situated adjacent to each other, many of the field survey transects traversed more than one treatment unit. The survey results for each transect are considered representative for each of the treatment units traversed by the transect (see Table 2). Field survey did not occur within 47 of the proposed treatment units. Data from the surveyed units are used to represent the condition of these 47 un-surveyed units.

Soil Resource Measurement Indicators:

The two soil quality indicators with measurements developed for this project are soil productivity and soil hydrologic function. Soil productivity is the inherent capacity of the soil resource to support appropriate growth of plants, plant communities, or a sequence of plant communities to support multiple land uses (USDA 2010). Soil hydrologic function is the ability of the soil to absorb, store, and transmit water, both vertically and horizontally. Soil capacity to buffer and filter chemical compounds and excess nutrients is generally not analyzed because this project does not involve significant application of chemicals such as herbicides, pesticides or other amendments. However, the proposed use of borax to prevent the spread of root disease is discussed.

Indicators 1 and 2: Productivity for Plant Growth and Soil Hydrologic Function

Measure 1: Percent effective soil cover

Short-term timeframe: 0-2 years after implementation.

Long-term timeframe: 2-10 years after implementation.

Data Sources:

- Field Data: Soils surveys were conducted in 2010 and 2011.
- Plumas National Forest Soil Resource Inventory and its associated Geographic Information System (GIS) component.
- Annual HFQLG Soil Monitoring Reports.

Spatial Boundary: Proposed treatment units.

Assumptions:

- Duff and litter greater than ½ inch in depth, surface gravels greater than ¾ inch in diameter and woody debris greater than ¼ inch in diameter count as effective soil cover.
- Units with moderate, high, and very high EHR's respectively require a minimum of 50 percent, 60 percent, and 70 percent for effective soil cover.

Methodology:

Data collection included point sampling in proposed treatment units along systematic randomized transects, which were designed to sample the geographic and topographic extent and variation of those proposed treatment units. Transects were randomly located using a topographic map and modified in the field to ensure collection of the necessary information. The data was collected systematically along each transect. The number of sample points along each transect varied but the total number of sample points was 30, 60 or 90. Information on slope, soil texture, detrimental soil compaction, soil cover, and soil disturbance was recorded at each sample point. Duff and litter greater than ½ inch in depth, surface gravels greater than ¾ inch in diameter and woody debris greater than ¼ inch in diameter was used to determine the percent of effective soil cover.

The Plumas National Forest Soil Resource Inventory (USDA 1989) and its associated GIS component were used to pre-determine a unit's Erosion Hazard Rating (EHR) for the proposed treatment units that were surveyed. Units with moderate, high, and very high EHR's respectively require a minimum of 50 percent, 60 percent, and 70 percent for effective soil cover to prevent significant or permanent impairment of soil productivity (USDA 1988a). Based on the soil textures collected and the range of soil map units within the proposed surveyed treatment units, conservatively the higher EHR was selected in minimize the effect of erosion. For the units that were not surveyed, the process of selecting the appropriate EHR was the same for the surveyed units except for soil texture could not be used to modify an EHR.

Measure 2: Organic matter on top of the mineral soil

Short-term timeframe: 0-2 years after implementation.

Long-term timeframe: 2-10 years after implementation.

Data Sources:

- Field Data: Soils surveys were conducted in 2010 and 2011.
- Annual HFQLG Soil Monitoring Reports.
- The North American long-term soil productivity experiment: Findings from the first decade of research

Spatial Boundary: Proposed treatment units.

Assumptions:

- Duff and litter greater than ½ inch in depth and woody debris between ¼ to 3 inches in diameter will count as organic matter on top of the mineral soil.
- Desired condition for organic matter on top of the mineral soil is 50 percent or greater and will be rated as good.
- Organic matter on top of the mineral soil ranging from 30 percent to 49 percent will be rated as fair condition while anything less than 30 percent will be considered poor condition.

Methodology:

The data that was used for the analysis is the same data that was collected for effective soil cover except for woody debris greater than 3 inches and gravels did not count for organic matter on top of the mineral soil. The soil analysis will discuss the impacts of the various alternatives has on soil organic matter on top of the mineral soil.

Measure 3: Percent detrimental compaction

Short-term timeframe: 0-5 years

Long-term timeframe: 5-30 years

Data Sources:

- Field Data: Soils surveys were conducted in 2010 and 2011.
- Annual HFQLG Soil Monitoring Reports.
- The North American long-term soil productivity experiment: Findings from the first decade of research

Spatial Boundary: Proposed treatment units.

Assumptions:

- A 10% increase in bulk density means that the sample detrimentally compacted.

Methodology:

Soil hydrologic function is the ability of soil to intake, retain, and transmit water that is influenced by soil texture and soil porosity. Soil porosity is the volume of pores in a soil that can be occupied by air, gas, or water and varies depending on the size and distribution of the particles and their arrangement with respect to each other. A monitoring strategy was developed in the Environmental Impact Statement (EIS) for the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act (USDA 1999) and the subsequently will be applied to the Grass Flat Hazardous Fuels Reduction and Forest Health Project. Implementation of the HFQLG monitoring plan for soil quality measures utilizes a tile-spade sample test that is correlated with measured changes in soil bulk density samples and soil porosity, with a 10% reduction in total soil porosity indicating detrimental soil compaction (Westmoreland 2008). For the Grass Flat Hazardous Fuels Reduction and Forest Health Project, this same field survey methodology was used to assess the existing areal extent of detrimental soil compaction at a depth of 4 to 8 inches.

Per the methodology used by the HFQLG monitoring program (described above), detrimental soil compaction was determined at a depth of 4 to 8 inches at every sample point by inserting a spade or shovel into the soil. If the spade was inserted without difficulty the soil was considered to be non-compacted. If the soil was resistant to insertion of spade or shovel, a shovel-full of soil was removed and soil structure examined for indications of compaction (platy or massive soil structure). Soil core samples were collected at some locations that were considered detrimentally compacted and non-compacted. Soil bulk density was determined for each soil core sample taken, and comparison of compacted and non-compacted spots was made to verify the accuracy of the spade method determinations and "calibrate" the surveyor.

Indicator 3: Filtering and Buffering Capacity

Short-term timeframe: 0-2 years

Long-term timeframe: 2-10 years

Spatial Boundary: Proposed treatment units.

Assumptions: N/A

Methodology:

Soil filtering and buffering capacity is the soils ability to protect water quality by immobilizing, degrading or detoxifying chemical compounds or excess nutrients. Soil capacity to buffer and filter chemical compounds and excess nutrients is generally not analyzed in this report because this project does not involve significant application of chemicals such as herbicides, pesticides or other amendments. However, the proposed use of borax to prevent the spread of root disease is discussed.

Known Soils Types

Based on the Plumas National Forest Soil Resource Inventory (USDA 1989) there are 13 different soil map units identified within the soil effects analysis area (Table 1). The PNF Soil Resource Inventory is an Order 3 soil survey that provides general soil map units but does not delineate the exact location of each soil type. The map units typically consist of a group of soils that occupy particular portions of the landscape. A soil map unit is an association or complex of soil components and does not necessarily consist of similar soil types. Map units consist of geographically associated soils that are typically different in soil characteristics and suitability for use and management. Soil textures were determined in proposed treatment units surveyed to aid in soil type detection and interpreting expected effects.

Table 3-62. Known soil types within proposed units

Soils Map Unit	Soil Map Unit Name	General Texture of Soil Surface Layer (and depth)	Management Concerns
178	Gibsonville family (45%) and Rock outcrop Complex (40%)	Gravelly loam (8")	These soils are highly erosive and prone to considerable mass instability. On slopes above 50%, mass instability is common place. Ground cover retention and low road density is essential.
179	Gibsonville family (60%) and Waca family (25%)	Gravelly loam (8"), gravelly sandy loam (10")	Soils are highly erosive and prone to mass wasting. Ground cover retention and low road density are essential standards that would be applied in this map unit.

Soils Map Unit	Soil Map Unit Name	General Texture of Soil Surface Layer (and depth)	Management Concerns
180	Gibsonville family (60%) and Waca family (25%)	Sam as Soils Map Unit 179	Same as Soils Map Unit 179 just found at greater slopes
183	Goodlow family (55%) and Haplaquolls complex (30%)	Sandy loam (5"), sandy loam, coarse sandy loam or loamy sand (15")	Due to periodic saturation, the soils in this map unit pose significant problems for mechanical operations. Erosion and instability is a common factor with this map unit.
223	Kistirn (40%)-Aiken (25%)-Deadwood (20%) families complex	Gravelly loam and silt loam (5"), gravelly loam (10"), gravelly loam or loam (4")	Mechanical operations would be curtailed or very limited when soils are wet.
226	McCarthy (55%)-Ledmount (30%)families complex	Gravelly loam (12"), gravelly sandy loam (9")	Not an extensive map unit.
227	McCarthy (55%)-Ledmount (30%)families complex	Same as Soils Map Unit 227	Same as Soils Map Unit 226 just found at greater slopes
243	Rock outcrop-Rubble land complex	N/A	Equipment operation is extremely difficult and slopes are often in excess of 50 percent.
247	Rubble land	N/A	Many areas of isolated seeps and bogs exist throughout the map unit and are responsible for considerable mass instability. Riparian areas are scattered throughout. Productivity is sparse and isolated.
286	Uvi (50%)-Smokey (35%) families complex	Very gravelly loam (8"), gravelly sandy loam (5")	Some areas of mass wasting can be seen, especially where road construction is involved. Most soils in this map unit are fairly erosive, therefore, ground cover retention is essential.
287	Uvi (50%)-Smokey (35%) families complex	Same as Soils Map Unit 287	Same as Soils Map Unit 286 just found at greater slopes
293	Waca (50%)-Woodseye (35%) families complex	Gravelly sandy loam (10"), very gravelly loam (10")	Mass instability is common place and a consistent problem on slopes greater than 50 percent. Surface erosion is considerable especially after soil disturbing events. Groundcover maintenance is essential with 40-60% cover.
294	Waca (50%)-Woodseye (35%) families complex	Same as Soils Map Unit 293	Same as Soils Map Unit 293 just found at greater slopes
296	Waca (50%)-Woodseye (35%) families complex	Same as Soils Map Unit 294	Same as Soils Map Unit 293 and 296 but it covers slopes from 20-70%

3.11.4 Affected Environment

Indicator 1: Productivity for Plant Growth and Soil Hydrologic Function

Measure 1: Percent effective soil cover

For the 67 surveyed units, Table 2 below indicates that 37 units have a moderate EHR, 23 units have a high EHR, and 7 units have a very high EHR. As discussed earlier in the methodology, moderate, high, and very high EHR need to have a 50, 60, and 70 percent effective soil cover respectively according to the guidelines suggested in the Plumas NF LRMP. The required ground cover levels for the 47 un-surveyed units are presented in Table 3. Unit 107 does not meet the minimum standard for effective soil cover under the existing condition and the primary reason is due to bare soil found on skid trails. The following units are within 3 percent of meeting the minimum standard for effective soil cover: 037, 038, 039, 040, 043, 115, 119, and 973. It is likely that a few of the 47 un-surveyed units also do not meet the minimum ground cover standard under the existing condition. The soil survey data indicates that the average, median, and mode for effective soil cover are 84 percent, 85 percent, and 87 percent respectively. The range of measured values is 53 percent to 100 percent.

Table 3-63: Existing condition for surveyed units.

Proposed Treatment Unit Number	Sample Points Collected	Adjacent Unit(s) Surveyed with this Transect	Percent Effective Soil Cover	Soil Map Unit (percentage of soil map unit within the proposed treatment unit)	Erosion Hazard Ratings	Required Effective Soil Cover	Meets Effective Soil Cover	Percent Organic Matter on top of the Mineral Soil	Percent Detrimental Compaction
021	60	030, 031, 033, 108, 109, 136, 967	87	293 (100%)	Moderate	50%	Yes	72	7
030	60	021, 031, 033, 108, 109,136, 967	87	293 (100%)	Moderate	50%	Yes	72	7
031	60	021, 030, 033, 108, 109, 967	87	293 (100%)	Moderate	50%	Yes	72	7
033	60	021, 030, 031,108, 109, 136, 967	87	293 (100%)	Moderate	50%	Yes	72	7
037	60	038, 039, 040, 119	62	223 (100%)	High	60%	Yes	43	5
038	60	037, 039, 040, 119	62	223 (100%)	High	60%	Yes	43	5
039	60	037, 038, 040, 119	62	223 (100%)	High	60%	Yes	43	5
040	60	037, 038, 039, 119	62	223 (98%), 294 (2%)	High	60%	Yes	43	5

Proposed Treatment Unit Number	Sample Points Collected	Adjacent Unit(s) Surveyed with this Transect	Percent Effective Soil Cover	Soil Map Unit (percentage of soil map unit within the proposed treatment unit)	Erosion Hazard Ratings	Required Effective Soil Cover	Meets Effective Soil Cover	Percent Organic Matter on top of the Mineral Soil	Percent Detrimental Compaction
043	30	973	60	294 (100%)	High	60%	Yes	27	*
102	60	700, 738	83	293 (89%), 183 (11%)	Moderate	50%	Yes	73	2
104	90	111, 113, 953	80	286 (97%), 293 (3%)	Moderate	50%	Yes	69	0
105	30		87	296 (74%), 294 (26%)	High	60%	Yes	47	0
106	30	868	93	296 (68%), 294 (32%)	High	60%	Yes	66	0
107	30		53	293 (80%), 294 (20%)	Moderate--High	60%	No	37	3
108	60	021, 030, 031, 033, 109, 136, 967	87	293 (100%)	Moderate	50%	Yes	72	7
109	60	021, 030, 031, 033, 108, 136, 967	87	293 (100%)	Moderate	50%	Yes	72	7
110	60		92	293 (100%)	Moderate	50%	Yes	77	0
111	90	104, 113, 953	80	286 (54%), 293 (46%)	Moderate	50%	Yes	69	0
113	90	104, 111, 953	80	286 (77%), 293 (23%)	Moderate	50%	Yes	69	0
114	60	995, 999	83	286 (100%)	Moderate	50%	Yes	60	0

Proposed Treatment Unit Number	Sample Points Collected	Adjacent Unit(s) Surveyed with this Transect	Percent Effective Soil Cover	Soil Map Unit (percentage of soil map unit within the proposed treatment unit)	Erosion Hazard Ratings	Required Effective Soil Cover	Meets Effective Soil Cover	Percent Organic Matter on top of the Mineral Soil	Percent Detrimental Compaction
115	30		73	287 (70%), 247 (30%)	High--Very High	70%	Yes	40	0
117	30	894	80	286 (100%)	Moderate	50%	Yes	37	*
119	60	037, 038, 039, 040	62	223 (100%)	High	60%	Yes	43	5
121	90	936, 952, 954, 997	84	286 (100%)	Moderate	50%	Yes	62	0
136	60	021, 030, 031,033, 108,109, 967	87	293 (100%)	Moderate	50%	Yes	72	7
696	60		88	183 (83%), 243 (17%)	Moderate--Very High	70%	Yes	58	2
700	60	102, 738	83	293 (91%), 286 (9%)	Moderate	50%	Yes	73	2
702	90	703	83	227 (81%), 183 (16%), 226 (3%)	Moderate--Very High	70%	Yes	49	6
703	90	702	83	183 (81%), 243 (19%)	Moderate--Very High	70%	Yes	49	6
738	60	102, 700	83	293 (100%)	Moderate	50%	Yes	73	2
782	30		100	286 (100%)	Moderate	50%	Yes	73	*
862	60	980	83	294 (79%), 296 (21%)	High	60%	Yes	55	2
864	30		77	294 (65%), 296 (35%)	High	60%	Yes	57	3

Proposed Treatment Unit Number	Sample Points Collected	Adjacent Unit(s) Surveyed with this Transect	Percent Effective Soil Cover	Soil Map Unit (percentage of soil map unit within the proposed treatment unit)	Erosion Hazard Ratings	Required Effective Soil Cover	Meets Effective Soil Cover	Percent Organic Matter on top of the Mineral Soil	Percent Detrimental Compaction
866	30		90	294 (100%)	High	60%	Yes	63	0
868	30	106	93	294 (99%), 296 (1%)	High	60%	Yes	66	0
870	30		93	296 (100%)	High	60%	Yes	73	3
872	60		95	294 (77%), 287 (20%), 286 (3%)	Moderate--High	60%	Yes	73	5
886	60	983, 984, 985	98	287 (95%), 247 (5%)	High--Very High	70%	Yes	65	0
888	30		97	286 (99%), 247 (1%)	Moderate--Very High	70%	Yes	67	*
890	30		100	286 (100%)	Moderate	50%	Yes	77	*
892	30	893	87	286 (100%)	Moderate	50%	Yes	53	*
893	30	892	87	286 (100%)	Moderate	50%	Yes	53	*
894	30	117	80	286 (100%)	Moderate	50%	Yes	37	*
910	60		85	286 (99%), 293 (1%)	Moderate	50%	Yes	65	0
934	30		90	286 (100%)	Moderate	50%	Yes	50	0
936	90	121, 952, 954, 997	84	286 (100%)	Moderate	50%	Yes	62	0
942	30		100	293 (100%)	Moderate	50%	Yes	80	3
949	60		90	286 (54%), 293 (46%)	Moderate	50%	Yes	67	0
952	90	121, 936, 954, 997	84	286 (100%)	Moderate	50%	Yes	62	0

Proposed Treatment Unit Number	Sample Points Collected	Adjacent Unit(s) Surveyed with this Transect	Percent Effective Soil Cover	Soil Map Unit (percentage of soil map unit within the proposed treatment unit)	Erosion Hazard Ratings	Required Effective Soil Cover	Meets Effective Soil Cover	Percent Organic Matter on top of the Mineral Soil	Percent Detrimental Compaction
953	90	104, 111, 113	80	293 (97%), 286 (3%)	Moderate	50%	Yes	69	0
954	90	121, 936, 952, 997	84	286 (100%)	Moderate	50%	Yes	62	0
957	30		77	286 (100%)	Moderate	50%	Yes	67	3
967	60	021, 030, 031, 033, 108, 109, 136	87	286 (100%)	Moderate	50%	Yes	72	7
969	60	970, 971, 974	88	294 (100%)	High	60%	No	75	2
970	60	969, 971, 974	88	294 (100%)	High	60%	No	75	2
971	60	969, 970, 974	88	294 (100%)	High	60%	No	75	2
972	30		80	223 (60%), 294 (40%)	High	60%	Yes	73	3
973	30	43	60	294 (100%)	High	60%	Yes	27	*
974	60	969, 970, 971	88	294 (90%), 223 (10%)	High	60%	No	75	2
980	60	862	83	294 (91%), 296 (9%)	High	60%	Yes	55	2
983	60	886, 984, 985	98	286 (100%)	Moderate	50%	Yes	65	0

Proposed Treatment Unit Number	Sample Points Collected	Adjacent Unit(s) Surveyed with this Transect	Percent Effective Soil Cover	Soil Map Unit (percentage of soil map unit within the proposed treatment unit)	Erosion Hazard Ratings	Required Effective Soil Cover	Meets Effective Soil Cover	Percent Organic Matter on top of the Mineral Soil	Percent Detrimental Compaction
984	60	983, 986, 985	98	286 (75%), 287 (25%)	Moderate--High	60%	Yes	65	0
985	60	886, 983, 984	98	286 (100%)	Moderate	50%	Yes	65	0
995	60	114, 999	83	286 (100%)	Moderate	50%	Yes	60	0
996	30		90	247 (96%), 287 (4%)	High--Very High	70%	Yes	77	0
997	90	121, 936, 952, 954	84	286 (100%)	Moderate	50%	Yes	62	0
999	60	114, 995	83	286 (100%)	Moderate	50%	Yes	60	0

*Detrimental compaction field data was not collected. Data came from 2010 field surveys.

Measure 2: Organic matter on top of the mineral soil

Percent of organic matter was calculated based on measurements from field surveys. The range of organic matter on top of the mineral soil is 27 percent to 80 percent; the average is 62 percent, the median is 65 percent, and the mode is 72 percent. According to the field data 14 units out of the 67 units that were surveyed do not meet the desired condition of 50 percent or greater for organic matter on top of the mineral soil, those units are 037, 038, 039, 040, 043, 105, 107, 115, 117, 119, 702, 703, 894, and 973. The percent of organic matter on top of the mineral soil for units 043 and 973 is below 30 percent and are considered to be in poor condition. Units 037, 038, 039, 040, and 119 were surveyed as one unit. These units are located on the Wyandotte Peninsula that consists of campgrounds and other facilities that have resulted in areas of bare soil. Units 043 and 973 were surveyed as one unit that contains a boat ramp and campground that resulted in a lot of bare soil areas. Unit 107 does not meet desired condition for organic matter because the concentration of skid trails that result in areas of bare soil. Units 105, 115, 117, 702 and 703 do not meet the desired condition of organic matter because of higher percentages in woody debris greater than 3 inches in diameter and/or surface gravels greater than ¾ inch in diameter which are not considered organic matter. Since 21% of the surveyed units (14 of 67 units) do not meet the desired condition for fine organic matter, it is likely that several of the 47 un-surveyed units also do not meet the desired condition. See table 2 for detailed information.

Measure 3: Percent detrimental compaction

The majority of the project area has had past land management activities; the locations of landings, skid trails, and temporary roads are still visible on the landscape. However, the extent of detrimental compaction (defined as a 10% reduction in total soil porosity) is generally low throughout the project area. Compaction measurements were not collected in 9 of the 67 units that were field surveyed. These units in 2010 purposely did not look at compaction in order to survey more units. At the time extent of the proposed project was much larger. Detrimental compaction was observed in 32 of the 58 units that were surveyed for compaction. The range and average for percent compaction for the units that were surveyed respectively was 0 percent to 7 percent and 2 percent, with a median of 2 percent.

Low occurrence of detrimental compaction in the project area is chiefly due to the general insusceptibility of the soil types to compactions (i.e., soil types that do not compact due to a low clay content or high rock fragment content occur throughout the project area). It is also likely that past operations occurred during dry soil periods when soils are less susceptible to compaction. Additionally, some areas may have had sufficient time since the last disturbance to recovery naturally.

3.11.5 Environmental Consequences

Alternative A – No Action

Direct, Indirect, and Cumulative Effects

Indicators 1 and 2: Productivity for Plant Growth and Soil Hydrologic Function
Measure 1: Percent effective soil cover

The no-action alternative would allow effective soil cover to remain and develop at its current rate in the Grass Flat Hazardous Fuels Reduction and Forest Health Project area. Units that do not meet the standard for effective soil cover under the existing condition would eventually meet the standard through the accumulation of duff and litter. The litter layer of soil cover absorbs water, increases storage capacity, and slows the velocity of overland flow. These effects to soil hydrologic function would be enhanced as soil cover increases from the existing condition. However, the units would likely not meet the standard for 2013 and the timeframe for when those units would meet the standard is unknown.

Unlike the action alternatives, the project area would not realize a reduction in the risk of future high intensity wildfire under the no-action alternative. If a high intensity wildfire fire were to occur, the affected stand(s) would not meet the Forest Plan standards and guides for effective soil cover due to the combustion of the soil cover. The loss of soil cover would increase erosion and the formation of hydrophobic soil layers (soils resistant to water adsorption and infiltration) would further increase runoff and erosion in the short term.

Measure 2: Organic matter on top of the mineral soil

Direct, Indirect, and Cumulative Effects

Under the no-action alternative, the existing condition for organic matter on top of the mineral soil would remain same or better for the year 2013. The units that were identified as not meeting the desired condition for organic matter under the existing condition are expected to be the same if not slightly better. The rate of organic matter accumulation is unknown therefore the timeframe for those units to meet the desired condition is also unknown.

If a high intensity wildfire occurred the organic matter would be burned (combusted) and alter decomposition rates and nutrient cycling processes that are essential for plant growth and soil organisms. When organic matter burns, essential nutrient loss can occur during a fire due to nutrient transfer to the atmosphere through volatilization and ash convection or due to surface runoff (erosion) of deposited nutrients in the surface ash layer (Neary et. al 2005 and Raison et al. 1984). Nutrients at a greater depth in the soil profile may be immediately lost following a fire due to leaching (Boerner 1982 and Neary et. al. 2005). Soil temperatures may be elevated for months or years depending on the degree of organic matter consumption (Neary et al. 1999). Such changes in the soil temperature regime would affect the rates of biological activity in the soil, resulting in altered nutrient cycling regimes (Neary et. al 2005). These effects could adversely affect long term soil productivity for plant growth.

The benefits from the action alternatives associated with construction of Defensible Fuel Profile Zones across National Forest System lands would not occur under Alternative A. In the event of a future wildfire, soil organic matter would be reduced in larger quantities than expected with the proposed project.

Measure 3: Percent detrimental compaction

Direct, Indirect, and Cumulative Effects

Within the project area, the existing extent of detrimental compaction is not of a size or pattern that would result in significant change in soil productivity potential or soil hydrologic function. Under the no-action alternative, no new soil compaction or displacement would occur as a consequence of activities proposed in the Grass Flat Hazardous Fuels Reduction and Forest Health Project. In areas where there had been a decrease in soil porosity as a result of past land management activities, soil porosity may continue to slowly recover to pre-disturbance levels. In the event of a future high intensity wildfire, severe soil heating may cause physical changes in soils, including a reduction in soil porosity (Clark 1994). However, this effect to soil productivity would be much less important than the increased risk of soil erosion due to soil cover losses from the severe wildfire.

Indicator 2: Filtering and Buffering Capacity

Direct, Indirect, and Cumulative Effects

Under the no-action alternative, the application of borax the active ingredient in Sporax a fungicide would not be used. The no-action alternative will not change the effective soil cover, organic matter on top of the mineral soil, and the extent of detrimental compaction which are all components that contribute to soils ability to filter and buffer chemical compounds. Proposed treatment units identified under the existing condition as not meeting the standard for effective soil cover may be limited in filtering and buffering any chemical compounds under the no-action alternative.

Alternative B – Proposed Action

Direct and Indirect Effects

Indicator 1: Productivity for Plant Growth and Soil Hydrologic Function

Measure 1: Percent effective soil cover Direct and indirect effects on this measure include partial removal of effective soil cover. Ground disturbance associated with the proposed activities (mechanical thinning, group selection treatment, mastication, sanitation, piling and burning of hand-cut trees, prescribed underburning treatments, and machine piling of hand-cut trees) of Alternative B are expected to temporarily reduce effective soil cover from the existing condition. While it is difficult to predict precise treatment effects on forest floor materials, general trends are well established. Following implementation of Alternative B, including the design features described below and in Chapter 2, all treated units are expected to meet the project standard for areal extent of effective soil cover (either 50%, 60%, or 70%, depending upon the EHR for each unit).

The 2010 HFQLG Soil Monitoring Report presents effects to soil parameters for over 100 units treated on the 3 National Forests that are implementing the HFQLG pilot project, including units on Plumas National Forest. Pre-treatment data collection started in 2001 and post-treatment data collection began in 2004. The total number of treatment units complied up to 2010 are 66 thinning and 37 group selection treatment units. According to the report, thinning units average 90 percent effective soil cover pre-activity and 82 percent post-activity while group selection units average 83 percent pre-activity and 64 percent post-activity, suggesting that group selection units are more prone to losses of effective soil cover (Young 2011). All but one of the mechanical thinning units had at least 50% cover post-treatment but nine of the 37 group selection units were found with less than 50% soil cover. However, of those 9 units, two units were also lacking cover pre-treatment, due to shallow rocky soils with sparse vegetative productivity and little duff. Another 6 of the 9 units were located on the same project and were noted as lacking cover due to extensive subsoiling activity to reduce compaction. It therefore appears that many of the group selection units with low post-treatment ground cover had legitimate reasons for that result and the loss of soil cover was not due to lack of operational controls.

The HFQLG Soil Monitoring Reports demonstrate that mechanical treatments such as those proposed under Alternative B are likely to cause reductions in the areal extent of effective soil cover, with losses averaging 8 percent for thinned units and group selection units perhaps being more prone to losses of soil cover. As described above in the Existing Condition section, 9 of 67 treatment units (13%) surveyed for the Grass Flat Hazardous Fuels Reduction and Forest Health Project had soil cover results that were less than or very close to the project standard. With these low levels of cover observed on 13% of the surveyed units, several of the 47 units that were not surveyed are also likely to also have low areal extent of existing soil cover.

Four of the nine units identified as endanger or not meeting the minimum standard for effective soil cover under the existing condition will meet the standard due to the proposed mastication prescription. Units 037, 038, 039, 043, and 107 will not meet the minimum standard for effective soil cover unless it's mitigated. To meet the standard for effective soil cover various methods could be utilized depending on the type of treatment.

To assure adequate levels of effective soil cover for Alternative B, the preferred treatment would be to leave scattered tops, limbs, and small woody debris in the mechanically treated units. If this does not result in adequate cover, weed-free straw would be scattered on bare soil areas until the project standard for effective soil cover is met. If straw is applied, the minimum thickness will have to be 0.5 inches to count as effective soil cover. With soil cover expected to meet the project standard (50 to 70 percent), soil hydrologic function would be protected and accelerated erosion would be prevented. Mastication units are expected to realize increases in the area of effective soil cover due to the nature of the fuels treatment activity. However, if the standard is still not met, then weed-free straw would be applied to meet the standard for effective soil cover. For hand cut pile burn units, the hand cut material will be left in place or scattered on bare soil until the standard is met.

HFQLG Soil Monitoring Reports indicate that group selection units may be prone to larger decreases in the areal extent of effective soil cover. All 17 proposed mechanical thinning with group selection units (700, 738, 748, 752, 770, 782, 864, 872, 886, 890, 934, 942, 955, 957, 979, 980 and 987) would be monitored for effective soil cover by forest staff. Monitoring will occur during and after mechanical treatments and make ocular estimates of effective soil cover retained.

Based upon the Erosion Hazard Ratings presented in the 1989 Plumas National Forest Soil Resource Inventory, Table 3 lists the project standard for effective soil cover for the 47 units that were not field surveyed. All design feature and mitigations to retain effective soil cover (see Appendix A of this report) would be applied to these units to assure that effective cover would be achieved following implementation of Alternative B.

Table 3-64 Proposed treatment units not surveyed and minimum percent effective soil cover.

Minimum Percent Effective Soil Cover	**Proposed Units**
50%	002, 004, 016, 017, 029, 101, 112, 124, 125, 126, 127, 129, 131, 132, 135, 748, 883, 922, 950, 951, 955, 966, 987, 998
60%	103, 123, 128, 133, 134, 752, 770, 783, 884, 935, 937, 958, 962, 968, 978A, 978B, 979
70%	116, 130, 692, 746, 993

Pile burning and underburning could reduce effective soil cover. Pile burning would remove forest floor at a relatively small scale compared with the area affected by mechanical traffic. In the majority of the proposed underburning treatment units, treatments are expected to occur under prescribed conditions that would not result in complete combustion of the duff and litter layers. Pile burning and underburning of the proposed treatments would occur within 3 years as a follow-up treatment or as a standalone treatment.

BMP monitoring of the Upper Slate DFPZ project occurred in 2006 in underburn treatment units where the fuel moisture was too dry, resulting in moderate to high intensity fire. During these treatments some areas had little to no consumption of the duff and litter while other areas had complete consumption that result in exposed bare soil, causing rifling and erosion of the surface soils (USDA 2006b).

However, these effects were not widespread and were not observed to cause significant soil erosion. BMP evaluations were performed in 12 prescribed fire units on the Upper Slate DFPZ project, with 2 units rating as deficient for BMP implementation. To prevent a high intensity fire in proposed treatment units of the Grass Flat Hazardous Fuels Reduction and Forest Health Project, burning would occur during cool conditions to prevent loss of effective soil cover below standards and guides. The BMP effectiveness was rated as sufficient for 96 percent of the underburn units from 2007 to 2009 (USDA 2009).

A significant reduction in effective soil cover would increase the risk of surface soil erosion temporarily in affected areas. While the overall percentage of effective soil cover for a unit is a very good measure for analyzing soil productivity effects, actual soil erosion realized would be highly dependent upon the size and distribution of bare areas as well as site specific factors such as soil erodibility and slope unit. The effect of short term reductions in soil cover for Alternative B would generally be well distributed across thinning and group selection units. Concentrated removal of soil cover is most likely to occur in areas such as landings, skid roads, temporary roads, and equipment tracks. Soil erosion would be minimized by the installation of erosion control structures such as cross ditches and waterbars. BMP monitoring on the Plumas National Forest for 2007-2009 rated 94 percent of the evaluations (61 out of 65) for skid trails and landings as effective (USDA 2009). The failed evaluations were generally centered on one timber sale where errors were made by the sale administrator during layout (USDA 2007, USDA 2008a).

The proposed action will result in mechanical traffic throughout a substantial percentage of the treatment unit area as this material is either yarded to the landing or raked into a burn pile. Mechanical cutting and yarding of trees results in substantial breakage of tops and limbs that can be left on the ground to maintain soil cover. Raking of this material can leave a substantial amount of material on the ground if the operator keeps the rake at a proper elevation.

Throughout much of the mechanically-treated area, traffic would mostly occur with low ground pressure equipment that typically make only one or two passes over a given section of ground, and would generally leave enough live grass and shrub components to retain effective soil cover. Multiple passes by rubber-tired equipment on skid trails would remove most of the live vegetation components of soil cover on those areas. However, those areas are relatively small compared with the rest of the treated stand and BMPs can effectively prevent substantial erosion of skid trails and landing soils, allowing them to eventually re-vegetate.

All landings and the last 200 feet of main skids leading to the landings will be reseeded with three species of native grasses post-treatment. The species of native grasses that will be used are Blue Wild Rye (*Elymus elaucus)*, California Brome (*Bromus carinatus*) and Orcutt's Brome (*Bromus orcuttianus*). The reseeding will put the land back to plant growth productivity and increase effective soil cover while minimizing the potential for erosion. According to the Natural Resources Conservation Services, California Brome is good in rapidly establishing deep roots and it's noted for its good soil stabilizing capabilities which make it valuable for revegetation and erosion control in disturbed areas (USDA NRCS 2004). An extra benefit to planting these native grasses is that they provide excellent habitat and a source of food for mammals and birds.

Cumulative Effects

The Silver Tip Roadside Hazard Sale is listed as present/future foreseeable action and it will have limited impacts to overlapping areas with the proposed project. This is because the extent of the roadside hazard sale is limited to approximately 200 feet on both sides of forest service road 22N60. It is expected that the roadside hazard tree removal will be implemented prior to the proposed project and if the effective soil cover is below the standard in those areas of overlap then the mitigations from the proposed project would be implemented to meet the standard.

The implementation of this alternative has important positive cumulative effects for long term soil productivity, which is the reduction of future wildfire risk or a modification of future wildfire behavior and intensity. A high intensity wildfire, occurring under conditions of high heat and low humidity, would result in nearly complete combustion of soil cover, and a significant increase in the risk of erosion. The proposed treatments are designed to reduce the risk of wildfire and behavior of a wildfire by modifying the arrangement of fuels and by regenerating disease free and fire-resilient species.

Measure 2: Organic matter on top of the mineral soil

Direct and Indirect Effects

Direct and indirect effects on this indicator include the removal of soil organic matter, potential short-term reduction of soil nutrients, and loss of habitat for organisms inhabiting soil organic matter. To protect soil productivity for plant growth, surface organic matter would be maintained in the amounts sufficient to sustain soil microorganisms and provide for nutrient cycling.

Organic matter is plant litter, duff, and woody material less than 3 inches in diameter which are all components of effective soil cover. Like the analysis for effective soil cover above, a similar reduction of fine organic matter can be expected for the thinning units under this project. After the initial reduction in organic matter due to the primary treatment, fine organic matter would increase over the next 2 years due to needle cast and leaves falling from the trees that remain.

Powers et al (2005) published the ten year results of The Long Term Soil Productivity (LTSP) study. This is a national and international study initiated in 1989 and is comprised of 62 study sites, including sites in the Sierra Nevada. The goals of the study are to gain understanding of potential soil productivity and effects of land management activities across a variety of sites. The national ten year results indicate that bole only and whole tree organic matter removals, similar to the thinning and group selection treatments proposed for this project, have had no detectable effects on soil nutrition or biomass productivity. Significant reductions in soil carbon and nutrient availability were observed only for the extreme case of whole tree removal plus complete removal of all surface organic matter on the forest floor. However, the data trend indicated no general decline in biomass productivity across any of the organic matter removal levels. Given the modest and short-term reductions of fine organic matter that are expected due to the proposed treatments, those reductions would not significantly change the soil production potential within the proposed units.

Under the existing condition, 14 units of the 67 units that were surveyed do not meet the desired condition of 50 percent or greater for organic matter on top of the mineral soil, units 037037, 038, 039, 040, 043, 105, 107, 115, 117, 119, 702, 703, 894, and 973. Several of the 47 un-surveyed units also likely do not meet the desired condition for fine organic matter. The project design features for meeting the project standard for effective ground cover (i.e. leaving scattered tops, limbs, and small woody debris generated by harvest and, if necessary, applying straw to bare areas) would bring areas affected by the treatment closer to the desired condition for fine organic matter. Additionally, a 2008 letter from the three Supervisors of the HFQLG Forests describes management techniques to assure project compliance with soil standards (USDA 2008). These techniques, including utilization of post-logging slash, would further enhance the effect of retaining fine organic matter and effective cover within the proposed treatment units. However, even if the desired condition for organic matter cannot be achieved, it still will not significantly change the soil biomass productivity potential as indicated in the LTSP study.

Cumulative Effects

As mentioned earlier the Silver Tip Roadside Hazard Sale will have no significant effect on the areas of overlap with the proposed project. Also, the loss of organic matter on top of the mineral soil does not have a significant effect on biomass productivity as indicated by the LTSP study. Wildfire is the other potential future effect considered for this cumulative effects analysis. Under Alternative B, reduction of fire hazards through construction of DFPZs on more than 1,815 acres would occur, resulting in a reduced risk of future high severity wildfire. A high severity wildfire would burn much hotter than the prescribed burn treatments proposed for Alternative B and would consume more of the top soil organic matter.

Measure 3: Percent detrimental compaction

Direct and Indirect Effects

Modest increases in soil detrimental compaction are expected in all mechanically treated areas such as mechanical thin, hand cut grapple pile, mastication, sanitation and group selection units while hand cut pile burn and underburn units are not expected to result in increases in soil detrimental compaction. Other areas with expected increases in soil detrimental compaction are existing and proposed new skid trails, landings, and temporary roads.

The degree of detrimental soil compaction varies with soil texture, soil moisture content at the time the activity takes place, the weight or ground pressure of the equipment used, and whether woody material remains in place to cushion the weight of the equipment while the operation is occurring. Proposed treatment units are susceptible to detrimental compaction when the soil moisture content is near field capacity regardless of the type of soil texture. However, soils with high clay content are a lot more likely to be detrimentally compacted if operated on by heavy timber equipment when the soils are wet (near field capacity) as opposed to sandy soils and/or soils with high rock content. The majority of soils found throughout the project are sandy soils and/or soils with high rock content. To further reduce the risk of thinning treatments causing detrimental compaction, a Limited Operation Period (LOP) would be applied to the entire Grass Flat Project. The LOP would allow ground-based harvest equipment to operate only when soils are considered dry. Soil in the 8 inches below the ground surface is defined as “dry” when it is not sufficiently moist to allow a soil sample to be squeezed and hold its shape, or when the squeezed sample crumbles when the hand is tapped. Dryness would be determined by the sale administrator along with the recommendation of district watershed staff.

The 2010 HFQLG Soil Monitoring Report compiled pre and post-soils data starting in 2001 for the pre-data and 2004 for the post-data. The total number of treatment units compiled up to 2010 is 66 thinning and 34 group selection treatment units. Soil porosity and compaction monitoring results reported in the 2007 HFQLG Soil Monitoring report stated that a review of monitoring data indicates that legacy compaction is commonplace (Westmoreland 2008). Most of the detrimental compaction observed post-project also existed pre-project (Young 2010). The 2010 report stated that the observed overall change in compaction levels was not large. For the 107 sets of pre- and post-treatment data available, only 10 units were below the report’s analysis threshold for areal extent of detrimental compaction in the pre-treatment condition and then over that threshold in the post-treatment condition (Young 2011). Statistical analysis presented in the 2007 report determined that, for 40 thinned units and 11 group selection units (the total number of pre- and post-treatment data sets available at that time), the mean post-project areal extent of detrimental compaction was not statistically different from the pre-project mean. Confidence intervals indicated broad ranges that suggested both a trend toward increasing the extent of detrimental compaction and a trend toward decreasing extent.

The report found that the level of compaction in group selections to be half when compared to thinning units, which can be counter-intuitive because group selections remove more timber than thinning units. A partial explanation of the fore mentioned observation was that a greater portion of group selections (76 percent) were subsoiled versus thinning units (61 percent) because groups were expected to have greater impacts from harvest activities (Young 2010). Another explanation is that in thinning units heavy logging equipment are more confined to skid trails which experience more traffic when compared to group selections were traffic is not as confined due to the nature of the prescription/activity. Subsoiling is one tool that the forest service uses to reduce/mitigate the impacts of detrimental compaction; however subsoiling will not be used in this project to due to various reasons. One of the reasons is because according to survey data the existing level of detrimental compaction is generally low. Another reason is the majority of the project units have soils that are high in sand content (i.e. sand, sandy loam, loam, etc…), which are prone to erosion when subsoiled where soil cover is not present or is sparse. A more appropriate manner of minimizing detrimental compaction is to reseed all landings and the last 200 feet of main skids leading to the landings with native grasses. California Brome is good in rapidly establishing deep roots and it's noted for its good soil stabilizing capabilities which make it valuable for revegetation and erosion control in disturbed areas with the added benefit of improving water infiltration (USDA NRCS 2004). The establishment of deep roots will uncompact the soil over time.

To prevent excessive overland flow and erosion, soil structure and macro-porosity in the top 8 inches of mineral soil for most of the stand area would be similar to the undisturbed, natural condition for the soil type and would provide sufficient infiltration and permeability for the given climate. Low levels of detrimental compaction found during field surveys indicate that this desired condition generally exists throughout the project area. Soil hydrologic function is not expected to be significantly impacted under Alternative B. Visually, soil structure and macro-porosity in the top 8 inches of soil would predominately be unchanged from natural condition for the area of each treatment unit. Localized areas of overland flow and signs of erosion such as pedestals, rills, or gullies are not expected within treatment units. Exceptions could occur along skid trails and landings but erosion on these features would be controlled by implementation of Best Management Practices.

Powers et al (2005) published the ten year results of The Long Term Soil Productivity (LTSP) study. The goals of the study were to gain understanding of potential soil productivity and effects of land management activities across a variety of sites. The study focuses on two key components readily affected by management: soil porosity and soil organic matter. The LTSP study has 1-acre study plots with 3 levels of compaction (none, intermediate, and severe (similar to a landing)), in factorial combination with 3 levels of organic matter removal (bole only, whole tree, whole tree and all forest floor). All plots were clearcut and planted with native species. In addition, to investigate the role of understory vegetation in compaction recovery, vegetation was allowed to naturally return on half of each plot, and controlled on the other half by manual or chemical methods.

The results indicate that soil compaction effects on total biomass productivity (all vegetation within a site, not just tree growth) differs depending upon the soil particle size or soil texture, along with other factors such as initial bulk density, rock content, and climate. On soils characterized as sandy, compacted plots had greater biomass productivity than uncompacted plots; on soils characterized as loamy, compaction generally resulted in little change in biomass productivity; and on soils characterized as clayey, compaction resulted in up to a 50% reduction in biomass productivity at particular sites, primarily in areas with poor soil drainage or high water table (Powers et al 2005).

It is important to note that LTSP compaction treatments were experimental; the maximum extent of plot area was compacted (90+ %) and to greater severity than normally encountered during operational practices (a mechanical roller, typically used for compaction of highway subgrades, was used). Therefore, treatments represent a "worst case scenario" when compared with current operational practices, and resulting effects would presumably be much greater.

Despite this, no significant effects of compaction on soil biomass productivity have been discovered at sites with sandy or loamy soils which are the majority of soil textures found throughout the proposed project. There are units that do contain soils with high clay content which may see a short term reduction in plant growth productivity but that will be minimized through the reseeding of landings and skid trails.

Cumulative Effects: As mentioned earlier the Silver Tip Roadside Hazard Sale will have no significant effect on the areas of overlap with the proposed project. Based on the type of soils and the LOPs on both projects, increases in detrimental compaction will not have a significant effect on soils biomass productivity and hydrologic function. Wildfire is another potential future effect considered for this cumulative effects analysis. Under Alternative B, reduction of fire hazards through construction of DFPZs on more than 1,815 acres would occur, resulting in a reduced risk of future high severity wildfire. In the event of a future wildfire, severe soil heating may cause physical changes in soils, including a reduction in soil porosity (Clark 1994). However, this effect to soil productivity would be much less important than the increased risk of soil erosion due to soil cover losses from the severe wildfire.

Indicator 3: Filtering and Buffering Capacity

Direct, Indirect, and Cumulative Effects

To prevent the spread of Heterobasidion annosum (annosus) root disease, the use of sodium tetraborate decahydrate (a fungicide treatment) is proposed project. Sodium tetraborate decahydrate, also known as borax, is the active ingredient and sole constituent in Sporax. The compound borax is not applied as a liquid using backpack, broadcast or aerial spray methods and it is not applied directly to vegetation (USDA 2006). Borax is applied to freshly-cut stump surfaces and is typically applied at a rate of one pound per 50 square feet of stump surface. This is equivalent to one pound of borax on 60 twelve-inch stumps (Sporax label, Wilbur-Ellis Company).

It is presently unknown if any fungicide containing borax has recently been applied on private land within the project soil effects analysis area. Boron is the agent of toxicological concern from Sporax and occurs naturally in soil (USDA 2006a). According to the Human Health and Ecological Rick Assessment for Borax Final Report the effects of Sporax to soil microorganisms essential for formation of soil organic matter have not been characterized, and there is a risk of environmental exposures affecting nontarget microorganism (USDA 2006a). However, given the atypical application method for Sporax, widespread exposures are not likely, and the risk of effects to soil indicators is minimal. The use of borax will have no significant direct, indirect, and cumulative effects to the soils ability to filter and buffer any chemical compounds.

Alternative B Modified

Direct, Indirect, and Cumulative Effects

The soil analysis conducted in Alternative B for effective soil cover applies to this alternative. The 9 units identified as endanger or not meeting the minimum standard for effective soil cover in the existing condition section only 5 of those units (037, 038, 039, 043, and 107) will not meet the standard unless they are mitigated to meet the standard. The mitigations that were discussed in Alternative B apply to this alternative as well. The same 17 units identified for monitoring for effective soil cover in Alternative B will apply to this alternative too.

For this alternative, the units that were under the desired condition for organic matter pre-activity (existing condition) would be corrected in the same or similar manner as discussed in alternative B. Given the modest and short-term reductions of fine organic matter that are expected due to the proposed treatments, those reductions would not significantly change the soil production potential within the proposed units. The analysis on detrimental compaction and its design features will apply to this alternative. The proposed treatments in alternative B modified are relatively the same to that of alternative B. The differences between the two are small and the effects to soil productivity and hydrologic function at the scale of the project area would be difficult to discern.

Alternative C – Non-commercial Alternative

Direct, Indirect, and Cumulative Effects

Alternative C drops all the group selections and those areas become part of the surrounding DFPZ treatments as mechanical thinning or hand cut grapple pile. Under alternative B, 37 units were proposed for mechanical thinning while alternative C only proposes 18 units. The other 19 units that were not proposed for mechanical thinning under alternative C but were in alternative B are now proposed for hand cut grapple pile in alternative C. The units proposed for mastication in alternative C are the same as alternative B except for units 129, 130, 131, 132, and 133 are dropped and will not be treated in any manner. The units proposed for treatment in alternative C are the same as alternative B except for unit 124 is converted to no treatment. There are no sanitation units proposed in alternative C; those units got converted to no treatment or hand cut grapple pile. There is no change for proposed underburn treatment units across alternative B and alternative C.

The soil analysis conducted in Alternative B for effective soil cover applies to this alternative. The 9 units identified as endanger or not meeting the minimum standard for effective soil cover in the existing condition section only 5 of those units (037, 038, 039, 043, and 107) will not meet the standard unless they are mitigated to meet the standard. The mitigations that were discussed in Alternative B apply to this alternative as well.

For alternative C, the units that were under the standard for effective soil cover and the desired condition for organic matter pre-activity (existing condition) would be corrected in the same or similar manner as discussed in alternative B. The design features and mitigations to address effective soil cover, organic matter on top of the mineral soil and detrimental compaction in alternative B and Chapter 2 also apply to alternative C. The proposed treatments in alternative C would have less of an impact on the landscape when compared to alternative B although these differences would exist at small, localized scales and differences in effects to soil productivity and hydrologic function at the scale of the project area would be difficult to discern.

Summary of Effects

Alternative A – No Action

Under the existing condition one unit do not meet the minimum standard for effective soil cover. There are 8 units within 3 percent of meeting the minimum standard for effective soil cover. A total of 67 units were surveyed while 47 units were not. The soil survey data indicates that the average, median, and mode for effective soil cover are 84 percent, 85 percent, and 87 percent respectively. The range of measured values is 53 percent to 100 percent.

The range of organic matter on top of the mineral soil is 27 percent to 80 percent, the average is 62 percent, the median is 65 percent, and the mode is 72 percent. Fourteen units do not meet the desired condition of 50 percent or greater for organic matter on top of the mineral soil. The percent of organic matter on top of the mineral soil for units 043 and 973 is below 30 percent and are considered to be in poor condition. Under the No-Action Alternative, accumulation of surface organic matter would continue at current rates. Increased organic matter would contribute to ground and surface fuel loads, which may lead to increased fire severity and intensity during a fire event.

The majority of the project area has had past land management activities, and locations of landings, skid trails, and temporary roads are still visible on the landscape. The range of areal extent of detrimental compaction found in the 58 surveyed units was 0 to 7 percent. The mean extent of detrimental compaction was 2 percent. The low occurrences of detrimental compaction in the project area are primarily due to the types of soils that do not compact because of the low clay content and/or high rock fragment content. It is also likely that past operations occurred during dry soil periods when soils are less susceptible to compaction.

Alternative B – Proposed Action

The extent of detrimental soil disturbances due to proposed activities for each of Alternative B would not be of a size or pattern that would result in significant change in production potential or soil hydrologic function for the activity area.

Ground disturbing activities will temporarily reduce the effective soil cover and organic matter on top of the mineral soil from their current levels. The 2010 HFQLG Soil Monitoring Report found that the areal extent of effective soil cover decreased on average of 8 percent for thinning units. To offset expected impacts to effective soil cover associated with Alternative B, tops and limbs would be left or weed free straw will be scattered on bare soil areas until the desired effective soil cover is met. If straw is applied the minimum thickness would have to be 0.5 inches to count as effective soil cover.

All 17 proposed mechanical thinning with group selection units would be monitored for effective soil cover by district watershed staff. Monitoring would occur during and after mechanical treatments and ocular estimates of effective soil cover retained would be made.

Pile burning and underburning could reduce effective soil cover. Pile burning would remove effective soil cover at a relatively small scale compared with the area affected by mechanical traffic. In the majority of the proposed underburning units, treatments are expected to occur under prescribed conditions that would not result in complete combustion of the duff and litter. Pile burning and underburning of the proposed treatments would occur within 3 years as a follow-up treatment or as a standalone treatment. BMP evaluations performed on Plumas National Forest prescribed fire units from 2007 to 2009, BMP effectiveness were rated as sufficient for 96% of the units (USDA 2009).

All new landings and pre-existing landings that are used, and the last 200 feet of main skids leading to the landings would be reseeded with three species of native grasses post-treatment. The reseeding would put the land back to plant growth productivity and increase effective soil cover while minimizing the potential for erosion.

Under the existing conditions 18 of the 67 units surveyed do not meet the desired condition of 50 percent or greater for organic matter on top of the mineral soil. The units that do not meet the desired condition for organic matter pre-activity and are projected not to meet effective soil cover post-activity would be mitigated by using weed free straw to meet the standard for effective soil cover while allowing the organic matter to regenerate back to the desired condition. However, even if the desired condition for organic matter cannot be achieved, it still would not significantly change the soil biomass productivity potential as indicated in the LTSP study.

Modest increases to soil detrimental compaction are expected on all mechanically treated areas, while no soil detrimental compaction are expected in hand treated and underburn areas. Other areas with expected increases in soil detrimental compaction are existing and proposed new skid trails, landings, and temporary roads. Powers et al (2005) published the ten year results of The Long Term Soil Productivity (LTSP) study. The results indicate that soil compaction effects on total biomass productivity (all vegetation within a site, not just tree growth) differs depending upon the soil particle size or soil texture, along with other factors such as initial bulk density, rock content, and climate. On soils characterized as sandy, compacted plots had greater biomass productivity than uncompacted plots; on soils characterized as loamy, compaction generally resulted in little change in biomass productivity; and on soils characterized as clayey, compaction resulted in up to a 50% reduction in biomass productivity. No significant effects of compaction on soil biomass productivity have been discovered at sites with sandy or loamy soils, which are the majority of soil textures found throughout the proposed project. There are units that do contain soils with high clay content which may see a short term reduction in plant growth productivity but that will be minimized due to the reseeding of landings and skid trails with native grasses.

The implementation of the project including the use of Sporax (active ingredient borax) would not have significant direct, indirect, and cumulative effects to the soils ability to filter, buffer, immobilize, degrade or detoxify any chemical compounds or excess nutrients in order to protect water quality.

Alternative B Modified

The direct, indirect, and cumulative effects of the alternative are very similar to alternative B meaning that there will be no significant negative effects to soil productivity for plant growth and soil hydrologic function. The soil analysis conducted in alternative B for effective soil cover applies to this alternative. The 9 units identified as endanger or not meeting the minimum standard for effective soil cover in the existing condition section only 5 of those units (037, 038, 039, 043, and 107) will not meet the standard unless they are mitigated to meet the standard. The mitigations that were discussed in alternative B apply to this alternative as well. The same 17 units identified for monitoring for effective soil cover in alternative B will apply to this alternative too.

Alternative C – Non-commercial Alternative

The units that were under the standard for effective soil cover and the desired condition for organic matter pre-activity (existing condition) would be corrected in the same or similar manner as discussed in alternative B. The design features and mitigations to address effective soil cover, organic matter on top of the mineral soil and detrimental compaction in alternative B and Chapter 2 apply to alternative C. The proposed treatments in alternative C would have less an impact on the landscape when compared to alternative B although these differences would exist at small, localized scales and differences in effects to soil productivity and hydrologic function at the scale of the project area would be difficult to discern. The implementation of the project will not have significant cumulative effects to the soil productivity for plant growth and soil hydrologic function.

Forest Plan Consistency

Alternatives B, B Modified and C would be in compliance with Forest Plan Standards and Guidelines and other regulations pertinent to the Soil Resource.

3.14 Wildlife

3.14.1 Introduction

Management of species habitat, and maintenance of a diversity of animal communities, is an important part of the mission of the Forest Service (Resource Planning Act of 1974, National Forest Management Act of 1976). Management activities on National Forest System (NFS) lands are planned and implemented so that they do not jeopardize the continued existence of threatened or endangered species, proposed, candidate or lead to a trend toward listing or loss of viability of Forest Service Sensitive or effects to Management Indicator Species (MIS), specified in the 1982 Planning Rule (36 CFR 219).

The Wildlife Biological Evaluation/Biological Assessment, Management Indicator Species Report, and the Migratory Bird Report are prepared to determine the effects of proposed projects on species listed by the USFWS and National Marine Fisheries Service (NMFS) in accordance with Section 7 of the Endangered Species Act (19 U.S.C. 1536 {c}), 50 CFR 402, and the standards established in Forest Service Manual (FSM) direction (FSM 2672.42), for possible effects on regionally listed Forest Service Sensitive species and MIS (including invertebrates, amphibians, reptiles, birds and mammals), and migratory birds.

Threatened, Endangered, Proposed, Candidate, Forest Service Sensitive species

Although the following species are found on the Plumas National Forest, they are not found on the Feather River Ranger District; therefore, they will not be discussed further in this document: **Swainson's hawk, Sierra Nevada red fox and Greater Sandhill crane.**

Although the following species are found on the Feather River Ranger District of the Plumas National Forest, there is no known habitat and/or no observations (or incidental) and/or out of the elevational range for the following species within the Grass Flat Project area; therefore they will not be discussed further in this document: **American Peregrine Falcon, Pacific Fisher, California wolverine, Willow Flycatcher, Western red bat, Great Gray owl and Valley Elderberry Longhorn Beetle.**

> The **Great Gray Owl** is found on the Feather River Ranger District and there is potentially suitable habitat within the Grass Flat analysis area, however it was omitted from further discussion because: 1) there is little potentially suitable meadow habitat and where it exists they are less than 5 acres in size and scattered; 2) surveys were conducted with no detections; 3) there are no known nests; 4) any potentially suitable meadow habitat within or adjacent to the treatment is within an area of human disturbance; and 5) proposed treatments would benefit any potential habitat within the project area.
>
> The **Pacific fisher**, **Willow flycatcher and Western red bat** are found on the Feather River Ranger District and there is potentially suitable habitat within the Grass Flat analysis area, however it was omitted from further discussion because: 1) there is little potentially suitable habitat; 2) surveys were conducted with no detections, 3) proposed treatments are at the high end of the species elevational range; 4) any potentially suitable riparian habitat adjacent to the treatment is within an area of human disturbance; and 5) proposed treatments would benefit any potential habitat within the project area.

The following species are found on the Feather River Ranger District on the Plumas National Forest and/or there is suitable habitat within the Grass Flat Project analysis area: **Pallid bat** and **Townsend's big-eared bat**. Effects to these species as a result of implementing the proposed Grass Flat Project are analyzed and discussed in the Grass Flat BE/BA but are not carried further in this document. Habitat components these species are dependent upon such as large trees, snags and large down wood are discussed and analyzed within this document.

The following species are found on the Feather River Ranger District on the Plumas National Forest and/or there is suitable habitat within the Grass Flat Project analysis area: **Bald eagle, California spotted owl, Northern goshawk and American marten**. Effects to these species as a result of implementing the proposed Grass Flat Project are analyzed and di**sc**ussed below.

Management Indicator Species

Of the twelve MIS species listed for the Plumas NF, five were identified as "Category 3", species whose habitat could be either directly or indirectly affected by the Grass Flat Project (refer to the Grass Flat Project MIS Report 2012). Habitat effects for the California spotted owl and the Northern flying squirrel for "Late Seral Closed Canopy Coniferous" forest are addressed under the existing condition and environmental effects section for the California spotted owl. Habitat effects for the Hairy woodpecker for "Snags in Green Forest" are addressed under the existing condition and environmental effects section for snags. Habitat effects for the yellow warbler for "Riparian Habitat" and macroinvertebrates for "Riverine Habitat" are addressed in the Aquatic and Hydrology sections within this document.

Migratory Birds

The Plumas utilizes the USFWS 2008 Birds of Conservation Concern for the Sierra Nevada as its framework for analyzing effects to migratory birds. Of this list of eleven birds, project level reports (e.g. BA/BE and MIS Reports 2012) address nine of the species either directly or by using a surrogate species that utilize the same or similar habitat attributes (refer to the Grass Flat Project Migratory Bird Report 2011). Suitable habitat does not exist within the Grass Flat Project analysis area for the remaining two species, the Peregrine falcon and the Black swift.

3.14.2 Analysis Regulatory Framework: Statute, Regulation, Forest Plan, and Other Direction

The Biological Assessment (BA) is prepared to determine the effects of proposed projects on species listed by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) as Endangered, Threatened or Proposed for listing. It is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act (19 U.S.C. 1536 {c}), 50 CFR 402, and standards established in Forest Service Manual (FSM) direction (FSM 2672.42).

The Biological Evaluation (BE) provides a process to review all Forest Service planned, funded, executed, or permitted programs and activities for possible effects on regionally listed Forest Service Sensitive species (FSM 2672.42). This document combines the BA and BE for aquatic and terrestrial wildlife species (including invertebrates, fish, amphibians, and reptiles).

The January 2004 Record of Decision for the Sierra Nevada Forest Plan Amendment allowed for full implementation of the Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLG) Pilot Project. The HFQLG establishes certain vegetation management activities to be implemented in order to test their effectiveness in: reducing the potential size of wildfires; reducing risk to firefighters; supplying timber for the economic stability of rural communities, and promoting ecological health of a forest through uneven-aged timber management benefiting wildlife.

3.14.3 Effects Analysis Methodology

This section provides the Geographic Boundary, Time Frame, Assumptions, Data Sources and Indicators and Measures relative to the proposed action.

Geographic Boundary

The Grass Flat Project is situated around Little Grass Valley Reservoir and north of the town of LaPorte, California. The analysis area is comprised of areas, which maintain and encompass the species habitats.

The wildlife analysis area used for determining direct, indirect and cumulative effects to the Bald Eagle, California spotted owl, Northern goshawk, Pacific fisher, American marten, Pallid bat and Townsend's big-eared bat totals 14,934 acres. These acres include 9,076 acres of National Forest System land and 5,858 acres of private land. Elevations within the project boundary range from 4,900 to 6,400 feet.

The direct and indirect effects analysis area for wildlife species analyzed was the **1,814** acres proposed for treatment for the Grass Flat Project. These effects are caused by the action and occur at the same time, or later in time or further removed in distance.

The cumulative effects analysis area, 14,934 for wildlife species analyzed was chosen based on the project treatment locations, the amount, location and intensity of treatments, survey requirements and the natural topography. If the analysis area is too large, relative to the proposed action size and intensity, the effects can be diluted and thereby not meaningful. Relative to the broad ranging species discussed in this document, their breeding, nesting, foraging and home ranges can vary in extent depending on the species. The cumulative effects analysis area includes past, present, and reasonably foreseeable future projects occurring within the Grass Flat Project wildlife analysis area. Past actions that occurred in and around the proposed Grass Flat Project treatments, such as timber sales and fuel reduction projects on Forest Service and on private lands. Limitations of the analysis include future activities on private land. Past activities are considered part of the existing condition and are discussed in the "Existing Condition" section for each resource.

Time Frame

The time frame for determining cumulative effects depends on the length of time past effects continue on into the future. This will vary widely between species because some wildlife, such as the California spotted owl, require large home range areas with mature, multi-canopy forests and diverse habitat components such as snags and large woody material while others species, while the Townsend's big-eared bat, require smaller home range areas and simpler habitats such as caves with riparian foraging habitat. Consequently, the analysis timeframe will vary for each species and will be dependent in part on past actions where species are located or there is suitable habitat. Generally, from the broadest perspective the timeframe for past cumulative effects on the terrestrial wildlife analysis area is approximately 20 years. In contrast, effects of mid- to late-nineteenth century hydraulic mining on the aquatic environment continue to be apparent, and the timeframe for cumulative effects on aquatic species is significantly longer.

Data Sources

Several types of data were compiled to provide the basis for understanding the nature and extent of wildlife and aquatic resources within the analysis area, and the potential effects of proposed fuels reduction and vegetative treatments on this resource. Most recent site-specific wildlife surveys were conducted in 2010 and 2011 using Region 5 Protocols, as available. Resource expert field reconnaissance and observations were also conducted.

Bald Eagle: Surveys follow the "National Bald Eagle Management Guidelines", USFWS, May 2007.

California Spotted Owl: Surveys follow the "Protocol For Surveying For Spotted Owls In Proposed Management Activity Areas And Habitat Conservation Areas"; U.S. Forest Service-Region 5; March 12, 1991 (revised February 1993)(USFS 1993).

Northern Goshawk: Surveys follow the "Survey Methodology for Northern Goshawks in the Pacific Southwest Region", U.S. Forest Service, May 14, 2002.

American Marten: Surveys follow the "American Marten, Fisher, Lynx, and Wolverine: Survey Methods for their Detection"; U.S. Forest Service-Region 5, Zielinski/Kucera; PSW-GTR-157; August 1995 (Zielinski et al 1995).

Archival and literature sources have been reviewed and data from Forest Service wildlife and aquatic resource records, maps and geographic information system (GIS) layers compiled to provide a historic overview of species status at a bio-regional geographic region, identify major localized use and natural disturbance events, and to provide information on previous field survey inventories, and to determine data confidence or accuracy.

Assumptions

The following assumptions are specific to wildlife resource analysis and related to the proposed action:

- The 1999 HFQLG FEIS & ROD provides an analysis for wildlife species for implementation of DFPZs. This document tiers to the HFQLG analysis and species determinations.
- The 2004 SNFPA FSEIS&ROD provides an analysis for wildlife species and considered "full" implementation of the 1999 HFQLF FEIS&ROD. This document tiers to the SNFPA analysis and species determinations.
- The cumulative effects are typically based on components starting with the understanding of the general status and trends of trying to predict how the activity would influence the natural workings of the habitat. For the purpose of the cumulative effects analysis, it is assumed that the current vegetation conditions reflect the sum of all past human-caused and natural disturbances within the planning area.
- Occupancy is assumed in all non-surveyed, potentially suitable habitat for each species analyzed.

Indicators and Measures

Habitat requirements vary widely by species, there are indicators of habitat structures and components that when altered can have a measurable effect on species. Refer to **Table 3.14-1** for the indicators and the associated measures used to evaluate effects to species for the proposed project.

3.14.4 Affected Environmental and Environmental Consequences

Environmental Effects Common To All Species

The proposed action is part of a strategic system of DFPZs which are intended to reduce the potential for high-severity wildfires. These wildfires could eliminate vast tracts of habitat for these species, thereby, increasing habitat fragmentation. The primary purpose and need (P&N) for the project is fuels reduction: to reduce the surface and ladder fuels by thinning, handcut/grapple pile, handcut/pile/burn, mastication and/or underburn. Refer to the Fire and Fuels section within this document. Another P&N is forest health which addresses the loss of trees from root disease by thinning out trees, primarily fir, under 24" dbh. Group Selection treatments are also incorporated targeting removal of dense fir pockets and to promote growth of pine trees which are under represented. Refer to the Vegetation section within this document. There is also a P&N for restoration for watershed health, and aquatic and wildlife habitat which includes restoring hydrologic connectivity, riparian habitat, and spotted owl and marten habitat. Refer to the Hydology and Aquatic sections within this document.

Refer to Table 2-9 which shows the comparison of the alternatives. Refer to Table 3.65 which shows the acres of CWHR by **primary** treatment. The major difference between action alternatives is that there are almost three times as many acres proposed for mechanical thin under Alternative B (562 acres) compared to Alternative B-Modified (200 acres) and twice as many compared to Alternative C (292 acres). The majority of the stands proposed for treatment are presently between 40-50% canopy cover. Alternatives B-Modified and C retain a 40-50% canopy cover, as a result many of the mechanical thin treatments change to fuels reduction treatments such as handcut/grapple pile.

Under all three action alternatives the size class 5 and 4 classifications would be retained. The major difference between action alternatives is the number of 5M/5D acres treated and the percent canopy cover reduction. Alternative B treats the most acres of mechanical thin. Under Alternative B, treatments reduce the canopy cover on 5Ms down to 40%; 4s down to 40%, 35%, and 25%, and 35 acres of 5D down to 60%. Alternative B-Modified treats the fewest acres of mechanical thin. Alternative B-Modified primarily takes the size class 4s down to 40% and a much smaller number of acres of 5s down to 50% Alternative C primarily takes 5Ms down to 40% and a smaller number of acres of 5M down to 50%, 4Ds down to 50% and 4Ms down to 40-50%. Both Alternative B-modified and Alternative C reduce seven acres of 5D down to 50% which are predominately related to campgounds.

Table 3.64 Wildlife Habitat Guide with Associated Species by Indicators and Measures

SPECIES	INDICATORS	MEASURES
Wildlife Habitat	Large Trees	Number of 30” dbh and greater
	Snags	Number of 15” dbh and greater
	Large Down Wood	10-15 tons per acre 10’ length and 20” diameter
Bald Eagle	600 foot protection area	Feet
California Spotted Owl	Nesting habitat CWHR 5M and 5D Large trees, moderate-dense canopy	Acres
	Foraging habitat CWHR 4M and 4D Medium-large trees, moderate- dense canopy	Acres
Northern Goshawk	Nesting habitat CWHR 4M, 4D, 5M and 5D Medium-large trees, moderate-dense canopy	Acres
	Foraging habitat CWHR 3M, 3P, 4P and 5P Small-large trees, moderate-dense canopy	Acres
American Marten	Denning habitat CWHR 5D and 4D Med-large trees, dense canopy	Acres
	Foraging habitat CWHR 5M and 4M Medium-large trees, moderate canopy	Acres
Habitat Components	Medium to Large Trees	Number of 20”dbh and greater
	Snags	Number of 15”dbh and greater
	Large Down Wood	10-15 tons per acre 10’ length and 20” diameter
	Riparian	Number of acres maintained, improved or reduced

Table 3.65. Thin and Group Selection treatments on CWHR 5s and 4s by the action alternatives

	ALTERNATIVE B						ALTERNATIVE B-Mod				ALTERNATIVE C			
	4P	**5P**	**4D**	**4M**	**5D**	**5M**	**4D**	**4M**	**5D**	**5M**	**4D**	**4M**	**5D**	**5M**
MT60%			0	0	35	0	0	0	0	0	0	0	0	0
MT50%			0	0	0	0	0	0	6	7	46	28	7	51
MT40%			40	12	0	268	24	151	0	12	0	34	0	126
MT35%			0	207	0	0	0	0	0	0	0	0	0	0
MT25%	14	33	0	0	0	0	0	0	0	0	0	0	0	0
GS			6	26	1	23	6	26	1	23	0	0	0	0
Subtotal	**14**	**33**	**46**	**245**	**36**	**291**	**30**	**177**	**7**	**42**	**46**	**62**	**7**	**177**
Total	**14**	**33**	**618**				**256**				**292**			

Alternative B and B-Modified propose to remove 56 acres by Group Selection which are classified as suitable habitat. It is expected that there would be a few trees, 30" dbh or greater, retained per acre. Alternative C does not include any GS. The handcut/grapple pile (HCGP), mastication (Mast), handcut/pile/burn (HCPB) and underburn (UB) treatments do not reduce the existing overstory canopy cover but could affect habitat use in the short-term due to disturbance and reduction of the understory canopy. The sanitation treatment (as primary or secondary) is proposed to remove live or dead trees that are a safety risk to the public or diseased and could be a hazard in the near future. These treatments are primarily within or along recreation areas such as campgrounds and access roads. It is expected that there could be 1-2 trees per acre of dominant and/or co-dominant trees that could be removed, but their removal is not expected to lower the overall canopy cover. Secondary and tertiary follow-up treatments consist primarily of underburning, handcut grapple pile, handcut pile burn and sanitation. The effects would be less intensive to the primary treatments discussed below. Sanitation is proposed on 90 acres of 5M, 125 acres of 4M, 44 acres of 4D and 29 acres of 3M.

Large Trees

The SNFPA FSEIS/ROD 2004 and HFQLG FEIS/ROD 1999 includes management direction for retention of large trees, 30 inches and greater.

Affected Environment

Of the 9,076 acre analysis area (FS lands only) there are approximately 13 trees per acre that are 30"dbh or greater; estimating 194,142 trees within the analysis area and 23,582 trees within the proposed 1,814 acre treatment area. It takes approximately 130 years to grow a 30"dbh tree in the Grass Flat Project area (Dunning and Reineke 1933). The District silviculturist believes it would only take 60-80 years to grow a 30"dbh tree based on growing conditions for the Grass Flat project area. The HFQLG FEIS, and SNFPA FEIS and FSEIS each discuss the importance of large tree retention for mature/old forest associated species. Large trees are an important habitat component.

Environmental Consequences

No Action (Alternative A)

Direct and Indirect Effects: Under Alternative A, no trees greater than 30 inches dbh would be removed as no treatments would occur. In addition, the large trees, which provide future recruitment of snags and large down wood, would be retained.

Action Alternatives: Alternative B, B-Modified and C

Direct and Indirect Effects: Other than hazard trees, trees greater than 30" dbh would not be removed for the 1,143 acres of proposed non-mechanical thin treatments such as mastication, handcut/grapple pile, handcut/pile, underburn except, and sanitation. Trees 30"dbh or greater could be removed for operability and/or if they pose a safety hazard on the mechanical thin treatments. The loss of large trees is directly related to the intensity of the action: Alternative B would have the greatest effect and Alternative B-Modified the least effect. Alternative B includes greater harvesting, more new landings and more temporary road construction. Also, it is estimated that 350,000 board feet of volume, of all tree sizes, could be removed as hazard trees (live or dead).

Cumulative Effects: Across the landscape the large tree standards and guidelines would be met.

Snags

The SNFPA FSEIS/ROD 2004 and HFQLG FEIS/ROD 1999 include management direction for retention of snags. Table 2 of the SNFPA ROD 2004 states "In westside mixed conifer and ponderosa pine types, retain four of the largest snags per acre, using snags larger than 15 inches dbh, clumped and distributed irregularly across the treatment units".

Affected Environment

Forest Inventory Analysis (FIA), based on stand data, for the Grass Flat project area show that the area consists on average of 7.5 snags per acre: 6.1 snags per acre between15-29" dbh and 1.4 snags per acre 30" dbh or greater.

Environmental Consequences

No Action (Alternative A)

Direct and Indirect Effects: Under Alternative A, no snags would be removed. Snag numbers would remain an average of 7.5 per acre for the proposed treatment area. In addition, there would not be a loss of large trees which are potential snag recruitment trees and future recruitment of large down wood. While maintaining the stand densities in the short-term, this competition could reduce the recruitment of large trees and future snags and large wood material for the long-term.

Action Alternatives: Alternative B, B-Modified and C

Direct and Indirect Effects: Post-treatment the snag numbers are expected to be lower but still meet the minimum standard of four snags per acre, on the landscape. However, snags may be felled for operability and/or safety hazards. It is estimated that half of the snags within the mechanical thin would be retained and no snags within the Group Selection would be retained. It is estimated that 350,000 board feet of volume, of all tree sizes, could be removed as hazard trees (live or dead). Overall, snags would be retained along the unit perimeters or within clumps in the units, where available. Alternative B-Modified would reduce the possibility of snag removal for operability or as hazardscompared to Alternative B and to a lesser degree over Alternative C.

Cumulative Effects: Across the landscape the snag standard and guideline would be met.

Large Down Wood

Table 2 of the SNFPA ROD 2004 and HFQLG FEIS states: Within Westside vegetation types, generally retain an average over the treatment unit of 10-15 tons of large down wood per acre (equivalent to 8-12 logs per acre ≥ 20-inch dbh and 10 foot in length or longer), with an emphasis on retention of wood that is in the earliest stages of decay.

Affected Environment

Analysis based on stand data and fuels exams show that on average the units within the project area consists of an average of <1 ton per acre (<1 log, 10' and 20" diameter). High quantities of downed large woody material are not expected to exist equally across the landscape. Overall, less productive soil types, such as exposed sites including ridge tops or south-facing slopes and areas with shallow or erosive soils, are expected to have less downed large woody material due to more open forest cover and slower growth rates of vegetation. Productive sites are capable of growing vegetation more quickly and produce high tree densities associated with mortality.

Environmental Consequences

No Action (Alternative A)

Direct and Indirect Effects: Under Alternative A, no Large Down Wood (LDW) would be removed. Also, no future log recruitment trees such as snags and large trees 30" or greater would be removed for operability or as safety hazards. Depending on each stands density and tree sizes, tree growth could be affected at varying rates due to competition for nutrients and space. While maintaining the stand densities in the short-term, this competition could reduce the recruitment of large trees and future snags and large wood material for the long-term.

Action Alternatives: Alternative B, B-Modified and C

Direct and Indirect Effects: The SNFPA ROD 2004 (HFQLG Land Allocation) standard and guideline for large down woody material is not met within the Grass Flat project area.

Under the action alternatives, Large Down Wood (LDW) would be removed. However, future log recruitment trees such as snags and large trees 30" or greater could be removed for operability or as safety hazards. This is expected to occur more on Alternative B and less on Alternative B-Modified. A design feature would be in place to not YUM (Yard Unmerchantable Material) logs 20"diameter and 10' length but to leave the cull logs to meet the large down wood standard, where feasible. The C clause, C6.7, will be used for all proposed treatment units. The contractor will be required to leave 8-12 logs per acre, which generates approximately 10-15 tons per acre, that are 20 inches or greater at the small end diameter and 10 feet long or longer. Logs will be evenly disturbed within units to the extent possible. However, it is expected that the snags and large trees that would be removed for operability and/or safety hazards which would have eventually fallen and contributed to the tons per acre. Since it is not know exactly how many logs could be recruited as a result of the no YUM design feature it is unknown whether more logs could be recruited if there was no treatment, and any large trees and snags that could be removed for operability or as safety hazards were retained.

Cumulative Effects: Across the landscape the large down wood would be below requirements.

Bald Eagle

Affected Environment

There are 21 known bald eagle territories on the Forest. Not all territories are active every year. Most are associated with lakes created for hydroelectric power. There are tremendous seasonal fluctuations in the water levels to accommodate hydroelectric demands, and there is a significant drawdown period in the fall, which may influence the habitat suitability of the reservoir(s). Large pine trees are a preferred tree species for nesting and roosting. Within the Grass Flat project area, one territory is located at Little Grass Valley Reservoir.

Bald and Golden Eagle Protection Act, 1962: The bald eagle is protected by the Bald and Golden Eagle Protection Act (Eagle Act, 1940 as amended in 1962). On June 5, 2007, the U.S. Fish and Wildlife Service clarified its regulations implementing the Bald and Golden Eagle Protection Act and published a set of National Bald Eagle Management Guidelines (May 2007). These actions are designed to give land managers clear guidance on how to ensure that actions they take are consistent with the Eagle Act. This law prohibits killing, selling or otherwise harming eagles, their nests or eggs.

HFQLG FEIS ROD, 1999: In the HFQLG FEIS ROD, 1999 (p. 8) it is stated that bald eagle management plans completed in consultation with the USFWS are required for the PNF. A management plan for the territory at Little Grass Valley Reservoir (based on guidance from the 1986 Recovery Plan for the Pacific Bald Eagle) was approved by the USFWS in 2002. The following information comes from the 2002 Bald Eagle Management Plan (BEMP) approval letter from the USFWS:

> "The Little Grass Valley Reservoir currently supports one pair of nesting bald eagles that have utilized two different nest locations. These bald eagles have had a lower than average rate of reproductive success. Recreational activities appear to be the main disturbance factor for this pair of bald eagles. Past protection measures for the bald eagle included annual monitoring of eagle use of the reservoir, campground closure, traffic restrictions, road and trail closures, watercraft traffic restrictions, posting of closure signs, and public awareness."

SNFPA FSEIS and ROD 2004: The following are Conservation Recommendations from the USFWS Biological Opinion for the 2004 SNFPA FSEIS and ROD: (1) Seasonal (January 1 to August 31 or 3 weeks after chicks have fledged) road closures within a quarter mile of bald eagle use areas would be implemented on roads, off-highway vehicle routes, or over snow vehicle routes within a quarter mile of bald eagle nesting, roosting, or wintering areas and (2) Seasonally restrict logging activities to avoid the bald eagle breeding period (January 1 to August 31 or 3 weeks after chicks have fledged) within one half mile of a nest. For a complete list of Conservation Recommendations from the USFWS Biological Opinion for the 2004 SNFPA and ROD see Appendix A.

In cooperation with the California Fish and Game (CDF) and the Department of Water Resources (DWR), the PNF currently monitors all known bald eagle territories annually to determine occupancy and breeding status. Surveys follow the "Bald Eagle Monitoring Protocol" Pacific Southwest Region, U.S. Forest Service"; Region 5; May 18, 1994.

The bald eagle territory at Little Grass Valley Reservoir has been monitored by the FS since 1987. A pair of eagles has nested there every year from 1987 through 2011. The eagle pair has successfully fledged young at this site; however, they have not fledged young every year. It appears that disturbance due to recreation (in particular OHV use) and other activities contributed to nest failure in the past. It is likely that this territory will continue to be inhabited for the duration of the project.

Environmental Consequences

No Action (Alternative A)

Direct, Indirect and Cumulative Effects: Current habitat conditions would not change in the near-term. Over the long-term, forest vegetation would continue to grow, increasing canopy cover of dominant and co-dominant trees. Mortality in intermediate and suppressed trees would increase, resulting in more snags and dead and down logs. These changes would benefit the bald eagle. However, under alternative A the pine component would not be enhanced. Pine trees are a preferred tree species utilized for nesting and roosting by bald eagles. Also, these long-term changes in forest structure could increase fuel hazards and increase the probability of wildfire in the future.

Action Alternatives: Alternative B, B-Modified and C

Direct Effects: Project activities would not result in direct effects to bald eagles. The HFQLG Forest Recovery Act specifies a Limited Operating Period of November 1 through August 31 within designated bald eagle territories (p. 2-8 HFQLG FRA FEIS). The Bald Eagle Protection Act requires activities enhance habitat and that eagles are not disturbed and are protected. All potentially significantly disturbing activities include harvesting, movement of logging trucks and other heavy equipment. Treatments proposed within the bald eagle protection zone are handcut pile burning. Large trees 30" dbh and greater would be retained. Snags,where not a safety hazard, would be retained. Pine, a preferred tree species, would be retained over fir. These activities would benefit habitat within the bald eagle territory by enhancing the pine component. Refer to "Design Features and Mitigations" in Appendices.

The disturbance would be lower for Alternatives B-Modified and C, however, pine trees would not be promoted as much as they would under Alternative B. Mitigations would be in place.

Indirect Effects: There could be some short-term indirect effects as a result of disturbance (noise and equipment) and smoke from underburning. Proposed activities could occur a early as June. By June, bald eagles would have a stronger affinity for their nest site and less likely to abandon their young. Implementation of the DFPZ will have no effect on bald eagle roost trees because no large trees will be removed. The proposed activity would not affect fish in the reservoirs, the primary prey species of bald eagles in this area. No large concentration of waterfowl, also prey for the bald eagle, is present within the project area. Smoke from prescribed burning may result in eagles avoiding areas; however, the avoidance will be temporary and not substantially alter their behavior or reproductive capacity. Roads that may be used for hauling timber are more than ¼ mile from nesting sites.

The disturbance would be lower for Alternatives B-Modified and C, however, pine trees would not be promoted as much as they would under Alternative B.

Cumulative Effects: This project will not contribute to habitat loss for the bald eagle. Recreation at Little Grass Valley Reservoir has had effects on bald eagles, as the reservoir is generally accessible during winter when the eagles are initiating breeding and are more sensitive to disturbance. However, this project will not serve to increase recreation levels at the reservoir and therefore will not contribute to cumulative effects for this species in this regard. Prescribed burning in public and private lands may result in bald eagles avoiding areas; however, this would be temporary and will not substantially affect the behavior or reproductive capacity of bald eagles.

California Spotted Owl

Affected Environment

California spotted owl (CSO) habitat is considered mature/old forest having multiple vegetative layers and high tree basal area, with old forest components such as larger diameter trees, snags and large down wood. California spotted owl studies show they preferred nesting canopy cover in conifer forests that is dense (70+ percent canopy cover) and an average of ≥ 24 inches in dbh. Foraging habitat typically uses canopy cover ranging between 40 and 60 percent.

The Grass Flat area is favorable for spotted owl habitat. The habitat type in the study area is comprised primarily of Sierra Mixed Conifer {White fir (*Abies concolor*), Ponderosa pine (*Pinus ponderosa*), Jeffrey pine (*Pinus jeffreyi*), Sugar pine (*Pinus lambertiana*), Incense cedar (*Calocedrus decurrens*) and Douglas fir (*Pseudotsuga menziesii*)} with a varied mix of aquatic and riparian habitat. The Grass Flat terrain consists of gentle to moderately steep slopes and non-forested areas including Grass Valley Bald Mountain, Little Grass Valley Reservoir, and some meadows, rock outcrops and brush fields. Nesting pairs found within the Grass Flat project area typically use habitat consisting of mature to older forest, mixed conifer, with well-developed under story and a moderate number of snags (>8 per acre) and large logs (>20 tons per acre). Atypical areas where owls may be found are in disturbed areas where logging, historic and active mining, recreation activities (i.e. off road vehicles) and vehicular traffic occur.

The area has been altered due to past logging, recreational use, fire suppression, mining and to some degree livestock grazing. In many cases, the forests have become so dense with smaller trees and brush that fire cannot safely or successfully be reintroduced without first reducing fuel loads. Too dense an understory makes it difficult for owls to hunt; on the other hand, some amount of understory vegetation provides cover for a diversity of prey for the owl.

The analysis area, for FS only, is 9,076 acres. Of the 9,076 acres of FS lands there are 5,411 acres classified as suitable habitat: 482 acres as suitable nesting habitat (5M,5D) and 4,929 acres as suitable foraging habitat (4M,4D). The Plumas forest e-veg layer classified out the most of acres as 4M. However, based on field confirmation of CWHR classification many of the proposed treatment units were updated from a classified of 4M to 5M. It is expected that, if the whole analysis area was ground-truthed that some of the 4M stands would type out as 5M stands. There is also approximately 3,664 acres of nonsuitable habitat within the analysis area, 1,580 of these acres are classified as water for Little Grass Valley Reservoir, and an estimated 260 acres are classified as barren and shrub located in the Grass Valley Bald Mountain area.

There are no Spotted Owl Habitat Areas (SOHAs) within the wildlife analysis area. There are all or portions of five CSO PACs (PL154, PL181, PL232, PL235 and PL240) within the wildlife analysis area. Of the 9,076 acres of FS lands there are 930 acres within the five PACs. Although the majority or acres within a PAC are classified as suitable nesting, not all of the acres are suitable. The far majority of suitable nesting habitat within the analysis area is within the PACs. The PACs were placed to include all of the activity centers (nest, young, pairs, etc.) associated with the PAC while considering suitable habitat and topography. The majority of the habitat within PACs is classifies out as 4M stands. As stated above, if ground-truthed many of the 4M stands would type out as 5Ms.

There are all or portions of six HRCAs, PL154, PL181, PL232, PL235, PL240 and PL024 within the wildlife analysis area. Of the 9,076 acres of FS lands there are 1,725 acres within six HRCAs (note* there is one HRCAs that overlaps into the analysis area, however, its corresponding PAC (PL024) does not).

Environmental Consequences

The following is an analysis of the effects of the no action alternative and three action alternatives. Three of the purpose and needs of the proposed action is to reduce fuels and address the root disease within the project area, and remove hazard trees within the recreation area. Two other purpose and needs are to implement restoration activities to improve watershed health (including riparian zones), and to maintain or improve habitat for old/mature forest dependent species.

No Action (Alternative A)

Direct and Indirect Effects: The No Action Alternative would lead to minor changes in known nesting habitat for the CSO. Implementation of Alternative A would allow succession to move the forest toward denser stand conditions thus reducing the amount of fragmentation within the area of connectivity for the CSO. As succession continues, natural stand processes would enhance the complexity of the un-maintained DFPZ and potentially improve both roosting and nesting characteristics. In addition, it would enhance foraging habitat by providing denser, more diverse stand conditions conducive to CSO and/or their prey species.

Closed-canopy mature/old growth stands are favored by CSOs. Forests with dense canopies and large trees maintain higher relative humidity and reduce heating and drying on surface fuels by solar radiation and wind. However, fires are unpredictable and are subject to spreading depending on the orientation of the landscape and prevailing winds. Ladder fuels, can also play a large role as to whether the fire reaches the canopy of large trees.

Over the long-term, forest vegetation would continue to grow, increasing canopy cover of dominant and co-dominant trees. Mortality in intermediate and suppressed trees would increase, resulting in more snags and dead and down logs. These changes would benefit species such as the CSO, northern goshawk, and forest carnivores, which are associated with late-succession forests. These long-term changes in forest structure could lead to an increase in fuel hazards and increase the probability of a stand-replacing fire in the future. The loss of late-succession forests could eliminate habitat for species associated with those forests in the case of this type of fire.

Maintenance activities would not occur which could cause behavioral disturbances to the roosting site. Large trees, 30”dbh or greater would be retained. Snags and large down logs would continue to accumulate, contributing to habitat diversity. Conversely, wildlife would continue to be threatened by habitat loss from potential wildfires and root rot disease.

Cumulative Effects: The No Action Alternative for the Grass Flat Project would not provide for the long-term protection of California spotted owl habitat from wildfire. There would be no actions designed to reduce the risk of high intensity wildfire (based on analysis conducted in HFQLG FEIS (1999) and SNFPA FEIS (2001). There would be no thinning that could enhance the growth of dominant and co-dominant trees that may provide future habitat availability.

Action Alternatives: Alternatives B, B-Modified and C

The action alternatives assume a risk because they remove suitable habitat, and decrease CSO habitat suitability and could reduce the use of the treated areas at least for the short-term. However, the proposed action is intended to reduce the long-term risk of the loss of habitat due to fire and disease. Refer to the Fire&Fuels and Vegetation sections within this document. Minimum levels of the direction, and standards and guidelines in the SNFPA ROD 2004, table 2 for DFPZs would be met. Refer to Tables 2.9 and Table 3.65 above. Of the 1,814 acres proposed for treatment under the action alternatives, approximately 1,386 acres of suitable CSO habitat would be treated. Refer to design features in Chapter 2, and mitigations and maps in Appendices.

Direct Effects: The California spotted owl is not expected to be directly affected based on the following direction, standard and guidelines, protection measures and design features:

1) CSO PACs have been established to encompass all known activity centers;
2) No treatments are proposed in CSO PACs;
3) Protocol level surveys were conducted over a 4 year period in 2007-2008 and 2010-2011 within the Grass Flat project wildlife analysis area;
4) Protocol level surveys were conducted for the Bald Mountain (2004-2005) and Bald Onion (2002-2003) project wildlife analysis area, which overlap the Grass Flat project wildlife analysis area;
5) If new activity centers are located, PACs would be adjusted to include the activity centers or a new CSO PAC created;
6) Protection measures such as Limited Operating Periods (LOPs), no activity between March 1 and August 15th, would be in place to prevent disturbances to nesting owls;
7) No mechanical thin treatments are proposed within northern goshawk PACs which may also provide suitable CSO nesting habitat; and
8) Almost half of the treatments are within or around campgrounds and access roads which are not optimum for nesting habitat due to higher levels of human disturbance or along ridge-tops which are not considered preferred nesting habitat.

Direct effects analysis focuses on the no entry to PACs that currently exist or were created as a result of historical (prior to 2011) surveys. There are all or portions of five CSO PACs (PL154, PL181, PL232, PL25 and PL240) within the analysis area, totaling **930** acres. The effect to potentially suitable nesting habitat outside of established PACs was considered under indirect effects based on the assumption that the extensive surveys, following Region 5 protocol, would have detected activity centers.

Operations shall be evaluated within ¼ mile of activity centers to prevent disturbance to species during the breeding season. If nesting status is determined, the limiting operating period (LOP) will be applied to ¼ mile around the nest stand, or as determined by the District Biologist. In addition, if any new owl activity centers are detected during implementation of the project, the District Biologist will be notified for further evaluation before continuing operation.

Any activity with the potential for disturbance would be limited to individual treatment units and would last a few days to two weeks in any location. Impacts from disturbance are not expected to substantially affect habitat use or reproductive capacity of this species.

Indirect Effects: Indirect effects to the California spotted owl habitat are expected to be low. Refer to the list of direction, standard and guidelines, protection mesures and design features that are listed under direct effects above as these avoid and minimize indirect effects as well. For all altnatives it is epected that forest lands within campgrounds would be managed with an emphasis for recreational use versus habitat for wildlife. There is heavy recreational development on the eastside of LGV reservoir and the peninsula. Trees are dying within the recreation areas due to root rot disease and creating hazard trees which are a safety concern.

Alternative B reduces more acres of habitat to below suitable then Alternatives B-Modified or C. There is a degree of risk and uncertainty regarding the need to reduce fuels and address root disease versus the reduction of suitable habitat. Alternative B would have the greatest short-term negative effect on owl habitat. Alternative B reduces canopy cover down to 40%, 30% and 25% canopy cover in size class 4s and 5s. In addition, if DFPZs are maintained as proposed, they may not provide habitat suitable for foraging in the long-term. Alternative B-Modified has the greatest positive effect by reducing fuels, removing or thinning out dense stands of fir and increasing the fire-resistent pine component while maintaining at least the minimum levels of habitat suitability in the short-term and long-term.

Alternative B-Modified reduces canopy cover to 40% for 4s and 50% for 5s. Alternative C has less negative habitat effects as compared to Alternative B but not as positive compared to Alternative B-Modified. Alternative C reduces canopy cover to 40% on south-facing slopes and 50% on north and east-facing slopes.

Home Range Core Areas - The amount of private land and nonsuitable habitat on FS lands (water, rock, etc.) limits the land available to establish HRCAs around the CSO PACs within the project area. Therefore, the majority of the proposed treatments are within HRCAs. Refer to the discussion below for direct and indirect effects on nesting (5D/5M) and foraging (4D/4M) habitat. Based on the number of acres treated and the level of effect that is proposed in individual HRCAs, it is difficult to predict if there would be a shift in owl use due to habitat alteration. In addition, due to the large amount of private land adjacent to the PACs in some cases there are not enough Forest Service lands surrounding PACs to provide for 700 aces of foraging habitat for each owl PAC. In addition, some of the FS lands that do surround PACs are not classified as suitable foraging habitat. Because of the limited habitat available to designate as HRCA some of the HRCAs are very close together and suitable foraging acres overlap.

Group Selection

Group selection is proposed on **56** acres of suitable habitat for Alternative B and B-modified. The 56 acres is **1%** of the total suitable habitat (5,411 acres) within the analysis area and was considered in the overall percent canopy cover reductions. Alternative C does not propose any GS treatment.

The majority of trees would be removed but retain an estimate of 6-8 trees per acre that are 30" dbh or greater. The California Spotted Owl Module: 2010 Annual Report notes that "evidence for GS use by the CSO was inconclusive" (USDA 2010). It is expected that since the quantity of proposed GS is comparatively low for the analysis area that the overall effects on suitable habitat would be low.

Nesting Habitat (5D and 5M)

- ***Alternatives B and B-Modified*** - propose removal of **24** acres of suitable nesting habitat by group selection: 1 acre of 5D and 23 acres of 5M.

Foraging Habitat (4D and 4M)

- ***Alternatives B and B-Modified*** - propose removal of **32** acres of suitable foraging habitat by group selection: 6 acre of 4D and 26 acres of 4M.

Mechanical Thin

Of the 5,411 acres of suitable CSO habitat within the analysis area, habitat would be reduced on **562** acres (**10.4%**) under Alternative B, **200** acres (**3.7%**) under Alternative B-Modified and **292** acres (**5.4%**) under Alternative C. All three action alternatives reduce some level of suitable habitat. However, the number of acres treated and the percent of canopy cover reduction under Alternative B could have a much greater impact on owls then Alternative B-Modified or even Alternative C. Alternative B-Modified reduces suitable habitat on the fewest acres and retains the highest canopy covers. Alternative C treats more acres then Alternative B-Modified and has a higher percent canopy cover reduction on size class 5s.

It is predominately the surface and ladder fuels that would be removed for mechanical thin treatments: 1) none of the trees 0-6" dbh would be retained; 2) very few of the trees 6-11" dbh would be retained; 3) only some of the trees 11-24"dbh would be retained; 4) the majority of the trees 24" dbh and greater would be retained; and 5) all trees 30" dbh or greater would be retained except for operability or safety. Refer to the Vegetation section within this document.

Nesting Habitat (5D and 5M)

- ***Alternative B -*** Canopy cover would be reduced on **303** acres of suitable nesting habitat but minimum classification for suitability would be retained. Alternative B proposes to take 5M and 5D stands down to their minimum percent canopy covers while retaining the minimum M and D classification. Although minimum canopy covers would be retained, this alternative would have the greatest effect on suitability of the habitat for nesting due to the number of acres thinned the level of reduction of canopy cover and layering.

- ***Alternative B-Modified -*** Canopy cover would be reduced on **25** acres of suitable nesting habitat. Alternative B-Modified proposes to reduce 6 acres of 5D to 5M, however, these 6 acres are isolated within a high use recreation area and not suitable habitat for the CSO. Alternative B-Modified proposes to retain canopy covers above or at minimum levels on 16 acres of 5M. The objective is to retain size class 5s at 50% canopy cover as a result the many of the acres of 5s identified for thin under Alternative B were changed to other fuels treatments under Alternative B-Modified because they were already below or close to 50% canopy cover. The acres would still be treated by other fuels reduction treatments to lower surface fuels. Reducing the number of size class 5 acres treated, and retaining higher canopy covers, retains higher quality suitable habitat.

- ***Alternative C -*** Canopy cover would be reduced on **184** acres of suitable nesting habitat. Although not as intensive as Alternative B, Alternative C reduces the percent canopy cover more intensively then Alternative B-Modified. The minimum canopy cover would be retained on 177 acres of 5Ms treated. Alternative C proposes to reduce the canopy cover on 7 acres of 5D to 5M, however, these 7 acres are isolated within a high use recreation area and not suitable habitat for the CSO. This alternative would have the greatest effect on nesting habitat than Alternative B-Modified because more acres of 5s are reduced in canopy cover but less than Alternative B, even possibly reducing the potential for use as foraging habitat.

Foraging Habitat (4D and 4M)

- ***Alternative B (Proposed)*** – Canopy cover would be reduced on **259** acres of suitable habitat. Of the 259 acres, **221** acres are within HRCAs. Canopy cover would be reduced but suitability maintained at minimum levels on 52 acres. Canopy cover would be reduced below suitability on 207 acres. This alternative would have the greatest effect on suitability of the habitat for foraging (or nesting) due to the reduction canopy cover below suitability and the reduction of and understory layering.
- ***Alternative B-Modified (Preferred) -*** Canopy cover would be reduced on **175** acres of 4D/4M but maintain minimum canopy cover levels of 40% for suitability. The majority of the175 acres are within HRCAs. Canopy cover would be reduced but suitability maintained at minimum levels on 151 acres. Canopy cover would be reduced below suitability on 24 acres. This alternative would have the least effect on suitability of the habitat for foraging (or nesting) due to fewer acres treated and higher canopy cover retention as compared to Alternative B.
- ***Alternative C (Noncommercial) -*** Canopy cover would be reduced on **108** acres of 4D/4M but maintain minimum canopy cover levels of 40% for suitability. This alternative would have the least effect on suitable foraging habitat due to fewer acres treated and higher canopy cover retention as compared to Alternative B and C. However, it also treats more nesting habitat.

Overall, suitable habitat based strictly on the size class typing and canopy cover, would be retained. However, treatments would reduce the understory, maintain a small percent of midstory and retain the majority of the overstory. Although there would be short-term disturbance, removing trees between 0-6" dbh would improve habitat in the long-term for the owl by opening up the understory area for flight. Removing trees between 6-11 inches would affect the understory and have a longer effect. Removal and/or reduction of the ladder fuels (0-16"dbh) reduces the potential for stand replacing fires and habitat loss for a much greater period. Refer to the Fire & Fuels section with this document. The majority of the trees removed between16-24"dbh are to reduce the spread of root disease within the LGV area. Refer to the Vegetation section within this document. Removing more trees in the intermediate and co-dominant size classes (20 to 30 inches in diameter) would reduce stand vertical heterogeneity. The LGV area has moderate public use but the use is concentrated in areas such as campgrounds, picnic areas, and access roads. The majority of the higher intensity treatments are within or around recreation areas or along the access roads.

The California Spotted Owl Module: 2010 Annual Report for the Plumas-Lassen Administrative Study (PLAS) area notes that "Spotted owls selected against DFPZ landscape fuelbreak thins, but not for other fuels treatments (removal of <10'dbh trees; understory thins), for nocturnal activities; we hypothesize that the habitat character of DFPZs may be unfavorable for common spotted owl prey species" and spotted owls foraged much closer to their site centers than expected by chance; because fuel treatments are not permitted within PACs" (USDA 2010). Alternative B-Modified would have less impact on suitable habitat then Alterantive B and to a lesser degree Alternative C. Not actively treating within CSO PACs, with the exception of allowing prescribed fire, no mechanical thin or GS treatments in goshawk PACs and Riparian Habitat Conservation Areas (RHCAs) would contribute to higher tree density and vertical and horizontal diversity within larger stand treatment areas.

Handcut/Grapple Pile, Mastication, Handcut/Pile/Burn and Underburn

Nesting Habitat (5D and 5M)

- ***Alternative B:*** proposes to treat 61 acres
- ***Alternative B-Modified:*** proposes to treat 309acres
- ***Alternative C):*** proposes to treat 203 acres

Foraging Habitat (4D and 4M)

- ***Alternative B:*** proposes to treat 694 acres
- ***Alternative B-Modified:*** proposes to treat 777 acres
- ***Alternative C:*** proposes to treat 880 acres

Overall the canopy cover and layering would not be reduced. There could be a short-term disturbance for owls utilizing the area for foraging. The California Spotted Owl Module: 2010 Annual Report for the Plumas-Lassen Administrative Study (PLAS) area notes that "**Spotted owls selected against DFPZ landscape fuelbreak thins, but not for other fuels treatments (removal of <10'dbh trees;** understory thins), for nocturnal activities (USDA 2010).

These treatments would be removing surface fuels (ground fuels, shrubs and small trees) which could have some short-term effects on prey species but would benefit habitat in the long-term. These treatments are designed to retain large pieces of down wood and maintain adequate ground cover to reduce erosion. The retention of snags and large down wood would aid in minimizing effects on the spotted owl and their prey species. The reduction of shrub cover may increase the susceptibility of prey species to predators. However, it could also result in a reduction of prey species due to the loss of cover.

The prescriptions within the RHCAs are more restrictive (refer to the Hydrology section) and would minimize the loss of canopy cover and remove some of the dense ground cover by removing surface fuels. Limited operating periods would be applied to any nesting owls. Proposed treatments would result in a short-term disturbance to species within the area due to road construction, activties to remove vegetation and hauling on roads.

Mastication would primarily occur within plantations which is not suitable habitat. Underburns would be lit outside of RHCAs, allowing fires to backburn into riparian habitat. Prescribed light underburns leave a mosaic of burned and unburned areas, so some shrubs would remain to provide cover for prey species using these areas. Underburns would not be ignited in RHCAs but would backburn into RHCAs. Smoke inhalation can kill or affect the health of owls. However, not all acres will be burned at once and adult owls can fly away from burning areas, especially small areas.

Under the action alternatives, the HCGP, Mastication, HCPB and UB treatments would remove surface fuels up to 9.9 inches dbh. Overstory canopy cover would not be reduced but the understory would be reduced. There could be a short-term disturbance for owls utilizing the area for foraging.

Sanitation

Nesting Habitat (5D and 5M) and Foraging Habitat (4D and 4M): The sanitation treatment is proposed to remove live or dead trees that are a safety risk to the public or diseased and could be a hazard in the near future. It is expected that there could be 1-2 trees per acre of dominant and/or co-dominant trees that could be removed, but their removal is not expected to lower the overall canopy cover.

- ***Alternative B:*** proposes to treat 7 acres
- ***Alternative B-Modified:*** proposes to treat 38 acres
- ***Alternative C:*** no sanitation proposed

Landings and Road Construction

Nesting Habitat (5D and 5M) and Foraging Habitat (4D and 4M): Alternative B and B-Modified would remove more acres of 5D/M and 4D/M compared to Alternative C primarily due to the Group Selection treatments which are not proposed for Alternative C.

- ***Alternative B:*** proposes to treat 10.4 acres
- ***Alternative B-Modified:*** proposes to treat 5 acres
- ***Alternative C:*** proposes to treat 4 acres

Cumulative Effects: Direct effects are not expected. Indirect effects are expected to be low. The action alternatives may affect individuals, but not likely result in a trend toward Federal listing or loss of viability for the California spotted owl. This determination is based primarily on 1) CSO PACs would not be entered; 2) existing suitable nesting habitat within proposed treated units would be reduced in suitability but retained; and 3) some of the existing suitable foraging habitat within proposed treated units would be reduced in suitability (which includes HRCAs).

The Grass Flat Project proposed construction of DFPZs units is designed to provide an area from which fire fighters can take a stand to reduce the spread of a forest fire. While there is no guaranteed method of protecting lands from a wildfire, the DFPZs create areas where firefighters could more effective fight fires and could reduce the wildfires impacts to habitat. On the Forest Service lands, short-term habitat suitability reductions within the project area will be offset by fuel treatments that in the long-term would reduce the potential risk of loss of wildlife habitat to wildfire. Wildfire can add to large-scale habitat.

It is uncertain what the wildlife species cumulative impact will be from these actions but some level of effects is expected. Proposed treatments for the Grass Flat Project are expected to result in low incremental impact when added to actions on the private land.

The cumulative effect of HFQLG Pilot Project actions (such as the Grass Flat Project and other vegetation management activities in the Sierra Nevada) was assessed in the Sierra Nevada Forest Plan Amendment Final Supplement Environmental Impact Statement (SNFPA FSEIS), to which this Grass Flat Project EIS is tiered. The habitat modeling used for the FSEIS was intended to indicate the direction, magnitude, and time frames (general trends) of change and was not intended to provide precise information. That assessment (pages 260–280 in the SNFPA FSEIS) acknowledged that suitable foraging habitat provided by CWHR 4 stands would diminish in early decades under the Sierra Nevada Forest Plan Amendment but would be offset by increases in acreage of CWHR 5 and 6 stands. According to projections (SNFPA FSEIS, table 4.3.2.3g), 20 years after implementation of the Sierra Nevada Forest Plan Amendment: there would be an 11 percent increase of total spotted owl habitat (classes 4M, 4D, 5M, and 5D) in the HFQLG Pilot Project planning area. By project year 50, there would be a drop in net gain of 6 percent; by year 130, there would be a net reduction of 7 percent. However, in the Sierra Nevada bioregion as a whole, there would be a 13 percent increase in total habitat by project year 20, 18 percent by year 50, and 20 percent by year 130.

***Past, Present and Foreseeable Future*:** Refer to the Past, Present and Foreseeable Future section within Chapter 1 of this document. There have been a number of projects completed previously within the past 10 years in this area. Three vegetation management projects include Bald Onion, Bald Mountain and Little Grass Valley FHP. Also there have been several small sales projects for hazard trees such as Silvertip Springs and Black Rock.

***Private*:** Of the 14,934 acres wildlife analysis area for the Grass Flat Project area, there are 5,858 acres of private lands. The nature of the private lands is that they are urbanized or managed for industrial timber such as by Sierra Pacific Industries. In general, these private lands are treated with different objectives than National Forest lands and therefore are minimally or not suitable as habitat for mature/older-forest dependent species. Sierra Pacific Industries, the largest private landowners in the analysis area, has outlined strategies that provide certain owl protections on their land. The company implements such activities such as conducting surveys for spotted owls before timber harvests, and/or buffer nest centers from disturbances, and/or protect forest units with nesting spotted owls from harvest altogether. The industry lands in the South Fork and Goat Mountain area have been heavily managed for timer production. The majority of the industry timber lands are not expected to be suitable habitat for the owl. The urban area of LaPorte is not suitable habitat for the owl. There is varying degrees of suitability in the land owned by private homeowners south of Little Grass Valley Reservoir.

***Wildfires*:** The DFPZs units are designed to provide an area from which fire fighters can take a stand to reduce the spread of wildfires. These wildfires could pose a threat to California spotted owl habitat. Large scale changes in owl habitat as a result of past wildfires and anticipated future fires in spotted owl habitat has been identified as a potential threat affecting spotted owl distribution (Federal Register, Vol. 70, June 2005 and Vol. 71, April 2006). Habitat effects from wildfires cannot be fully measured immediately following wildfire, because direct and indirect tree mortality may not become evident for several years. It is unknown, therefore, how much burning of PACs resulted in sufficient loss of live mature trees and changed stand structure to eliminate or significantly diminish habitat suitability for spotted owls.

Excerpt from the *"*California Spotted Owl Module: 2010 Annual Report*"*: A primary source of uncertainty regarding the effect of fuels treatments is an assessment of risk to the CSOs and their habitat from treatments versus the risk from wildfire that occurs across untreated landscapes. Results of 2 years of survey work for the Moonlight-Antelope Complex Wildfires, primarily high-severity, suggest that the

primarily high-severity wildfire does not support CSOs other than a single pair that is using the landscape. First year results of the Cub-Onion Complex wildfire, primarily low-moderate severity) suggests that CSOs were able to persist in the post-fire landscape with similar abundance and spacing as has been observed in unburned forests outside the burned areas. It is important to determine both the acute and chronic responses of CSOs and their habitat to wildfires as it is unknown if CSOs can persist over both the short-term and long-term in these areas.

***Barred Owl*:** The U.S. Fish and Wildlife Service concluded that barred owls constitute a threat to site occupancy, reproduction and survival of the California spotted owl, but that there currently is not enough information to conclude that hybridization with barred owls poses a threat (Federal Register, vol. 70, 35613, June 21, 2005).

The *"*California Spotted Owl Module: 2010 Annual Report*"* states: "Barred and sparred owl detections were the highest during 2010 surveys within the Plumas-Lassen Study area then any that were detected in any year during the study from 2003-2010. The pattern of records suggest that barred/sparred owls have been increasing in the northern Sierra Nevada from 1989-2010 and are now present in low, stable numbers over the 4-5 years on our study area. Results indicate that barred owls are increasing in the northern Sierra Nevada and may become an increasing risk factor to CSOs."

The potential for the barred owl to become established and compete with California spotted owls within the Grass Flat Project area is a possible additional cumulative effect, but at this point, it is unknown as to what the extent this effect will be. The treatments are primarily on ridge-tops and not preferred habitat for the California spotted owl but could be suitable for barred owls.

***Plumas-Lassen Administrative Study*:** "California Spotted Owl Module: 2010 Annual Report": 1) The Lassen Demographic Study results suggest a decline in the CSO population within the Lassen study area over a 20-year study period; 2) The Plumas NF Survey Areas crude density estimates within individual Survey Areas indicate similar densities and number of territorial single sites) between 2004-2010 for the survey areas on the Plumas NF; 3) California spotted owls selected against DFPZs, but not other fuel treatments (group selection), for nocturnal activities: hypothesized that the habitat character of DFPZs may be unfavorable for common spotted owl prey species. Spotted owls foraged much closer to their site center than expected by chance; because fuels treatments are not permitted within PACs. One owl strongly selected underburn treatments over untreated forest for foraging; limited availability of underburn within the study are prevents further extrapolation of the result: 4) Overall, about 90% of the 103 CSO territorial sites were located within CWHR 4M, 4D,5M,5D and 6 size classes. The remaining 10% of sites were located in more open, smaller-tree size polygons, with nests or roosts located within remnant, scattered larger trees.

***Uncertainty*:** Potential effects from the proposed GS, Mechanical thin treatments are the reduction in the quality of suitable habitat. The key uncertainties related to viability in the Sierra Nevada include (1) factors driving population trends; (2) habitat relationships and habitat quality; (3) current distribution, amount, and quality of habitat; (4) treatment effects, including fuels and silvicultural treatments, on habitat and populations at multiple scales; and (5) increase in barred/sparred owl detections. There is a degree of uncertainty as to risk of potential wildfire and disease if treatments were implemented to a lesser degree, thereby retaining habitat that is more suitable in terms of canopy cover and layering.

Northern Goshawk

Affected Environment

Suitable Northern goshawk (NOGO) nesting habitat consists of CWHR classes 5D, 5M, 4D and 4M in Sierra Mixed Conifer, White Fir and Montane hardwoods. Suitable NOGO foraging habitat consists of CWHR classes 3M, 3D, 4P, 5P and 6 in Sierra Mixed Conifer, True Fir and Montane hardwoods. The CWHR estimates are based on the most recent vegetation data available for Grass Flat, which is from aerial photo interpretation and Plumas National Forest "e-veg" timber type coverage's (based on 1997 aerial photographs) in the Geographic Information System (GIS).

The photographs were used to determine timber strata, CWHR size, and densities. The GIS coverage was also used to determine land classifications and allocation.

The analysis area for the Northern goshawk, including all ownerships (FS and Private), is 14,934 acres. The analysis area, for just FS, is 9,076 acres. Of the 9,076 acres there are 6,586 acres classified as suitable habitat: 5,411 acres as suitable nesting habitat (5D, 5M, 4D, 4M) and 1,175 acres as suitable foraging habitat (3M, 3D, 4P, 5P, 6). There is also approximately 2,489 acres of nonsuit able habitat within the analysis area, 1,580 of these acres are classified as water, and estimated 260 acres is barren and shrub located in the Grass Valley Bald Mountain area.

There are all or portions of five NOGO PACs within the wildlife analysis area: T28 (Little Grass Valley Horse Camp), T33 (Feather Fork Mine), T41 (Black Rock Creek), T56 (Peninsula) and T65 (Kenzie Ravine). About 90 percent of T28 and 35 percent of T33 overlaps with a CSO PAC. Of the 5,411 acres of suitable habitat there are 1,080 acres within the five goshawk PACs. Not all of the acres that are within the PACs are typed as suitable for nesting. The PACs were placed to include all of the activity centers associated with the PAC while considering suitable habitat and topography.

Environmental Effects

No Action Alternative (Alternative A)

Direct and Indirect Effects: There would be no direct effects on Northern goshawk or goshawk habitat, as no activities would occur that would cause disturbance to nesting or foraging birds, nor any impacts to the existing habitat conditions. Indirect effects of no action include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and create a more intense burn, which could lead to increased rates of spread resulting in potential loss of suitable goshawk nesting habitat and other important prey habitat attributes such as large trees, large snags and down woody material.

Cumulative Effects: The No Action Alternative for the Grass Flat Project would not provide for the long-term protection of goshawk habitat from wildfire. There would be no actions designed to reduce the risk of high intensity wildfire. Total wildfire acres and high intensity wildfire acres are anticipated to increase from current levels under this alternative (based on analysis conducted in SNFPA (2001and 2004). There would be no thinning that could enhance the growth of dominant and co-dominant trees that may provide future habitat availability.

Action Alternatives: Alternative B, B-Modified and C

Direct and Indirect Effects: Direct and indirect effects to the Northern Goshawk and it's habitat are expected to be low based on the following direction, standard and guidelines, protection measures and design features:

1) NOGO PACs have been established to encompass all known activity centers;
2) No group selection and mechanical thin treatments are proposed in NOGO PACs;
3) No new landings or road construction are proposed in NOGO PACs;
4) Protocol level surveys were conducted in 2008 and 2009 within the analysis area;
5) Known activity centers were field checked in 2010 and 2011 for activity;
6) If new activity centers are located, PACs would be adjusted to include the activity centers or a new NOGO PAC created;
7) Design features such as Limited Operating Periods (LOPs), would be in place to prevent disturbances to nesting goshawks located within ¼ mile of treatments (harvest, road construction, log hauling, etc.);
8) The proposed fuels reduction may improve habitat available for foraging outside of NOGO PACs;
9) Almost half of the treatments are within or around campgrounds and access roads which are not optimum for nesting habitat due to higher levels of human disturbance.

The action alternatives assume a risk because they remove suitable habitat, and decrease NOGO habitat suitability and could reduce the use of the treated areas at least for the short-term. However, the proposed action is intended to reduce the long-term risk of the loss of habitat due to fire and disease. Refer to the Fire&Fuels and Vegetation sections within this document. Minimum levels of the direction, and standards and guidelines in the SNFPA ROD 2004, table 2 for DFPZs would be met. Refer to Tables 2.9 and Table 3.65 above. Of the 1,814 acres proposed for treatment there are 1,600 classified as suitable habitat: 1,386 acres of nesting habitat and 214 acres of foraging habitat. Refer to design features in Chapter 2, and mitigations and maps in Appendices.

Group Selection retains very little overstory, trees 30" dbh and greater. Mechanical thin treatments propose to predominately remove surface (0-9.9"dbh) and ladder (10-16"dbh) fuels: 1) none of the trees 0-6" dbh would be retained; and 2) few of the trees 6-11" dbh would be retained. Some of the understory canopy cover of size class 4 (trees 11-24"dbh) would be retained. The overstory would be retained 1) the size class trees 24-30" dbh would actually increase; and the 30" and greater trees would only decrease slightly. Other fuels treatments, such as HCGP and HCPB, would remove surface fuels and retain most existing canopy cover. Refer to "Mitigations" in Appendices.

Nesting Habitat (5D,5M,4D,4M): Refer to the discussion above for the CSO for nesting (5D,5M) and foraging (4D,4M) habitat. The discussion would be similar. Northern goshawks use 4D and 4M stands for nesting as well as the 5D and 5M used for nesting by the CSO. Of the 6,586 acres of suitable NOGO habitat within the analysis area, habitat would be removed on 56 acres (0.9%) for GS under Alternatives B and B-Modified, and reduced on **562** acres (**9.2%**) under Alternative B, **200** acres (**3%**) under Alternative B-Modified and **292** acres (**4.4%**) under Alternative C. All three action alternatives reduce some level of suitable habitat.

A major difference between the CSO and the NOGO is that the Northern goshawks will utilize a more open understory for foraging so treatments, outside of NOGO PACs, may benefit this species in the long-term.

Foraging Habitat (3M, 3D, 4P, 5P): Under all action alternatives there are **214** acres proposed for treatments within suitable foraging habitat. Under Alternative B, **47** acres of 5P and 4P are proposed to be reduced to 25% canopy cover, they would be reclassified as 5S and 4S and no longer suitable habitat. Of the 6,586 acres of suitable NOGO habitat within the analysis area, habitat would be reduced on **47** acres (**0.7%**) under Alternative B. The remaining **167** acres would be treated by HCGP, HCPB, mastication and underburn. Under Alternatives B-Modified and C there is no mechanical thin proposed, all 214 acres would be treated by HCGP, HCPB, mastication and underburn. These treatments would removing surface fuels and small trees up to 9.9 inch dbh, retaining upper and midstory canopy cover which could have some short-term effects on prey species but would benefit goshawk habitat in the long-term.

Cumulative Effects: Direct effects are not expected and indirect effects are likely to be very low. Cumulative effects from the Grass Flat Project for the Northern goshawk are expected to be minimal when added to other actions. Based on not entering goshawk PACs, surveys, protection measures, project design features and retaining suitable habitat.

Cumulative effects on the goshawk could occur with the incremental loss of the quality of habitat for this species. Overall, increases in recreational use of National Forest lands, and the use of natural resources on state, private, and federal lands, may contribute to habitat loss for this species. High-intensity stand-replacing fires, and the means by which land managers control them, have contributed and may continue to contribute to loss of habitat for this species.

The analysis of cumulative actions focuses on past timber sales as they related to impacts on suitable owl habitat, more specifically CWHR size 4M, 4D, 5M, and 5D. These same CWHR types are considered suitable goshawk nesting habitat. Generally, the average tree size in the nest stands found on the project ranged from 25 to 40 inches. That translates to CWHR size 5M and 5D. Through analysis, all of these actions often translated into a projected decrease in habitat suitability for goshawks.

It is uncertain as to what influence this reduction in habitat would do to goshawk activity and occupancy in the wildlife analysis area, but it is not anticipated that the cumulative habitat reduction would result in loss of occupancy and productivity of known goshawk PACs. This is based on the location of project activities in relation to known PACs, no habitat alteration in PACs, and distribution of known PACs.

American Marten

Existing Condition

The analysis area, elevations between 4,900'-6,400', is within the ranges for the American marten. The area is at the very low elevational range for the marten (5,000-10,000').The following CWHR types are important to marten: generally structure classes 4D, 4M, 5D, 5M and 6 in ponderosa pine, montane hardwood-conifer, mixed conifer, montane riparian, aspen, red fir, Jeffrey pine, lodgepole pine, subalpine conifer, and eastside pine.

The physical structure of the forest and the prey associated with forest structures are thought to be the critical features that explain marten habitat use. Powell (in Federal Register 2004) states that forest type is probably not as important as the vegetative and structural aspects, and marten may select forests that have low and closed canopies. Numerous studies (as referenced in the 2004 SNFPA final supplemental EIS) indicate that canopy closure over 60 percent is important, and marten preferentially select home ranges to include high proportions of dense forested habitat. The marten's need for overhead cover was very well documented in the April 8, 2004, Federal Register.

Marten select stands with continuous canopy cover to provide security cover from predators. The dense canopy increases snow interception, lowers the energetic costs of traveling between foraging sites, and preferred prey species may be more abundant and vulnerable in areas of higher canopy closure (ibid.). A number of studies have shown that the marten avoid areas with little forest cover r significant human disturbance and prefers large areas of contiguous interior forest (ibid.).

Marten utilize large diameter trees and snags as above ground rest (den) structures (Gilbert et al. 1997) and (Raphael and Jones 1997). Martens show a higher use of fires than other tree species when using live and snags as rest (den) structures (Spencer 1987). Marten seek larger live trees and snags than those generally available. Availability of these larger trees, snags and downed logs, frequently associated with older forests, are essential components for functional habitat for martens (Payer and Harrison 1999).

These findings were similar in the Lassen National Forest, American Marten Rest Site Use, Progress Report 2011.

The potential direct effects on marten from vegetation management activities consist of modification of habitat or habitat components, in regards to denning/resting habitat and foraging/travel habitat. There are no known den sites in the analysis area. However, there is suitable habitat within the project area and the lack of detections as a result of surveys does not mean species absence. If a marten den site is found in the future, the site will be protected and a LOP would be implemented within ½ mile of the den site (1999 HFQLG FEIS/ROD and 2004 SNFPA FSEIS/ROD). Although surveys were conducted to protocols, the marten are very elusive species and are not as easily detected as the CSO or goshawk. In addition, there are no land allocations such as there are for the CSO and goshawk with PAC land allocations. Therefore, direct effects are based on the loss, modification or fragmentation of suitable habitat and habitat components. Whereas, indirect effects are road density and new temporary road construction, and disturbances such as equipment noise as a result of the activity.

The wildlife analysis area for the marten is 9,076 acres. There are **5,411** acres classified as suitable habitat: 1,115 acres as suitable denning and resting habitat (6, 5D and 4D) and 4,296 acres as suitable foraging and travel habitat (5M and 4M). Based on CWHR classification, there is moderate to high suitable denning/resting and foraging/travel habitat throughout the analysis are, including the proposed treatment units. There are historical detections of marten within the analysis and treatment area since 1977. However, no den sites have been located. To date there have been no marten detections within the project area.

The Grass Flat area is the only area on the Feather River Ranger District with historical detections of marten. The Grass Flat area is at the lower end of the elevational range for the marten and the area has limited habitat for movement within the best-cost corridor identified for the marten because of the amount of land unsuitable (water,rock,etc.). Also there is a lot of private land within the corridor which is used for timber production by the timber industry or private home owners. The marten are most likely utilizing the mid-slopes and riparian zones but could also utilize the smaller ridges to crossover between subwatersheds. The analysis area is around the headwaters of the South Fork Feather River system. Riparian zones are used for denning, resting, foraging and as movement corridors. Protocol level surveys conducted in 2001 and 2002 for the Bald Mountain Project resulted in no new detections. The FS wildlife crew installed four cameras during February-March 2011 around the LGVR area for the Grass Flat Project and no marten were detected. However, due to multiple heavy snow events, access was very limited; in some cases cameras were buried and were checked infrequently. These surveys did not follow formal protocols.

Environmental Effects

No Action Alternative (Alternative A)

Habitat connectivity is a key to maintaining marten within a landscape. Avoidance of open areas may restrict movement between habitat patches and decrease colonization of unoccupied yet suitable habitat. The highest likelihood of conserving populations is management of areas large enough to include many contiguous home ranges. The No Action alternative would not increase any large scale, high contrast fragmentation above existing level.

Direct and Indirect Effects: There would be no direct effects on the marten. No activities would occur that would cause disturbance to known denning or resting sites and no detections have been made in the analysis area. If present, based on elevation it is more likely the marten than the fisher would be affected by reduction in canopy cover and stand layering. Marten could be disturbed if denning, resting, foraging or traveling through the area.

Indirect effects of no action include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and create a more intense burn, which could lead to increased rates of spread resulting in potential loss of suitable forest carnivore habitat and other important prey habitat attributes such as large trees, large snags and large down wood.

Cumulative Effects: The "No Action" alternative for the Grass Flat Project would not provide for the long-term protection of forest carnivore habitat from wildfire. There would be no actions designed to reduce the risk of high intensity wildfire (refer to Fire and Fuels section). Total wildfire acres and high intensity wildfire acres are anticipated to increase from current levels under this alternative (based on analysis conducted in SNFPA (2001). Thinning would not occur which could reduce the level of root disease and enhance the growth of dominant and co-dominant trees that may provide future habitat availability (refer to Vegetation section within this document).

Action Alternatives: Alternatives B, B-Modified and C

Direct and Indirect Effects: Direct and indirect effects are expected to be low based on the following direction, standard and guidelines, protection measures and design features:

1) there are no known den/rest sites in the analysis area;
2) protocol level surveys were conducted within the analysis area in 2001/2002 for the Bald Mountain Project;
3) additional limited surveys were conducted in 2011 for the Grass Flat Project;
4) protection measures such as LOPs are included to protect any den or rest sites if they are located;
5) many acres of suitable mature/older forest habitat will be avoided because there will be no treatments in CSO PACs and no GS or mechanical thin treatments within NOGO PACs;
6) overall, treatments are not entering RHCAs except for understory burning and handcut/pile/burn, retaining riparian vegetation;
7) retention of large trees 30"dbh or greater;
8) retention of important habitat components, where available, such as 4 snags (15"dbh and greater) per acre on the landscape, and 10-15 tons (8-12 logs, 20" diameter and 10' length minimum) per acre of large down wood and;
9) any treatments within riparian areas would be to maintain or restore habitat.
10) almost half of the treatments are within or around campgrounds and access roads which are not optimum for nesting habitat due to higher levels of human disturbance or along ridge-tops which are not considered preferred nesting habitat.

Refer to "Mitigations" in Appendices. Alternative B-Modified addresses the first three purposes and needs, and least effects suitable habitat for the American marten. One of the objectives of Alternative B-Modified is to retain a minimum 50% canopy cover for all size class 5s treated. Many of the acres of 5s identified for thin under Alternative B were already below or close to 50% canopy cover as a result they did not require thinning and were modified to other fuels treatments. The acres would still be treated by other fuels reduction treatments to lower surface fuels. Reducing the number of size class 5 acres treated, and retaining higher canopy covers, retains higher quality suitable habitat. This alternative would have the least effect on suitability of the habitat due to fewer acres treated and higher canopy cover retention as compared to Alternative B. Under the preferred alternative, Alternative B-Modified, the majority of the size class 5s would not have GS or be mechanically thinned. Alternative B would have the greatest effect on suitability of the habitat for travel and foraging (or nesting) due to the reduction canopy cover, canopy cover reduced to below suitability and the reduction of understory layers. Although not as intensive as Alternative B, Alternative C reduces the percent canopy cover on more acres then Alternative B-Modified.

Project treatments are expected to improve habitat conditions for the long-term. The 2004 SNFPA ROD identifies higher than average canopy closure as habitat attributes important to the marten, stating a minimum of 40 percent canopy cover needed. Forest carnivores primarily travel and forage along rivers and streams, whereas they den and forage within mature/old forest habitat. The mature/old forest blocks are predominately encompassed by CSO PACs and the NOGO PACs within Grass Flat analysis area. In addition, riparian zones, used as travel corridors, in general would be maintained or improved.

The effects are mainly short-term in nature. Size class 4 trees stands that are thinned would grow into size class 5 stands. Size class 5 stands are retaining at least the minimum level of suitability. It is predominately the surface fuels that would be removed: 1) none of the trees 0-6" dbh would be retained; and 2) very few of the trees 6-11" dbh would be retained. Some of the understory canopy cover of size class 4 (trees 11-24"dbh) would be retained. The overstory would be retained 1) the size class trees 24-30" dbh would actually increase; and the 30" and greater trees would only decrease slightly.

Group Selection

Group selection is proposed on **56** acres of suitable habitat for Alternative B and B-modified. The 56 acres is **1%** of the total suitable habitat (5,411 acres) within the analysis area and was considered in the overall percent canopy cover reductions. Alternative C does not propose any GS treatment.

Denning/Resting Habitat (5D and 4D): Alternatives B and B-Modified propose removal of **6** acres of suitable denning/resting habitat by group selection: 1 acre of 5D and 6 acres of 4D. The **6 acres is 0.5%** of what is typed as suitable denning/resting habitat within the analysis area.

Travel/Foraging Habitat (5M and 4M): Alternatives B and B-Modified propose removal of **49** acres of suitable travel/foraging habitat by group selection: 23 acre of 5M and 26 acres of 4M. The **49 acres 1%** of what is typed as suitable travel/foraging habitat within the analysis area.

Alternative C does not propose any GS treatment. Group selection was considered in the overall percent canopy cover reductions for Alternatives B and B-Modified. The majority of trees would be removed but retain an estimate of 6-8 trees per acre that are 30" dbh or greater. It is expected that since the quantity of proposed GS is comparatively low and that they are fairly well dispersed, within the analysis area that the overall affects on suitable habitat would be low.

Mechanical Thin

Of the 5,411 acres of suitable marten habitat within the analysis area, habitat would be reduced on **562** acres (**10.4%**) under Alternative B, **200** acres (**3.7%**) under Alternative B-Modified and **292** acres (**5.4%**) under Alternative C. All three action alternatives reduce some level of suitable habitat. However, the number of acres treated and the percent of canopy cover reduction under Alternative B could have a much greater impact on marten then Alternative B-Modified or even Alternative C. Alternative B-Modified reduces suitable habitat on the fewest acres and retains the highest canopy covers. Alternative C treats more acres then Alternative B-Modified and has a higher percent canopy cover reduction on size class 5s.

Denning/Resting Habitat (5D and 4D): The major difference between action alternatives is the number of 5D/4D acres thinned and the percent canopy cover reduction. Alternative B thins the most acres of 5D/4D stands and has the greatest overall percent canopy cover reduction. Alternative B-Modified thins the fewest acres and retains the highest percent canopy cover. Alternative C falls somewhere in between Alternatives B and B-Modified.

- ***Alternative B:*** 75 acres of 5D/4D would be thinned, 35 acres remain suitable habitat but 40 acres become unsuitable habitat.
- ***Alternative B-Modified*:** 30 acres of 5D/4D thinned down to unsuitable habitat.
- ***Alternative C*:** 53 acres of 5D/4D thinned down to unsuitable habitat.

Foraging/Travel Habitat (5M and 4M): The major difference between action alternatives is the number of 5M/4M acres thinned and the percent canopy cover reduction. Alternative B thins the most acres of 5M/4M stands and has the greatest overall percent canopy cover reduction. Alternative B-Modified thins the fewest acres and retains the highest percent canopy cover. Alternative C falls somewhere in between Alternatives B and B-Modified.

- ***Alternative B*:** 487 acres of 5M/4M thinned, 280 acres remain suitable habitat but 207 acres become unsuitable habitat.
- ***Alternative B-Modified*:** 170 acres of 5M/4M thinned and remain suitable.
- ***Alternative C*:** 239 acres of 5M/4M thinned and remain suitable.

Handcut/Grapple Pile, Handcut, Pile and Burn, Mastication and Underburn

Handcut/Grapple Pile, Handcut/Pile/Burn, Mastication and Underburn treatments would be removing surface and some ladder, fuels up to 9.9 inches dbh. Overall canopy covers and layers would not be reduced. One of the objectives of Alternative B-Modified (Preferred Alternative) is to retain a minimum 50% canopy cover for all size class 5s treated. Many of the acres of 5s identified for thin under Alternative B were already below or close to 50% canopy cover as a result they did not require thinning and the treatments proposed were modified to other fuels treatments. The acres would still be treated by other fuels reduction treatments to lower surface and ladder fuels.

Denning/Resting Habitat (5D and 4D): There could be a short-term disturbance for any marten utilizing the area for denning or resting. Alternative B-Modified would treat more acres of 5D/4D by fuels reduction treatments instead of thins which would reduce the canopy cover and layers. Alternative B proposes to treat fewer stands with HCGP, HCPB, mastication and underburn as these acres would be proposed for mechanical thin as well as a some secondary treatment of fuels reduction. Alternative C is closer to Alternative B-Modified.

- ***Alternative B*:** proposes to treat 232 acres
- ***Alternative B-Modified*:** proposes to treat 277 acres
- ***Alternative C*:** proposes to treat 261 acres

Foraging/Travel Habitat (5M and 4M): There could be a short-term disturbance for any marten utilizing the area for foraging or travel. Alternative B-Modified would treat more acres of 5M/4M by fuels reduction treatments instead of thin treatments which would reduce the canopy cover and layers. Alternative B proposes to treat fewer stands with HCGP, HCPB, mastication and underburn as these acres would be proposed for mechanical thin as well as a some secondary treatment of fuels reduction. Alternative C falls closer to Alternatives B.

- ***Alternative B*:** proposes to treat 249 acres
- ***Alternative B-Modified*:** proposes to treat 396 acres
- ***Alternative C*:** proposes to treat 280 acres

Analysis indicates that prescribed burning would result in 60 to 80 percent mortality of conifers, hardwoods (10.0 inches or less), and most shrubs. Burns will be conducted to retain large trees, snags and large down wood. Prescribed burns leave a mosaic of burned and unburned areas, so some shrubs will remain to provide cover for carnivores and prey species using these areas. Habitat modification by these treatments would not affect the over story of mature forest stands in RHCA, used by carnivores as travel corridors.

The existing heavily traveled roads around the Grass Flat area fragment suitable habitat. It is expected that the marten would avoid the immediate roaded area. The road density is presently high for the project area and will remain so. There is no new road construction or road reconstruction proposed for this

project. However, 0.9 mile of new temporary road construction and 1.7 miles of temporary road reconstruction is proposed.

It is unknown as to how some of the important prey species (small mammals and birds) preferred by marten would respond to the DFPZ treatments but it is expected that the disturbance would be short-term disturbance. Small mammal availability is a subject being monitored by the Plumas-Lassen Administrative Study but results are not available.

Sanitation

Denning/Resting Habitat (5D and 4D) and Travel/Forage Habitat (5M and 4M): Suitable denning/resting habitat would not be treated but suitable travel/foraging habitat are proposed for treatment. Refer to discussion for sanitation under the California spotted owl**.**

Landings and Road Construction

Denning/Resting Habitat (5D and 4D) and Travel/Forage Habitat (5M and 4M): Alternative B and B-Modified would remove more acres of 5D/M and 4D/M compared to Alternative C primarily due to the Group Selection treatments which are not proposed for Alternative C. Refer to discussion for sanitation under the California spotted owl**.**

Cumulative Effects: Cumulative effects are expected to be low. There are no known unavoidable adverse effects. Cumulative effects on the American marten habitat could occur with the incremental reduction of the quantity and/or quality of habitat for these species. Historic fires, timber harvests, recreational use and fire suppressions have extensively modified habitat of the Marten. Overall, increases in urbanization, increases in recreational use of Forest Service system lands, and the utilization of natural resources on state, private and federal lands may contribute to habitat loss for this species. High intensity stand replacement fires, and the methods land managers utilize to control them, have contributed and may continue to contribute to loss of habitat for this species. Cumulative effects on the American Marten could occur if incremental amounts of habitat are lost through a variety of activities over time.

The proposed Action Alternative would not increase any large-scale, high-contrast fragmentation above existing levels. The design features of DFPZs would retain habitat elements within the range of those used by the marten for foraging and dispersal, such that the DFPZs would likely note create large barriers to further expansion and connectivity to fisher habitat (BA/BE for the HFQLG FEIS, page 243). There have been historical detections of marten in the Grass Flat area since 1977.

The retention of nesting habitat within California Spotted Owl PACs, Northern goshawk habitat PACs and RHCAs will provide connectivity between large blocks of suitable habitat. In addition, implementation of Riparian Management Objectives (RMOs) (refer to the Hydrology and Aquatic sections) will also improve habitat conditions within riparian.

***Wildfire*:** Refer to the discussion above under CSO. The greatest concern for the American marten in the Sierra Nevada range is the risk of further fragmentation due to large stand replacing fire (2004 SNFPA FSEIS, page 244). The design features of DFPZs retain habitat elements within the range of those used by marten for foraging and dispersal such that they are not likely to create large barriers to further expansion and connectivity (Ibid, page 243). DFPZs are created as a strategic location to fight wildfires and protect communities but also may reduce the potential for large stand replacing fires.

The Truex/Zielinski 2005 paper "Short-term Effects of Fire and Fire Surrogate Treatments on Fisher Habitat in the Sierra Nevada" was reviewed. Measures to mitigate short-term effects, as suggested in the paper, were considered and applied were feasible and applicable. SNFPA ROD 2004 and HFQLG FEIS 1999 "Standards and Guidelines" were applied to retain large trees, snags, large woody material and large

oaks, thereby reducing effects of implementing fuels-reduction ("Fire and Fire Surrogate") treatments such as mechanical harvest, mechanical harvest followed by burn and fire (underburn) only treatments. The paper also states, "The short-term effects of treatments may be mitigated by the beneficial effects of the treatments on subsequent stand development". Marten could be affected by prescribed underburns if they are utilizing an area. They could be directly affected by the fire or by smoke inhalation. The size of the burned area will be small and adults could escape. However, if there were den sites the young could perish since they would not be able to escape.

***Studies/Reports*:** The HFQLG Independent Science Panel "Red Flag" Issue Monitoring Report-2008 recommended that the following question be addressed: "Does DFPZ implementation present a risk to marten movement or marten habitat connectivity?" The publication "Decline in American Marten Occupancy Rates at Sagehen Experimental Forest, California" states "Marten detections in 2007-2008 were 60% lower than in surveys in the 1980s. No martens were detected at lower elevations where most of the recent forest management activity occurred. We suggest that the marten population at SEF has been negatively affected by the loss and fragmentation of habitat. We recommend that future management of forests in the Sagehen basin focus on restoring and connecting residual marten habitat to improve habitat quality for marten" (Moriarty et al 2011). Also of concern is the mortality of radiocollared marten in the study area on the Lassen NF.

***Connectivity*:** In 2009 a "least-cost path (corridor)" analysis for the Plumas NF was modeled connecting the Lassen NF to the Tahoe NF for the marten. This form of GIS modeling uses a cost/risk surface to evaluate potential animal movement pathways by increasing 'travel costs' in vegetation types they are not commonly associated with (Kirk and Zielinski 2009). The marten "path" runs directly across the Grass Flat area which also contains the best habitat which provides the "least-cost" pathway. Outside of private lands (timber industry and homeowners) in the Grass Flat area there is a very limited "path" for marten around the Little Grass Valley Reservoir. The path is also affected by the level of recreational use in the area. Grass Flat is at the lower end of the marten range.

***Uncertainty*:** A potential effect from the proposed DFPZ and forest health treatments is the reduction in the quality of suitable habitat. The key uncertainties related to viability in the Sierra Nevada include (1) factors driving population trends; (2) habitat relationships and habitat quality; (3) current distribution, amount, and quality of habitat; and (4) treatment effects, including fuels and silvicultural treatments, on habitat and populations at multiple scales.

There is a degree of uncertainty as to risk of potential wildfire and disease if treatments were implemented to a lesser degree such as under Alternative C, thereby retaining habitat that is more suitable in terms of canopy cover and layering. Refer to the Fire&Fuels and Vegetation sections within this document. Wildfires are most likely to occur due to recreational activity and private land use in the area which directs the *need* to more aggressively address fuels and tree spacing (canopy closure). An identified "need" is to control the root rot disease in the Grass Flat area. However, diseased trees, especially fir, are important den/rest trees for marten.

Summary of Cumulative Effects

The cumulative effects of this project on wildlife species include those effects from past, present, and reasonably foreseeable projects occurring in the Grass Flat Project wildlife analysis area, which includes 9,076 acres of National Forest System land. Past activities are considered part of the existing condition and are discussed in the "Affected Environment and Existing Conditions", and "Environmental Effects" sections for each resource.

Determinations

Refer to Table 3.66 for a summary of effect determinations for wildlife species that potentially occur within the planning area and could be affected by implementation of the Grass Flat Fuels Reduction Project.

Alternative A (No Action)

The following determinations are based on the potential for habitat loss due to wildfires or disease:

Federally Protected Species with a Will Not Effect Determination: It is my determination that the no action alternative may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability the **Bald eagle.**

Forest Sensitive Species with a Will Not Affect Determination: It is my determination that the no action alternative may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability the **California spotted owl, Northern goshawk and American marten.**

Action Alternatives: B, B-Modified and C

The following determinations are based on the potential for habitat loss and the reduction of habitat quality due toreductions in canopy cover:

Federally Protected Species with a May Effect Determination: It is my determination that Alternatives B, B-Modified and C may affect the **Bald eagle**.

Forest Sensitive Species with a May Affect Determination: It is my determination that Alternatives B, B-Modified and C may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the **California spotted owl, Northern goshawk and American marten.**

Table 3.66. Summary of effects for wildlife species which could be affected by the Grass Flat Hazardous Fuels Reduction and Forest Health Project.

SPECIES		ALTERNATIVES		
	A	B	B-Modified	C
Bald Eagle (*Haliaeetus leucocephalus*)	MAI	MAI	MAI	MAI
Northern goshawk (*Accipiter gentilis*)	MAI	MAI	MAI	MAI
California spotted owl (*Strix occidentalis occidentalis*)	MAI	MAI	MAI	MAI
American marten (*Martes americana*)	MAI	MAI	MAI	MAI

MAI = May Affect Individuals

Federal, State, and Local Agencies

United States Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) issued the species list for the Plumas National Forest on April 23, 2003 (USFWS reference 1-1-03-SP-1810), and updated the computer database on September 18, 2011. The list fulfills the requirement to provide a current species list pursuant to Section 7(c) of the *Endangered Species Act*, as amended. The department was contacted during scoping for the Grass Flat Project and was provided with the proposed actions.

No adverse effects to Threatened, Endangered or Proposed species were expected to occur as a result of the proposed action therefore informal consultation was not initiated. It was determined through early involvement with the USFWS that proposed treatments would not impact the habitat of these species based on limited habitat available, and/or no detections from surveys, and/or applied mitigation measures and design features.

California Department of Fish and Game

The department was contacted during scoping for the Grass Flat Project and was provided with the proposed action. The department manages wildlife populations for the state of California, with an emphasis typically on game species such as the local deer herds and associated habitats.

Chapter 4 Consultation and Collaboration

4.1 Preparers and Contributors

During the development of this environmental assessment, the Forest Service consulted with the following: individuals, federal, state, and local agencies, tribes, and non-Forest Service persons.

Cindy Roberts	Aquatic/Wildlife Biologist
Oswaldo Angulo/Danding Gan	Hydrologist/Soil Science
Carvel Bass	GIS Coordinator
Deirdre Cherry	Fire and Fuels Officer
Mary Mayeda	Transportation/Logging Systems
Karen Hayden	District Ranger
Lawrence Janeway	Botanist
Jamie Moore	Archaeologist
Deb Schoenberg	Recreation/Lands
Dan Smith	Ecosystem Operations
Sharen Parker	NEPA Planner/Team Leader
Judy Welles/Dan Roskopf	Silviculture/Economics
Donna Duncan	Minerals Administrator

4.1.2 Federal, State, and Local Agencies

United States Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) issued the species list for the Plumas National Forest on April 23, 2003 (USFWS reference 1-1-03-SP-1810), and updated the computer database on August 13, 2010. The list fulfills the requirement to provide a current species list pursuant to Section 7(c) of the *Endangered Species Act*, as amended. The department was contacted during scoping for the Grass Flat Project and was provided with the proposed actions.

Wildlife. No adverse effects to Threatened, Endangered or Proposed species were expected to occur as a result of the proposed action therefore informal consultation was not initiated. It was determined through early involvement with the USFWS that proposed treatments would not impact the habitat of these species based on limited habitat available, and/or no detections from surveys, and/or applied mitigation measures and design features.

Botanical. The Forest Service has not initiated formal consultation with the USFWS for threatened, endangered, or proposed plants because no such species were found to occur within the Grass Flat Project area.

California Department of Fish and Game - The department was contacted during scoping for the Grass Flat Project and was provided with the proposed action. The department manages wildlife populations for the state of California, with an emphasis typically on game species such as the local deer herds and associated habitats.

4.1.3 Organizations

The Forest Service began collaboration in 2006 by hosting community meetings for individuals and organizations interested in reducing wildland fire risk, cutting timber, and creating jobs, recreation, and protecting the environment in Plumas, Sierra, and Yuba Counties. The Grass Flat Project continues to develop through collaborative effort.

4.1.4 Local Agencies

Plumas County Fire Safe Council

Counties of Lassen, Plumas, Shasta, Sierra, and Tehama QLG Forester

La Porte Fire Department

4.1.5 Nongovernmental Organizations

Sierra Forest Legacy

Sierra Pacific Industries

South Feather Water and Power Company

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Glossary

90th percentile weather conditions – high air temperatures, low relative humidity, strong wind conditions and low fuel moisture content levels that historically have occurred on 10 percent of days during the fire season. It references potential fire behavior as a result of these conditions; a 90th percentile weather day has the potential for severe wildfire behavior. During the fire season 90 percent of days have less severe conditions and 10 percent of days have more severe conditions.

active crown fire - the independent movement of flames from a fire through the branches and top of the trees.

age class – a distinct aggregation of trees originating from a single natural event or regeneration activity.

backing fire – a prescribed fire that gradually burns downhill.

basal area – the combined area of the cross sections of tree boles at a height of 4.5 feet above the ground, generally given as square feet per acre.

biomass – limbs and foliage (parts of tree other than logs) that can be collected, chipped, or ground, then exported from the forest and used for power production or manufacture of wood fiber products.

blister rust – A disease caused by a fungus that commonly infects sugar pines and causes branch dieback and bole cankers leading to tree mortality if infection is severe enough.

California Wildlife Habitat Relationships (CWHR) — a system developed jointly by Forest Service Region 5 and the California Department of Fish and Game that classifies forest stands by dominant species types, tree sizes, and tree densities, then rates the resulting classes in regard to habitat value for various wildlife species or guilds. The CWHR system has three elements: (1) major tree-dominated vegetation associations, (2) tree size, and (3) canopy cover. Tree size and canopy cover classes are:

Tree Size Classes

1 = Seeding (less than inch dbh)
2 = Sapling (1-6 inches dbh)
3 = Pole (6-11 inches dbh)
4 = Small (11-24 inches dbh)
5 = Medium/Large (greater than 24 inches dbh)
6 = Multilayered (size class 5 over a distinct layer of size 3 or 4, total canopy greater than 60-percent closure). In this EIS, class 6 is included in class 5.

Canopy Cover Classes

S = Sparse Cover (10-24 percent canopy closure)
O = Open Cover (25-39 percent canopy closure)
M = Moderate Cover (40-59 percent canopy closure)
D = Dense Cover (greater than 60 percent canopy cover)

canopy— the branches and foliage of trees (as distinct from the stem or bole).

canopy base height — the height above the ground of the first canopy layer where the density of the crown mass within the layer is high enough to support vertical movement of fire.

canopy cover — the ground area covered by tree crowns, or the degree to which the canopy blocks sunlight or obscures the sky, expressed as a percent ground area; also referred to as canopy closure or crown cover.

Defensible Fuel Profile Zone (DFPZ) — a zone approximately 0.25 miles wide accessible to firefighters (usually along roads) in which fuel loads are light enough to cause approaching crown fires to drop to the ground where it may successfully be attacked by ground forces during 90th percentile weather conditions.

Equivalent Roaded Area (ERA) — a conceptual unit of measure used to assess ground-disturbing activities. All landscape disturbances are evaluated in comparison to a completely impervious or roaded surfaces. Road surfaces are considered to represent 100 percent hydrologic disturbance, with maximum rainfall-runoff potential. Other ground-disturbing activities are assigned disturbance coefficients that represent a typical ratio of their hydrologic impact compared to the same roaded area. Disturbance coefficients are assigned based on local conditions. In a given watershed, disturbances are added together to determine a cumulative equivalent roaded area compared to the Threshold of Concern.

fireline – A corridor which has been cleared of organic material to expose mineral soil. Firelines may be constructed by hand or by mechanical equipment (e.g. dozers).

fire type — a description of how fire burns, such as on the forest floor (suface) or in the tree crowns.

flame length — the length of flame measured in feet. Increased flame lengths increase resistance to control and likelihood of torching events and crown fires.

fuel loading — the weight of fuel (vegetative matter both living and dead) present at a given site, usually expressed in tons per acre. This value generally refers to the fuel that would be available for consumption by fire.

grapple piling – see machine piling.

Group selection – a silviculture system that involves harvest of small areas of trees (generally less than two acres). Implementation results in uneven-aged management (all-aged) forests consisting of small even-aged (same-aged) groups. Harvest openings must be large enough to allow for sufficient sunlight for regeneration tree seedlings to establish and grow.

hand piling – piling by hand branches and limbs from tree harvests or thinning for burning at a later time.

hazard tree - any dead or dying tree, or dead parts of live trees (dead tops and limbs), or unstable live trees that are within striking distance of structures, forest visitors, vehicles, or other property and has the potential to cause property damage, personal injury or fatality in the event of a failure.

Interdisciplinary Team (ID Team) — the team of Forest Service resource specialists involved in project planning and analysis. The ID Team members for the Slapjack Project are listed at the beginning of this chapter.

ladder (fuel) — shrubs or trees that connect fuels at the forest floor to the tree crowns.

landings — forested openings that are cleared of vegetation, leveled and graded and used to store (deck) logs and eventually to load log trucks for haul to the mill.

late-successional old-growth ranks 4 and 5 — late mature successional stages of forest trees, as defined by the Sierra Nevada Ecosystem Project (volume II, appendix 21.1)

machine piling – piling of branches and limbs from tree harvest or thinning, using mechanical equipment. Machine piles are generally burned at a later time.

mastication – mechanical grinding of harvest residue or thinnings. Masticated material is usually left scattered on the harvest site.

mechanical thinning – the use of tractors, cable systems, or helicopters to remove trees that have been cut by chainsaws, or the use of the feller-bunchers – wheeled vehicles with lopping shears or saws that cut and collect trees and carry them to the landing site.

operability — the ability to conduct vegetation management operations, which include construction of access roads and log landings, use of cable logging systems, clearing of central skid trails for tractor logging, and removal of trees that pose hazards to forest workers.

particulate matter — the general term used for a mixture of solid particles and liquid droplets found in the air. Some particles are large enough to be seen as dust or dirt. Others are so small they can be detected only with an electron microscope. PM2.5 describes the "fine" particles that are less than or equal to 2.5µm in diameter. "Coarse fraction" particles are greater than 2.5 µm, but less than or equal to 10µm in diameter.

piling and burning — piling harvest or thinning residues (branches and limbs) and burning them when moisture content has been reduced through evaporation, wildfire hazard is low, and atmospheric conditions are favorable for dispersal of smoke.

prescribed burning — fire purposefully ignited to achieve a beneficial purpose, such as reducing fuels on the forest floor or fuels generated by logging or thinning forest trees.

Riparian Habitat Conservation Areas (RHCA) — zones of specified widths along streams and watercourses and around lakes and wetlands that vary according to stream or feature type, as described in the Scientific Analysis Team guidelines.

road decommissioning – culvert removal and removal of stream-crossing fills, and regarding of the road prism, to restore natural slope, natural contours and watercourse morphology.

road closure – barricading of roads to prevent use until required for future management actions.

road reconstruction – reconstruction of an existing road in or adjacent to its current location to improve capacity and/or correct drainage problems.

sanitation cutting - the removal of trees or parts of trees (pruning/topping) to improve stand health by stopping or reducing actual or anticipated spread of insects and disease.

shade tolerant — species (such as ponderosa pine) that require full, open sunlight on the forest floor to establish and grow).

silviculture — a branch of forestry dealing with the development and care of forests.

size class — a classification of forest stands based on the average diameter of trees in the stand.

snag — a dead standing tree.

subsoiling — performed after vegetation treatments, wherein mechanized equipment is used to till compacted soil to reduce soil compaction and consequent erosion.

Threshold of Concern (TOC) — describes the amount of disturbance when detrimental response may begin to occur. Estimates of watershed "tolerance" to land use may be established based on basin-specific experience, comparison with similar basins, and modeling of watershed response. These indices of allowable levels of disturbance are called Thresholds of Concern. The tolerance of a watershed is used to prescribe mitigations measures to prevent detrimental responses. The TOC does not represent an exact level of disturbance above which cumulative watershed effects will occur. Rather, it serves as a "yellow flag" indicator of increased risk of significant adverse cumulative effects occurring within a watershed. It is compared to the equivalent roaded area score, and its units of measure are expressed as percent disturbed and percent of TOC.

un-even aged — a stand of trees of three or more distinct age classes, wither inter-mixed or in small groups. Uneven-aged silvicultural systems are a planned sequences of treatments designed to maintain and regenerate a stand with three or more age classes.

whole tree yarding — the whole-tree harvest method is where trees are felled at the stump and skidded to the landing for de-limbing, bucking and processing. Large trees may be bucked in the treatment unit to facilitate removal to the landing and reduce skidding damage to residual trees. Most activity slash would be removed.

Wildland Urban Interface — the area, or zone, where structures and other human development meet or intermingle with underdeveloped wildland or vegetative fuels. It generally extends out for 1.5 miles from the edge of developed private land into the wildland.

Index of Appendices

Appendix A - Mitigations

Appendix B - Recreation Area Design Features and Restoration Opportunities

Appendix C - Map Details of Restoration Opportunities other than Recreation: Meadows, Culverts, Planting, and Stream Re-Alignment

Appendix D - Past, Present, and Future Foreseeable Activities

Appendix E - Unit Treatment Descriptions by Alternatives

APPENDIX A

Mitigation Measures

The following mitigation measures are applicable to all action alternatives (B, Modified B and C) and would be applied during implementation, if selected.

Botany

Revegetation of disturbed areas with native species:

- All activities that require seeding or planting will need to use only locally collected native seed sources. Examples of proposed activities that may need to be seeded are road closures, landings, or skid trails. This will implement the USFS Region 5 policy (Stewart, 1994) that directs the use of native plant material for revegetation and restoration for maintaining "the overall national goal of conserving the biodiversity, health, productivity, and sustainable use of forest, rangeland, and aquatic ecosystems." An alternative method of erosion control where erosion is a particular concern and where adequate sources of local native seed are not available is to use weed-free seed or weed-free straw with seed-heads of non-persistent cereal grains such as white oats. This will provide erosion control until native species can naturally seed in. Use K-V or other funds as available for collecting and planting native grasses for revegetation of disturbed areas.

TESP and Special Interest Plants:

Unit	Common name	Mitigation
1037	Jepson's onion	No burn piles.
1037	Ahart's sulfur flower	No burn piles.
1037	Sierra rayless daisy	No burn piles.
1041	Butte County calycadenia	No burn piles.
1041	Cut-leaved ragwort	No burn piles.
1041	Ahart's sulfur flower	No burn piles.
1043	Cut-leaved ragwort	No burn piles.
1045	Jepson's onion	No burn piles.
1045	Jepson's onion	No burn piles.
1045	Ahart's sulfur flower	No burn piles.
1060	Ahart's sulfur flower	No burn piles.
1067	Jepson's onion	No burn piles.
1067	Cut-leaved ragwort	No burn piles.
1071	Jepson's onion	No burn piles.
1071	Butte County fritillary	No burn piles.

- Pile burning impacts will be minimized through the use of control areas to prevent pile burning in areas of concentrated plants.

Noxious Weeds:

The Standard Management Requirements (SMRs) are based on the priorities established in FSM 2081.2 which states "where funds and other resources do not permit undertaking all desired measures, address and schedule noxious weed prevention and control in the following order:

First Priority: Prevent the introduction of new invaders,
Second Priority: Conduct early treatment of new infestations, and
Third Priority: Contain and control established infestations."

1. Prevention/Cleaning: Require all off-road equipment and vehicles (Forest Service and contracted) used for project implementation to be weed-free. Clean all equipment and vehicles of all attached mud, dirt and plant parts. This will be done at a vehicle washing station or steam cleaning facility before the equipment and vehicles enter the project area. Cleaning is not required for vehicles that will stay on the roadway. Also, all off-road equipment must be cleaned prior to leaving areas infested with noxious weeds.

2. Prevention/Road Construction, Reconstruction, and Maintenance: All earth-moving equipment, gravel, fill, or other materials need to be weed free. Use onsite sand, gravel, rock or organic matter where possible.
3. Prevention/Revegetation: Use weed-free equipment, mulches, and seed sources. Avoid seeding in areas where revegetation will occur naturally, unless noxious weeds are a concern. Save topsoil from disturbance and put it back to use in onsite revegetation, unless contaminated with noxious weeds. All activities that require seeding or planting will need to use only locally collected native seed sources. Plant and seed material would be collected from as close to the project area as possible, from within the same watershed and at a similar elevation whenever possible. Persistent non-natives such as timothy, orchardgrass, or ryegrass will be avoided. This will implement the USFS Region 5 policy that directs the use of native plant material for revegetation and restoration for maintaining "the overall national goal of conserving the biodiversity, health, productivity, and sustainable use of forest, rangeland, and aquatic ecosystems."
4. Prevention/Staging Areas: Do not stage equipment, materials, or crews in noxious weed infested areas where there is a risk of spread to areas of low infestation.
5. Small infestations identified during project implementation will be evaluated and hand treated or "flagged and avoided" according to the species present and project constraints. If larger infestations are identified after implementation, they would be isolated and avoided with equipment (and equipment washed as in # 1 above).

The following prevention measures will be implemented on the Feather River Ranger District:

- Clean all ground disturbing equipment, such as masticators, harvesters, and other off-road equipment before entering National Forest System land.
- Use weed free fill and mulch.
- Avoid staging equipment on or immediately adjacent to any of the identified noxious weed sites.
- Within mechanical treatment units, exclude all equipment from known infestations. A 25 foot "No Equipment" buffer will be placed around infestations. These areas will be identified on project maps and on the ground with day-glow orange noxious weed flagging.
- Wash equipment before leaving an infested weed unit and entering an uninfested unit. Infested units are listed in the table below.
- Pull known infestations of weeds.
- Where mulch is needed for ground cover and slash or wood chips are not available, certified weed-free straw or rice straw will be used.
- Utilize road surface gravel from weed-free sources. Pre-inspect gravel sources for the presence/absence of noxious weeds prior to utilization of gravel from those sources.

The following Controlled Areas (CAs) will be applied to prevent the spread of Noxious Weeds. CAs are generally a small portion of a Unit. STAY OUT OF THESE CAs EXCEPT AS OTHERWISE NOTED BELOW.

Unit	Common name	Mitigation
1007	Yellow starthistle	Pile burn on top of weeds.
1007	Rush skeleton weed	Pile burn on top of weeds.

1017	Yellow starthistle	Use takifier or cover weeds with gravel prior to use.
1017	Barbed goatgrass	Use takifier or cover weeds with gravel prior to use.
1025	Yellow starthistle	
1025	Rush skeleton weed	
1027	Yellow starthistle	
1027	Rush skeleton weed	
1027	French broom	
1028	Yellow starthistle	Pile burn on top of weeds.
1029	Rush skeleton weed	
1044	Yellow starthistle	
1051	Rush skeleton weed	Pile burn on top of weeds.
1052	French broom	
1061	French broom	
1069	French broom	
1070	French broom	
1070	Spanish broom	
1072	French broom	Pile burn on top of weeds.
1082	French broom	
1086	French broom	Pile burn on top of weeds.
1088	Spanish broom	

Recreation/Scenery/Lands/Minerals

- Dispose of slash in the visual foreground of major roadways, neighborhoods, recreation areas/site and authorized special uses.
- Flush Cut stumps within the visual foreground (approximately 600') of major roadways, neighborhoods and recreation areas/sites.
- Restore the surface of the ground, disturbed by yarding, mastication, tractor pilling and other mechanical operations within the visual foreground (approximately 600') of major roadways, neighborhoods/communities, and recreation areas/sites.
- Protect access to private properties, and uses authorized under special use permit or active mining operations.
- Avoid cull decks or landings with the visual foreground (approximately 600') as seen from major roadways, neighborhoods or recreation sites.
- Do not yard cull logs to decks within approximately 600' of major roadways, neighborhoods, or recreation sites.
- Protect all overhead utility lines and underground utilities by establishing a clear, avoidance area of 100' from centerline of line or corridor
- Protect any improvements within road right of ways.
- Recreational use of project area could be limited during implementation phase.

See Appendix C for a detail approach to mitigation and design features for Recreation/

Wildlife

The following Standards and Guidelines are from pages 2-6 through 2-14 of the 1999 HFQLG FEIS and Table 2 (page 69) of the 2004 SNFPA ROD and will be followed for this project. These actions must be implemented in full for determination statements to be valid.

C-Clauses

- C6.24-B6.24 - Protection of Habitat of TEPS Species (10/78): Location of areas needing special measures for protection of animals (or plants) as Threatened, Endangered, Proposed or species under the ESA of 1973 and R5 Sensitive Species are shown on map and or discussed in this document. If protection measures prove inadequate, if other such areas are discovered, or if new species are listed on the Endangered Species List, FS may either cancel under C8.2 or unilaterally modify this contract to provide additional protection regardless of when such facts become known. Discovery of such areas by either party shall be promptly reported to the other party.

- CT6.313 - Limited Operating Period (1/84): Except when agreed otherwise, Purchaser's operations shall be "limited" as described within this document.

- C6.7 – C6.705 Logs not meeting utilization standards shall be used to meet the Land and Resource Management Plan as amended requirements. Logs would be evenly distributed within the units (stands) to the extent possible.

- If new TEPS species are listed or discovered within an area in which they may be adversely affected by activities, protection measures such as LOPs will be implemented as recommended by a qualified biologist, as appropriate for the species. The dates and reason for delaying harvest would be included in C6.313 Limited Operating (1/84), or other language that is appropriate for the type of contract.

Limiting Operating Periods

- LOPs are designed to reduce potential harm/harassment to wildlife during critical seasons, primarily nesting and their offspring seasons, when animals are most vulnerable to activities (running equipment, timber harvest, and hauling, burning, operating chainsaws/brush cutters) that could result in failed nesting attempts.
- If new activity centers are located, unit prescriptions may be adjusted (an example might be to drop a treatment or have no harvest around the nest tree or a LOP.
- If management objectives cannot be met by implementing the LOPs identified, a qualified biologist will be consulted to determine more specific areas and kinds of activities that may be pursued. The biologist may recommend removing LOPs, if sufficient information is provided by additional surveys or new information arises.
- If potential raptor nests, large stick nests, or signs of active denning are observed in or near trees that are designated for removal, the occurrence and location would be reported to a biologist to determine the need for further review. During marking of the timber sale, potential raptor nest trees will be identified and reported to the District Biologist.

SPECIES	LOCATION	LIMITED OPERATING PERIOD
Bald Eagle	Within designated territories	November 1 through August 31
California Spotted Owl	Within ¼ mile of a protected activity center boundary	March 1 – August 15
Northern Goshawk	Within ¼ mile of territory or active nest site	February 15 – September 15
American Marten den	100 acre den site buffer	May 1 – August 1
Pacific Fisher den	700 acre den site buffer	March 1 – July 1
Pallid Bat **Townsend's Big-eared Bat**	Within ¼ mile of maternity and other roosts	April 1 – October 31
Mountain Yellow-legged Frog	Where suitable habitat is found	*October 15 or the 1st wetting rain greater than ¼ inch

***If a weather system resulting in more than ¼ inch of precipitation occurs in project area, operations must be suspended until a dry period of 72 hours occurs, unless the district biologist determines there will be no effect to frogs.**

	UNITS		
SPECIES	Alternative B	Alternative B-Modified	Alternative C
Bald Eagle	038, 039, 040	038, 039, 040	038, 039, 040
California Spotted Owl	752	none	none
Northern Goshawk	968, 969, 910, 004, 002 937, 872 125, 116 949, 950	968, 969, 974, 910, 004, 002 937 125, 116 949, 950	968, 969 910 937 125,116 949, 950
Mountain Yellow-legged Frog	116, 996	116, 996	116

Surveys

- Surveying of areas of suitable habitat, to protocols based on the best available science, to determine information relevant to implementation of site-specific resource management activities.

  - Bald Eagle (BE): Surveys would be conducted in summer 2012 to determine where the Little Grass Valley Reservoir eagle pair are nesting and which roost and perch trees they are utilizing. At a minimum, it is expected that nest/roost/perch trees around the Peninsula will be utilized.

  - California Spotted Owl: If new activity centers are located, unit prescriptions may be adjusted (an example might be to drop a treatment or have no harvest around the nest tree or a LOP). A new Protected Activity Center (PAC) and Home Range Core Area (HRCA) would be created if any new activity centers can not be covered by existing PACs.

  - Northern Goshawk (NOGO): If new activity centers are located, unit prescriptions may be adjusted (an example might be to drop a treatment or have no harvest around the nest tree or a LOP). A new PAC would be created if any new activity centers can not be covered by existing PACs.

  - Mountain Yellow-legged Frog (MYLF): Soma additional surveys may be conducted in 2012. Proposed treatments may be modified if a new population is located.

Snags

- Within westside vegetation types, generally retain an average over the treatment unit of 10-15 tons of large down wood per acre (equivalent to 8-12 logs per acre ≥ 20-inche dbh and 10 foot in length or longer).
- In westside mixed conifer and ponderosa pine types, retain four of the largest snags per acre.
- Use snags larger than 15 inches dbh to meet the above guidelines.

  - Retain all snags 15" or greater, except for those that are a safety hazard.
  - Sanitation (removal of hazard or defect trees) needs to be reviewed by biologist prior to final mark and implementation since it in not specific at this time which trees would be removed.
    Areas of high sensitiveity for the Bald Eagle are units **021, 039, 038, 041, 934, 955** and **957**.
    Area of high sensitivity for the MYLF are units **021, 110, 888, 993** and **995**.
    Areas of moderate sensitivity for MYLF and NOGO are units 108, 109, 124, 968, 969, 970, 971, 972 and 974.

Large Down Wood

- Determine retention levels of down woody material on an individual project basis. Within Westside vegetation types, generally retain an average over the treatment unit of 10-15 tons of large down wood per acre. Emphasize retention of wood that is in the earliest stages of decay. Consider the effects of follow-up prescribed fire in achieving desired retention levels of down wood.

  - Do not Yard Unmerchanable Material (YUM) logs 20"diameter and minimum 10' length, but to leave the cull logs to meet the large down wood standard which is presently deficit.
  - Refer to Sanitiation under snags above.

Riparian and Aquatic

Riparian Management Objectives (RMOs)

- Management activities in RHCAs must contribute to improving or maintaining watershed and aquatic habitat conditions described in the Riparian Management Objectives (RMOs). Where riparian conditions are presently degraded and a determination that no action would result in adverse effects, management activities must be designed to improve habitat conditions and meet RMOs. RHCA widths shall be consistent with RMOs and Scientific Analysis Team (SAT) guidelines set forth in the HFQLG FEIS Appendix B. Treatments to achieve fuel or timber objectives within RHCAs are required to satisfy Riparian Management Objectives.

  - A description of how this project meets the **RMO**s is contained in the Appendices.

  - Refer to and apply the **Water Drafting Plan** as identified in the Appendices. Locate and manage water-drafting sites to minimize adverse effects on amphibians, sedimentation, instream flows required to maintain riparian resources, and channel condition.

  - Refer to Appendices and implement **Best Management Practices** *(*BMPs) to ensure water quality standards are met and riparian and upslope conditions are maintained or improved. All BMPs would be applied that re-distribute soil and debris to pre-treatment landscape contours to minimize sedimentation to creeks. Effectiveness monitoring of all applicable BMPs would occur.

Riparian Habitat Conservation Areas (RHCAs)

- The Lassen, Pumas, and Tahoe Forest Plans would be amended to apply the minimum protection riparian buffer widths prescribed by the Scientific Analysis Team guidelines (SAT). Scientific Analysis Team (SAT) Guidelines Table 5-4 (also HFQLG FEIS Table 2.15) defines how to delineate "interim boundaries" of RHCAs for different water bodies. The prescribed minimum widths as "interim boundaries" in RHCAs are:
  - 300 feet (perennial fish bearing streams and lakes),
  - 150 feet (perennial non-fish bearing streams, ponds, wetlands greater than 1 acre, and lakes), and
  - 100 feet (intermittent and ephemeral streams, wetlands less than 1 acre, and landslides). Features to in RHCA determination, (whichever is greatest) are: (1) top of inner gorge, (2) 100-year floodplain, (3) Outer edge of riparian vegetation, and (4) A distance equal to one or two tree heights.

  - Refer to RHCA buffers in the Hydrology section within the main body of this document.

  - Wherever possible, hand piles would be located away from riparian vegetation to prevent scorching. Slash piles within RHCAs shall not be burned during the LOP, and when burned,

would be burned with the provisions that 1) fuel not be dumped on the pile, but rather use fusees or light with a single propane torch, and 2) piles will be burned from a single location rather than multiple locations, allowing a sheltering frog to escape.

- During implementation of under burning, no ignitions would occur within RHCAs. Active ignition within the RHCA may occur with the Aquatic biologist or the Hydrologist approval when deemed beneficial to the RHCA. Fire would be allowed to back into an RHCA to achieve low intensity burning. All burning would be conducted on permissive burn days, within air quality constraints. Fire lines (control lines) include roads, skid trails, natural barriers and hand or machine lines (ATV or tractor). Hand line construction may occur within RHCAs, where it is necessary to enter the RHCA to provide for logistical boundaries in underburning the DFPZ.

Bald Eagle:

- Nest Trees/Site: Surveys would be conducted in summer 2010 to determine where the Little Butte Creek eagle pair are nesting and which roost and perch trees they are utilizing. At a minimum, it is expected that roost/perch trees around Paradise Lake will be utilized.
- If nesting status is determined, the limiting operating period (LOP) would be implemented around the nest stand, or as determined by the District Biologist. If any new occurrences of these species are detected during implementation of the project, the District Biologist will be notified for further evaluation before continuing operation.
- Treatment areas #1076 and #1064 are radial release/thins and may require a LOP if a eagle is found nests in the area. Treatment area #1089 is a handcut, pile and burn, and may require a LOP if an eagle is found nesting in the area.

California Spotted Owl:

- According to HFQLG Act, the spotted owl PACs and SOHAs cannot be entered into by resource management activity including DFPZ construction.
- Seasonal restrictions apply for unit treatments including road access from March 1 through August 15 within a ¼ mile of the designated activity centers.
- Conduct surveys prior to project implementation. California spotted owl surveys were conducted in 2005/2006 by the USFS. No owls were detected in the project area prior to the wildfire and now because of the wildfires no owls are expected to be nesting within the project area.
- If owls are located a LOP (March1 through August 15) will be required for treatment units where activity centers (nests, pair, young) have been located within ¼ mile of the treatment unit.
- If owls are located the LOP may be added or modified for this project by the district wildlife biologist. Stand prescriptions may be adjusted as well (an example might be to have no harvest around the nest tree, etc.).
- A new Protected Activity Center (PAC) and Home Range Core Area (HRCA) will be created if a new territory is discovered.

Northern Goshawk:

- Conduct surveys prior to project implementation. Surveys were conducted in 2005/2006.
- If goshawks are located a LOP (March1 through September 15) would be required for treatment units where active nests sites have been located within ¼ mile. The LOP may be added or modified for this project by the district wildlife biologist. Stand prescriptions may be adjusted as well (an example might be to have no harvest around the nest tree, etc.).
- A new PAC would be created if a resident, pair or nest is discovered.

Pallid Bat and Western Red Bat:

- If a roost is found, project activities will be modified to avoid impacts to bat species or a LOP (no activity May 15 to August 15, or as otherwise determined) may be applied during the breeding season. The District Wildlife Biologist will be contacted if any suspected or known bat roosts are located during project activities. If a roost is found, do not pile slash/burn piles, around the roost site.

Fire and Fuels

All prescribed burning units:

- Smoke management plan/Best Available Control Measures (BACM)/ Burn Plan
- Conduct prescribed burns when favorable smoke dispersal is forecasted, especially near sensitive Class I areas.
- Use appropriate smoke modeling software to predict smoke dispersion.
- Minimize smoke emissions by following Best Available Control Methods.
- Avoid burning on high visitor use days and notify the public before burning.
- Incorporate burn plan data into appropriate modeling software.
- Comply with Title 17 of the 2004 California Air Pollution Control Laws and interim air quality policy and local smoke management programs.
- Follow the Memorandum of Understanding on prescribe burning with the California Air Resources Board and the USDA Forest Service, Pacific Southwest Region.

All Harvest units:

- Mitigate dust from project activities by including standard dust abatement requirements in sale and project contracts

All WUI and RHCA units:

- Small diameter material 1-9 inches DBH will be hand cut, piled and burned adjacent to private property and in RHCA's within the DFPZ
- In areas sparse of vegetation, small diameter material may be lop and scattered, fuel loading will not exceed 5 tons per acre of material less than 3 inches in diameter

In burned areas:

- Mastication of material up to 11.9 inches DBH will be done to accelerate the dispersal of course woody debris and reduce snags per acre

In green stands:

- Mastication in green stands will include conifers 1 to 10.0 inches dbh unless needed for spacing and all shrubs greater than 18 inches in height.

Pileburn units:

- fuel load reduction piles created by machine and by hand

Underburn units:

- controlled underburn fuel load reduction method

Air Quality

The following operating procedures are from the HFQLG final EIS (1999) and the SNFPA final EIS (2001):

1. Mitigate dust from project activities by including standard dust abatement requirements in sale and project contracts.
2. Conduct prescribed burns when favorable smoke dispersal is forecasted, especially near sensitive Class I areas.
3. Use appropriate smoke modeling software to predict smoke dispersion.
4. Minimize smoke emissions by following Best Available Control Methods.
5. Avoid burning on high visitor days and notify the public before burning.
6. Consider alternatives to burning.
7. Incorporate burn plan data into appropriate modeling software.
8. Comply with Title 17 of the 2004 California air pollution control laws and interim air quality policy and local smoke management programs.

- Follow the Memorandum of Understanding on Prescribed Burning with the California Air Resources Board.

- Burning permits would be acquired from the Butte County and Feather River Air Quality Management Districts. The Air Quality District would determine days when burning is allowed. The California Air Resources Board (CARB) provides daily information on "burn" or "no burn" conditions. Burn plans will be designed and all fuel reduction burning will be implemented in a way to minimize emissions. Prescribed fire implementation will coordinate daily and seasonally with other burning permittees both inside and outside the forest boundary to help meet air quality standards.

Heritage Resources

Project Area:

- Standard resource protection measures for cultural resources set forward in the Regional 106 Compliance Programmatic Agreement, (USDA 2001).
- Flag and avoidance of sites.
- A map showing the location of all sites in the project area will be provided to the Forest Service project manager.
- Sites will be monitored during and after the project.
- If additional heritage resources are identified during project activities, all work shall stop in that area until the District Archaeologist assesses the situation.

All prescribed burning units:

- Historic sites must have fire lines placed around them so they are not burnt over.

Silviculture/Vegetation

All standard contract practices would be applied (timber sale contract B provisions) as would some additional C-provisions and site specific prescription mitigations. Recommended mitigations associated with vegetation management would be designed to reduce logging damage to residual trees, reduce fuels, and reduce opportunities for infection of trees by insects or disease.

Recommended mitigations include: (1) minimizing logging in the Spring when bark is loose and trees are more susceptible to logging wounds, (2) removal of small trees damaged beyond repair in harvesting operations, (3) no removal of specially-identified trees (eg, marked survey trees, genetically superior trees and proven rust resistant trees, 4) Canopy cover would be measured during project implementation (sale administrator or harvest inspector) to confirm a minimum of 40 percent canopy cover in DFPZs (CWHR Size Classes 5M, 5D and 6).

Project Area:

- No removal of specially identified trees(e.g. marked survey trees, superior gene trees, and rust resistant sugar pine
- All standard management practices would be applied (B provisions) as would some additional C provisions and site specific prescriptions. Recommended mitigations include removal of small trees damaged beyond repair during harvesting in thinning units.
- Canopy Cover would be measured during project implementation (sale administrator or harvest inspector) to confirm a minimum of 40 percent canopy cover in DFPZs

Hydrology/Soils

STREAMSIDE MANAGEMENT ZONE PLAN AND RESOURCE OBJECTIVES:

This plan describes goals, objectives and treatments for all streamside and riparian zones within the project area that would be impacted by management activities. As required by the Plumas Land and Resource Management Plan, this plan also identifies the vegetative treatments within riparian and streamside areas and the maximum amount of vegetation manipulation allowable to meet the stated objectives.

In addition, the maximum area of soil exposure allowable is identified, as well as the necessary erosion control measures to meet the stated objectives. This plan also assesses those areas "... within the SMZ having oversteepened slopes (over 60 percent) with a very high erosion potential or high instability, and procedures to limit soil disturbance to no more than 5 percent of these areas per decade". Specific prescriptions for roads, skid trails, landings and other harvesting facilities are referenced and opportunities and procedures for restoration of deteriorated watershed conditions are presented.

Definitions Used For Determining Riparian Habitat Conservation Areas and Streamside Management Zones:

Widths of Riparian Habitat Conservation Areas (RHCAs) were determined under the provisions of the Herger-Feinstein Quincy Library Group Forest Recovery Act Final Environmental Impact Statement (HFQLG FEIS) (USDA Forest Service, 1999). These guidelines were applied on the ground, and RHCAs were flagged as no-equipment zones.

The HFQLG FEIS Glossary defines these terms:

1. A perennial stream is a stream or portion of a stream that flows throughout the year. The groundwater table lies above the bed of the stream at all times.

3. An intermittent stream is any non-permanent flowing drainage feature having a definable channel and evidence of annual scour and deposition, including ephemeral streams with a definable channel and evidence of annual scour or deposition.

3. An ephemeral stream is a stream that contains running water only sporadically, such as during and following storm events. Ephemeral streams with a definable channel are considered "seasonally flowing" or intermittent when they show evidence of annual scour or deposition. Ephemeral streams without a definable channel are considered swales.

4. An ephemeral stream/swale is a shallow, trough-like depression in the landscape that may be hydraulically connected to stream channels downslope. Swales are sometimes referred to as those ephemeral channels having an undefined channel and no evidence of scour or deposition. Upslope precipitation, as rainfall or snowmelt, is generally concentrated in swales and directed towards definable stream channels as subsurface flow.

Scientific Analysis Team (SAT) Guidelines Table 5-4 (also HFQLG FEIS Table 2.15) defines how to delineate “interim boundaries” of RHCAs for different water bodies.
The prescribed minimum widths as "interim boundaries" in RHCAs are:

1. 300 feet (perennial fish bearing streams and lakes),

2. 150 feet (perennial non-fish bearing streams, ponds, wetlands greater than 1 acre, and lakes), and

3. 100 feet (intermittent and ephemeral streams, wetlands less than 1 acre, and landslides). Features to in RHCA determination, (whichever is greatest) are: (1) top of inner gorge, (2) 100-year floodplain, (3) Outer edge of riparian vegetation, and (4) A distance equal to one or two tree heights.

The average height of a site potential tree has been determined to be 150 feet on the Feather River Ranger District. This means a 150-foot RHCA buffer width is applied to seasonally flowing streams (intermittent or ephemeral) that have a definable channel and evidence of annual scour and deposition, instead of a 100 foot RHCA buffer.

Ephemeral streams with a defined channel but without evidence of annual scour and deposition occur on the Feather River Ranger District. These ephemeral streams may only scour during the two-, five- or ten-year storm event. This situation is frequent on the west side of the forest due to periodic high rainfall intensities or durations and to heavy organic litter accumulation (Taylor, 2002). If these ephemeral channels were not protected from mechanized ground-base equipment, stream degradation could result. Neither the SAT guidelines nor the HFQLG FEIS specify interim guideline widths for channels without annual scour. Language in Component 2 of Appendix L 6-7 allows for field-refined areas of RHCA protection. Guidelines were previously established in the Plumas National Forest Land Resource Management Plan Appendix M - Guidelines for Widths of Streamside Management Zones (SMZs). These guidelines establish an SMZ width for streams based on active stream channel and sideslope stability. The width of SMZs varies from 0 to 50 feet of either side of the stream reach. For ephemeral streams, the range is 25 to 50 feet. These streams are also protected by application of BMPs from the Regional handbook (USDA Forest Service 2000). Appropriate SMZs will be identified prior to initiation of vegetation management activities

Treatment units where the use of Sporax® is proposed:

- Pesticide Use Planning Process – To introduce water quality and hydrologic considerations into the pesticide use planning process.
- Pesticide Application According to Label Directions and Applicable Legal Requirements – To avoid water contamination by complying with all label instructions and restrictions for use.
- Pesticide Application Monitoring and Evaluation :

    - To determine whether pesticides have been applied safely, restricted to intended target areas, and have not resulted in unexpected non-target effects.
    - To document and provide early warning of possible hazardous conditions resulting from possible contamination of water or other non-target areas by pesticides.
    - To determine the extent, severity and possible duration of any potential hazard that might exist.
- Pesticide Spill Contingency Planning – To reduce contamination of water by accidental pesticide spills.
- Cleaning and Disposal of Pesticide Containers and Equipment – To prevent water contamination resulting from cleaning, or disposal of pesticide containers. The cleaning and disposal of pesticide containers must be done in accordance with Federal, State, and local laws, regulations, and directives. Specific procedures for the cleaning and disposal of pesticide containers are documented in the Forest Service Pesticide Use Management and Coordination Handbook (FSH 2109.114), and state and local laws.
- Streamside Wet Area Protection During Pesticide Spraying – To minimize the risk of pesticide inadvertently entering waters, or unintentionally altering the riparian area, Stream Management Zone (SMZ), of wetland.

All treatment units:

- Standard resource protection measures for hydrology and fisheries resources.
- Timber Sale Planning Process – Incorporate water quality and hydrological considerations into the timber sale planning process.
- Timber Harvest Unit Design – Timber harvest unit design will secure favorable conditions of water quality and quantity while maintaining desirable stream channel characteristics and watershed conditions.
- Determination of Surface Erosion for Timber Harvest Unit Design – Identify high erosion hazard areas in order to adjust treatment measures to prevent downstream water quality degradation.
- Use of Sale Area Maps and/or Project Maps for Designating Water Quality Protection Needs – Recognition and protection of areas related to water quality protection delineated on sale area maps or project map.

Riparian Habitat Conservation Area (RHCA) – Protect riparian areas, streams with annual scour, lakes, wetlands, and ponds:

- 300 foot buffer on each side of fish bearing streams and lakes, and ponds with mountain yellow-legged frog habitat and
- 150 foot buffer on each side of perennial non-fish bearing streams, intermittent and ephemeral channels with annual scour, meadows, ponds, wetlands, lakes greater than 1 acre and landslide-prone areas.

Streamside Management Zone (SMZ) – Protect ephemeral stream channels without evidence of annual scour:

- For channels with a slope less than 60—percent a 25 foot buffer on each side is applied and
- Unstable channel slopes or channel slopes greater than 60 percent a 50 foot buffer on each side is applied.
- In all treatment units with ground-based mechanical equipment, equipment may reach into SMZs in the identified no-tractor equipment zone. Retain trees along streambanks.
- TM-1: Prohibit scheduled timber harvest, including fuelwood cutting, in RHCAs.
- Management activities in RHCAs must contribute to improving or maintaining watershed and aquatic habitat conditions described in the Riparian Management Objectives. When activities are found to detract from meeting RMOs, those activities will be modified, rescheduled, or

discontinued. Areas where riparian conditions are presently degraded, management activities must be designed to improve habitat conditions.

- FM-1 – Design fuel treatment to meet Resource Management Objectives (RMO), and to minimize disturbance of riparian ground cover and vegetation.
- FM-4 – Design prescribed burn projects to protect RHCAs from burning. Where riparian ecosystems would be enhanced by prescribed burns, clearly identify the specific objectives and risks.
- Protection of Wetlands – Avoid adverse water quality impacts associated with destruction, disturbance, or modification of wetlands. The Forest Service will not permit the implementation of activities and new construction in wetlands whenever there is a practical alternative.
- Cumulative Off-Site Watershed Effects – Protect the identified beneficial uses of water from the combined effects of multiple management activities which individually may not create unacceptable effects but collectively may result in degraded water quality conditions.

Temporary road locations, Haul Routes, Road Reconstruction, and Stream Crossing Upgrade or Removals:

- Standard resource protection measures for hydrology and fisheries resources.
- General Guidelines for the Location and Design of Roads – Locate and design roads with minimal resource damage.
- RF-8 – Require a Road Management Plan be developed and carried out that meets the RMOs.
- Erosion Control Plan – Limit and mitigate erosion and sedimentation through effective planning prior to initiation of construction activities and through effective contract administration during construction.
- Timing of Construction Activities – Minimize erosion by conducting operations during minimal runoff periods.
- Stabilization of Road Slope Surfaces and Spoil Disposal Areas – Minimize erosion from exposed cut slopes, fill slopes, and spoil disposal areas.
- Road Slope Stabilization Construction Practices – Reduce sedimentation by minimizing erosion from road slopes and slope failure along roads.
- Dispersion of Subsurface Drainage From Cut and Fill slopes – Minimize the possibilities of cut or fill slope failure and the subsequent production of sediment.
- Control of Road Drainage – Minimize the erosive effects of water concentrated by road drainage features; disperse runoff from disturbances within the road clearing limits; to lessen the sediment yield from roaded areas; minimize erosion of the road prism by runoff from road surfaces and from uphill areas.
- Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects – Minimize erosion and sedimentation from disturbed ground on incomplete projects.
- Construction of Stable Embankments (Fills) – Construct embankments with materials and methods, which minimize the possibility of failure and subsequent water quality degradation.
- Control of Sidecast Material During Construction and Maintenance – Minimize sediment production originating from sidecast material during road construction or maintenance.
- Servicing and Refueling of Equipment – Prevent pollutants such as fuels, lubricants, bitumens and other harmful materials from being discharged into or near rivers, streams and impoundments, or into natural or man-made channels.
- Control of Construction and Maintenance Activities Adjacent to SMZs – Protect water quality by controlling construction and maintenance actions within and adjacent to any streamside management zone
- Bridge and Culvert Installation – Minimize sedimentation and turbidity resulting from excavation for in-channel structures.
- Disposal of Right-of-Way and Roadside Debris –

- Ensure that organic debris generated during road construction is kept out of streams so that channels and downstream facilities are not obstructed.
- Ensure debris dams are not formed which obstruct fish passage, or which could result in downstream damage from high water flow surges after dam failure.
- Specifying Riprap Composition - minimize sediment production associated with the installation and utilization of riprap material.
- Water Source Development Consistent with Water Quality Protection – Supply water for roads and fire protection while maintaining existing water quality.
- Maintenance of Roads – Maintain roads in a manner which provides for water quality protection by minimizing rutting, failures, sidecasting, and blockage of drainage facilities all of which can cause erosion and sedimentation, and deteriorating watershed conditions.
- Road Surface Treatment to Prevent Loss of Materials – Minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production from those areas.
- Traffic Control During Wet Periods –
    - Reduce road surface disturbance and rutting of roads.
    - Minimize sediment washing from disturbed road surfaces.

All treatment units:

- Standard resource protection measures for hydrology and soil resources.
- Determining Tractor Loggable Ground – Minimize erosion and sedimentation resulting from ground disturbance of tractor logging systems.
- Tractor Skidding Design – Design skidding patterns to best fit the terrain, the volume, velocity, concentration, and to control direction of runoff water in a manner that will minimize erosion and sedimentation.
- Log Landing Location – Locate new landings or reuse old landings in such a way as to avoid watershed impacts and associated water quality degradation.
- Erosion Prevention and Control Measures During Timber Sale Operations – Ensure that the purchasers' operations will be conducted reasonably to minimize soil erosion.
- Revegetation of Areas Disturbed by Harvest Activities – Where soil has been severely disturbed by the purchaser's operations, and the establishment of vegetation is needed to control accelerated erosion, the purchaser will be required to take appropriate measures normally used to establish an adequate ground cover of grass or other vegetative stabilization measures acceptable to the Forest Service. The type and intensity of treatment to establish ground cover is prescribed by the Timber Sale Administrator, with assistance from soil scientist and botanist as needed.
- Log Landing Erosion Control – Reduce the impacts of erosion and subsequent sedimentation associated with log landings by use of mitigating measures.
- Erosion Control on Skid Trails – Protect water quality by minimizing erosion and sedimentation derived from skid trails.
- Erosion Control Structure Maintenance – Ensure that constructed erosion control structures are stabilized and working.
- Acceptance of Timber Sale Erosion Control measures Before Sale Closure – Ensure the adequacy of required erosion control work on timber sales. The effectiveness of soil erosion prevention and control measures is determined by the conditions found after sale areas have been exposed for one, or more years to the elements as determined by the sale administrator.
- Soil Disturbing Treatments on the Contour – decrease sediment production and stream turbidity while mechanically treating slopes. This is a preventive measure that limits surface disturbance activities to preclude water from concentrating by providing means of adequate infiltration and by decreasing the velocity of surface runoff so that infiltration is enhanced.
- Slope Limitations for Mechanical Equipment Operation – reduce gully and sheet erosion and associated sediment production by limiting tractor use.

- Tractor Operation Limitation in Wetlands and Meadows – Limit turbidity and sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion by excluding the use of mechanical equipment in wetland and meadows except for the purpose of restoring wetland and meadow function.
- Revegetation of Surface Disturbed Areas – Protect water quality by minimizing soil erosion through the stabilizing influence of vegetation foliage and root network. This is a corrective practice to stabilize an otherwise unstable soil surface during vegetation manipulation projects. The plant species selected will be a mix best suited for site conditions and attainment of multiple management objectives for the area.
- Soil Moisture Limitations for Mechanical Equipment Operations – Use to prevent compaction, rutting, and gullying, with resultant sediment production and turbidity.

Units with underburn or pile burn treatments:

- Standard resource protection measures for hydrology and soil resources for prescribed burning treatments.
- Fire and Fuel Management Activities – Reduce public and private losses and environmental impacts which result from wildfires and/or subsequent flooding and erosion by reducing or managing the frequency, intensity and extent of wildfire.
- Consideration of Water Quality in Formulating Fire Prescriptions – Provide for water quality protection while achieving the management objectives through the use of prescribed fire.
- Protection of Water Quality from Prescribed Burning Effects – Maintain soil productivity, minimize erosion, and minimize ash, sediment, nutrients, and debris from entering water bodies.
- Minimizing Watershed Damage from Fire Suppression Efforts – Avoid watershed damage in excess of that already caused by the wild fire. Avoid heavy equipment operation on fragile soils and steep slopes whenever possible.
- Repair or Stabilization of Fire Suppression Related Watershed Damage – Stabilize all areas that have had their erosion potential significantly increased, or their drainage pattern altered by suppression related activities. Treatments for fire-suppression damages include, but are not limited to, installing water bars and other drainage diversions in fire roads, firelines, and other cleared areas; seeding, planting and fertilizing to provide vegetative cover; spreading slash, or mulch to protect bare soil; repairing damaged road drainage facilities; clearing stream channels or structures and removing debris deposited by suppression activities which can have adverse life, property and environmental impact.

APPENDIX B

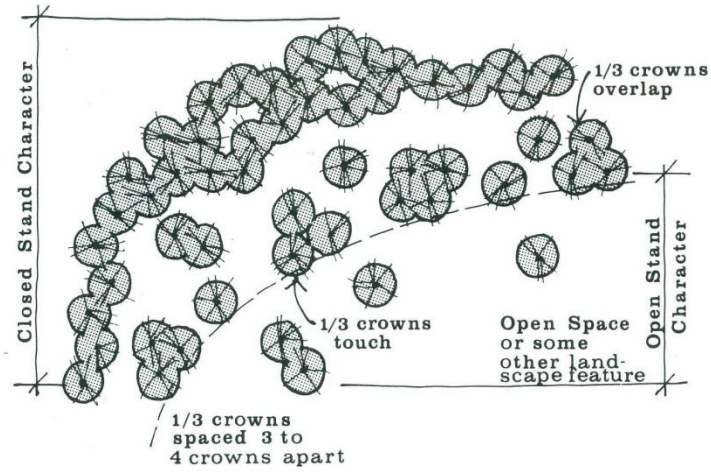
Recreation Area Design Features and Restoration

When thinning trees in campgrounds where annosus root disease is present, it is recommended that a mix of tree species and sizes be selected with priorities for leave trees given to species other than true fir. Preference for removal would be given to trees infected with dwarf mistletoe, root disease, trees infested with bark beetles and trees with extensive human caused injuries. For root diseases it is reasonable to use the condition of the crown as an indicator of advanced decay. Although not always caused by root decay, a thin crown does indicate poor tree vigor. The thinner the crown of a tree in an area where root disease is present, the more likely it is that the roots have been weakened by decay.

Selecting for more drought tolerant species such as Jeffrey pine and incense cedar over red and white fir will increase species diversity and make the stand more resilient to disturbance agents such as insects, disease, and fire. Thinning can also decrease the need to enter stands to conduct salvage operations, decrease the amount of fuel loading and reduce the number of hazard trees. When planning such thinning, it would be recognized that this is an average to be applied across the landscape and some variability may be desired. Individual high value trees, such as mature pine, as well as pure stands of younger ponderosa and Jeffrey pine would benefit by having the stocking around them reduced to lower levels.

In addition to reducing tree stress, thinning, especially of the understory, will somewhat reduce the risks and damage from any fire that might occur and provide a more defensible space for the campground. Focus would be on maintaining and protecting existing healthy Jeffrey pine, ponderosa pine and incense cedar as important secondary species. Diversity of tree species would help reduce the impact of existing biotic agents on residual trees, and add visual interest and structural elements to the forest surrounding the camping areas.

In lodgepole pine areas, mortality is occurring as a result of overstocking. Trees that have been heavily infected with western gall and stalactiform rust are a priority for removal. Even-aged lodgepole pine stands would be thinned to 80 to 100 square feet of basal area to lessen their risk to bark beetle attack. Areas of heavy fuel accumulations would be treated to reduce fire risk. Specific thinning guidelines were developed to achieve a more natural, clumpy irregular appearance, recommendations are to leave 3-5 trees in random clumps throughout the thinning, and varying spacing and diameter of trees removed. Generally remove trees <6-8” in diameter except in created openings, hand thin dead limbs to elevate tree crowns and open views, and create openings of 30-50’ wide between thinned groups.



Elements of a thinning regime for campgrounds would include a diversity of age and size classes to achieve a clumpy irregular natural looking appearance. To avoid wind throw and snow breakage, stocking reduction would occur over time. Selective pruning within the crown to remove the dwarf mistletoe infection can improve the health and vigor of the tree.

Where openings have been created from hazard tree reduction or where additional screening is desired, consideration would be given to the establishment of Jeffrey pine, rust-resistant sugar pine and incense cedar saplings as replacement trees. Incense cedar can be utilized as a low vegetation screen, as it maintains its limbs in an open grown situation, and may also be utilized as a physical barrier to the spread of mistletoe between trees. Hardwoods such as black oak (*Quercus kelloggii*) would also be considered as replacements for some more rocky areas found around the lake. Planting of trees or shrubs would consider vertical structure and placement across a horizontal spatial arrangement. Care would be taken to match appropriate species to the site and soil conditions. A mixture of tree species would be planted with a design to mimic natural openings, regeneration, and planting shapes, at the appropriate scale for existing facilities and campsites. New stocking levels would be mimic natural regeneration with a widely varied spacing; open sparse areas would then contrast with more heavily stocked areas.

Materials left after hazard tree reduction and precommercial thinning, including any chips or pole size material would be utilized for campground restoration activities including fencing, barriers and trail surfacing. Large cull logs could be used to limit recreation impacts on stream areas.

Site Specific Design Features
Refer to individual maps for additional site direction.

Pancake Beach and Maidu Boat Ramp

1. Remove hazard trees and replant with a mixture of pine and black oak.
2. Thin and prune lodgepole pine surrounding the perimeter of the parking lot. Remove damage, diseased or trees <6” dbh.
3. Remove lodgepole pine on edge of parking lot to improve view from lot to the lake.
4. Remove lodgepole pine surrounding interpretive displays so that the items interpreted can be seen. Update or replace an interpretive display about the Osprey nests, visible on the peninsula.
5. Selectively thin lodgepole pine <6” dbh and prune dead branches at the boat ramp to create filtered and framed views of the lake.
6. Repair a social trail from the upper parking area to the lower lot and ramp using salvaged materials.

(No map available)

Little Beaver Complex

1. Develop an internal trail system plan and use salvaged materials for definition of edges and paving surfaces, i.e. logs and chips.
2. Continue with ongoing hazard tree removal and replanting in areas exposed during tree removal.
3. Add shrubs and trees for screening between selected sites and roads.
4. Add barriers to prevent intrusion into wetlands, stream channel and from campground to overflow parking area.
5. Remove lodgepole pine thickets where identified. Thin and prune lodgepole stands along shoreline to open views of the reservoir and Bald Mountain.
6. Add interpretive sites for education of wetland, mountain and stream resources.
7. Consider conversion of sites 80, 81 and 82, and 111, and 114 to family sites, or require rehabilitation, barriers and new plantings.
8. Obliterate and rehabilitate old skid road from campground to 22N57 road.

(See Appendix for Map)

Red Feather Campground

1. Continue with ongoing hazard tree removal and replanting in areas exposed during tree removal.
2. Develop an internal circulation plan and use salvaged materials for definition of edges and paving surfaces, i.e. logs and chips.
3. Plant 6-8 trees and acorns in the inner open space of loop 1 and the far east side inner open space of loop 2.
4. Remove <4" dbh and generally clean up lodgepole pine stand on the right side of the entrance drive to loop 1.
5. Considerable use occurs in loop 1 between sites 11PL and 18. Several options would be evaluated. One is to reduce the number of sites to reduce trampling and compaction and allow natural rehabilitation. The other is to rip and restore the area, with barriers, fencing or other form of barricade to allow new plantings to grow without disturbance.
6. Hand thin the vegetation between sites 42 and 43 in loop 2.
7. Keep the trail between sites 45 and 47, but define edges and repair the tread. Obliterate other social trails.

Peninsula Tent Camp

1. Create a defined trail system within the campground and from campground to beach. Use salvaged materials to create footbridges, trail edges and trail tread.
2. Continue with hazard tree removal throughout the site and selective removal of competing trees from large, healthy specimens. Replant pines, cedar and oak throughout the campground to promote forest regeneration.
3. Remove and/ or relocate the excessive number of downed logs throughout the campground. There's a need for barriers and drainage channel restoration throughout so, these may be used.
4. Plant Alder, willow, cottonwood, and other herbaceous species to enhance, define and protect the wetlands and drainage channels. Restore the channel from the parking lot edge to the lake shore, through the entire width of the campground.
5. Consult with biologist over number and location of snags outside of camping area for animal habitat. Other dead trees would be removed as needed for safety.
6. Thin and prune lodgepole thickets at entry and along shoreline to 50% coverage. Trees <10" dbh may be removed.

Blue Water Beach

1. Remove the significant number of hazards, particularly in the day use area near Peninsula Tent Camp.
2. Remove failing lodgepole pine and replant with Black Oak and Pines.
3. Thin lodgepole thickets.
   (No map available)

Toombs Boat Launch

1. Improve views of the lake by thinning and pruning lodgepole pine. Emphasize the lake foreground views, with backdrop of the ridge visible across the lake.
2. Emphasize the large specimen trees with treatments.
3. Reduce density of trees in the parking island, but plant sizeable numbers of shrubs and forbs to emphasize the view of the lake from the upper parking lot.
4. Formalize the trail extending from Wyandotte CG to the boat ramp.
5. Clean up ragged vegetation surrounding the dump station and fish cleaning station. Plant low shrubs and forbs in the area after clean up.

(No map available)

Wynadotte East and West Campgrounds

1. Rehabilitate the sites where numbers of hazard trees have been removed. Plant with sugar pine, incense cedar, black oak, dry land shrubs and groundcover.
2. Open up vegetation to promote and emphasize framed views of the lake and Bald Mountain, on each side of central campground road.
3. Provide interpretation messages about the environment- and soils and why the ridge is so populated by sugar pine and manzanita, describe and illustrate the presence of osprey and eagle nests.

(See Appendix for map)

Black Rock Boat Launch

1. Remove lodgepole pine that are damaging the upper parking lot surface with heaving and uplift.
2. Thin and prune <6” dbh lodgepole thickets as well as white fir stands creating fuel loads, particularly in the island separating the two parking lots.
3. Add manzanita plantings to the bank behind the toilet building. Add oaks in sunny areas.

(See Appendix for map)

Black Rock Campground

1. Remove lodgepole pine on shoreline to enhance view of lake and the opposite shore with personal direction.
2. Remove unauthorized tent pads, rehabilitate site, add log or stone barriers, to define the perimeters of the sites.
3. Plant dogwoods and shrubs to create layered effect and screening between sites, throughout the campground.
4. Rehabilitate heavily overused site (#2), clogged culverts, hillsides threatened by erosion as a result of hazard tree removal, unauthorized tent pad construction, and steep slopes.

(See Appendix for map)

Maintaining and promoting healthy trees are important objectives for development plans in recreation areas. Care would be taken during future campsite, trail, and facility construction to minimize negative impacts on the landscape. The following guidelines from the Forest Health Protection Report (FHP Report NE06-10) would be applied for areas under construction or in areas where future construction will take place.

1. Tree density would be appropriate for the site. This will provide access to light, moisture and nutrients and allow the trees to better cope with their altered environment. It is important to leave a mixture of ages and species to provide for a continual forest canopy throughout the coming years.
2. Trees that will directly interfere with structures or that will be seriously damaged during construction or excavation would be removed. Fence off individual or groups of trees before construction to negate or minimize root damage by soil compaction or trunk and root damage by equipment. Protective fences would be placed, at a minimum, at drip line. Depending on the species, tree roots can exist within a radius two times the crown radius and encompass an area well beyond drip line. Drip line is defined by the outer edge of the foliage. Penalties for damaging trees would be incorporated into tree removal or construction contracts.
3. Road or lot grades would be changed as little as possible. Grading damages roots and can set up conditions that favor soil erosion. It can also alter the contour such that the flow of surface and subsurface water is drastically affected. Trenches would always be dug away from tree roots and avoid back filling with earth or rocks around the trunks of trees. Avoid paving with either concrete or asphalt over root systems, or close to the trunks of trees.
4. Use caution in applying wood preservatives and other chemicals to buildings. Trees and other plants have been killed by direct contact with them or as a result of their runoff in rainwater.
5. Avoid leaving green pine slash on site to prevent the build up of pine engraver (*Ips pini*) beetle populations that may attack standing green trees.
6. Additional educational signing to inform campground users of rehabilitation efforts within the campgrounds will help gain cooperation and respect for sustaining recreational values.

Design Features Common to all Action Alternatives

Developed Recreation Areas: Objective – An aesthetically pleasing, safe and natural environment, free of obvious management activities, with intact and healthy tree stands, creeks and streams, active and abundant wildlife including deer, bear, bald eagles, osprey, songbirds and fish in a developed, well maintained recreation setting.

- Remove 100% of standing snags or hazard trees in developed recreation areas.
- Flush cut all tree stumps, or no taller than 6” within campgrounds or slant cut away from roads. Grind all stumps at ground level prior to treatment with borax.
- Clean up slash and debris from treatment activities within 60 days of completion of project.
- Perform management activities after conclusion of main recreation season (after Labor Day) and burn piles the following year, before the start of recreation season (Memorial Day)
- Hand pull and pile slash for handpile and burning a minimum 15 feet away from the undefined perimeter of campsites, day use areas and boat ramps so that they don’t interfere with recreation use as much as feasible.
- Locate chip piles in designated spots for easy use and/or disposal at the direction of recreation staff in cooperation with sale administrators.
- Mark only those trees to take. Do not mark leave trees.
- Maintain shrub groups and stands as much as feasible during operations.

- Drag cull logs to locations directed by the landscape architect or recreation staff for use as barriers, to define campsites, to improve stream habitats, etc. Do not stack or pile cull logs in decks within the developed recreation area.
- Restore all soil surfaces damaged or disturbed during treatment operations or operate tractors or feller bunchers on slash mats. This includes surface leveling, recontouring, erosion control measures, reseeding, and revegetation. If slash mats are used, the slash must be piled for burning within 60 days of completion of operations.
- Directionally fall timber away from infrastructure improvements as flagged or identified.
- Install temporary or permanent barricades for protection of wetland, meadow and stream restoration. Barricades may include fences, logs, rock walls, large boulders, etc.
- Limit activities in size, scale and timing so as to minimize impacts to the public. Remove equipment and locate in a safe, designated spot for weekend recreation use.
- Uneven age management activity would maintain smaller scale openings no larger than ¼-1/2 acre in size and single tree selections to avoid appearance of clear cuts.
- Locate skid trails parallel to the roadway and at least 25 feet from the main road.
- Locate landings at least 25 feet off the main roads or internal access roads and out of sight from drivers, by placement uphill or downhill from line of sight. If not possible to locate out of sight, maintain a vegetative buffer between the road and landing.
- Restore skid roads and landings by recontouring to blend with the surrounding topography and replanting with native grasses and shrubs. Closure with berms and logs is not an acceptable form of restoration.
- Avoid all flagged areas for entry or treatment.

Perimeter Roadways in Retention zones: Objective – Manage vegetation, hazard trees and restore forest health while maintaining highly prized scenic values in a heavy use recreation area. Perform management activities so that they don't appear visible or obvious to the viewer; perform activities that restore the high scenic character of the area.

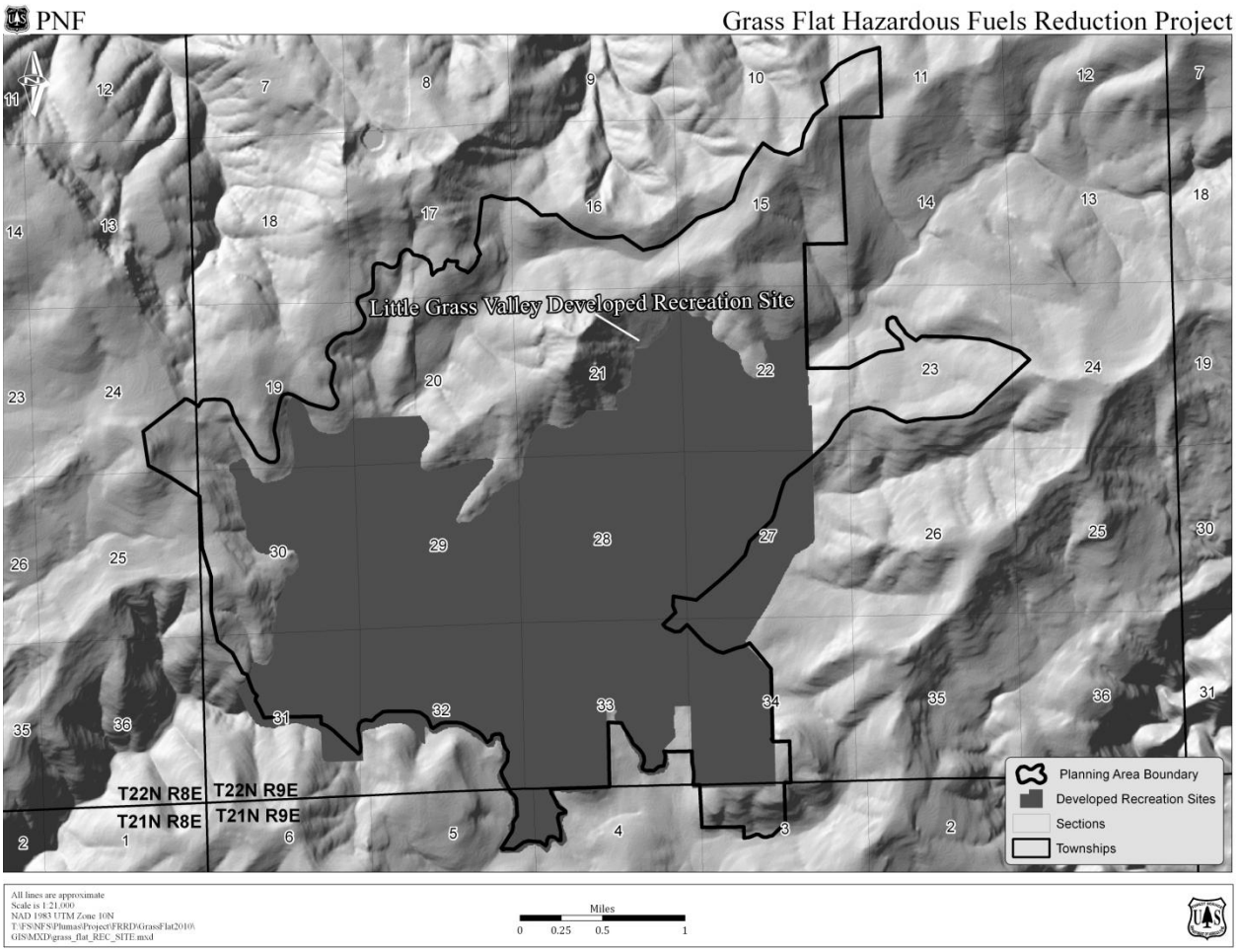
- Mark only take trees, and put the mark on the unseen side of the tree.
- Select trees with upper and lower diameter limits. Maintain 3-5 random trees per acre.
- Create irregular edges for treatment units to de-emphasize the activity and to mimic natural events. Feather vegetation edges by leaving trees in irregular edge alignments and of various heights and sizes.
- Slant cut all stumps at lowest possible level, however no higher than 8" maximum height above soil surface, pointing away from the roadway. Remove slash and debris created by harvest activity.
- Disguise landings by locating at least 50 feet off the road edge either uphill or downhill out of sight from drivers. Maintain at least 50 feet of vegetation between viewer and landing for screening purposes.
- Locate skid trails parallel to the roadway and at least 25 feet from the main road.
- Fully restore skid roads to pre-activity condition including contouring, and revegetation with native grass and shrub seed, immediately following conclusion of treatment activity.
- Leave cull logs in the woods. Do not skid or deck.
- Do not create piles for burning within 100 feet of the road edge.
-

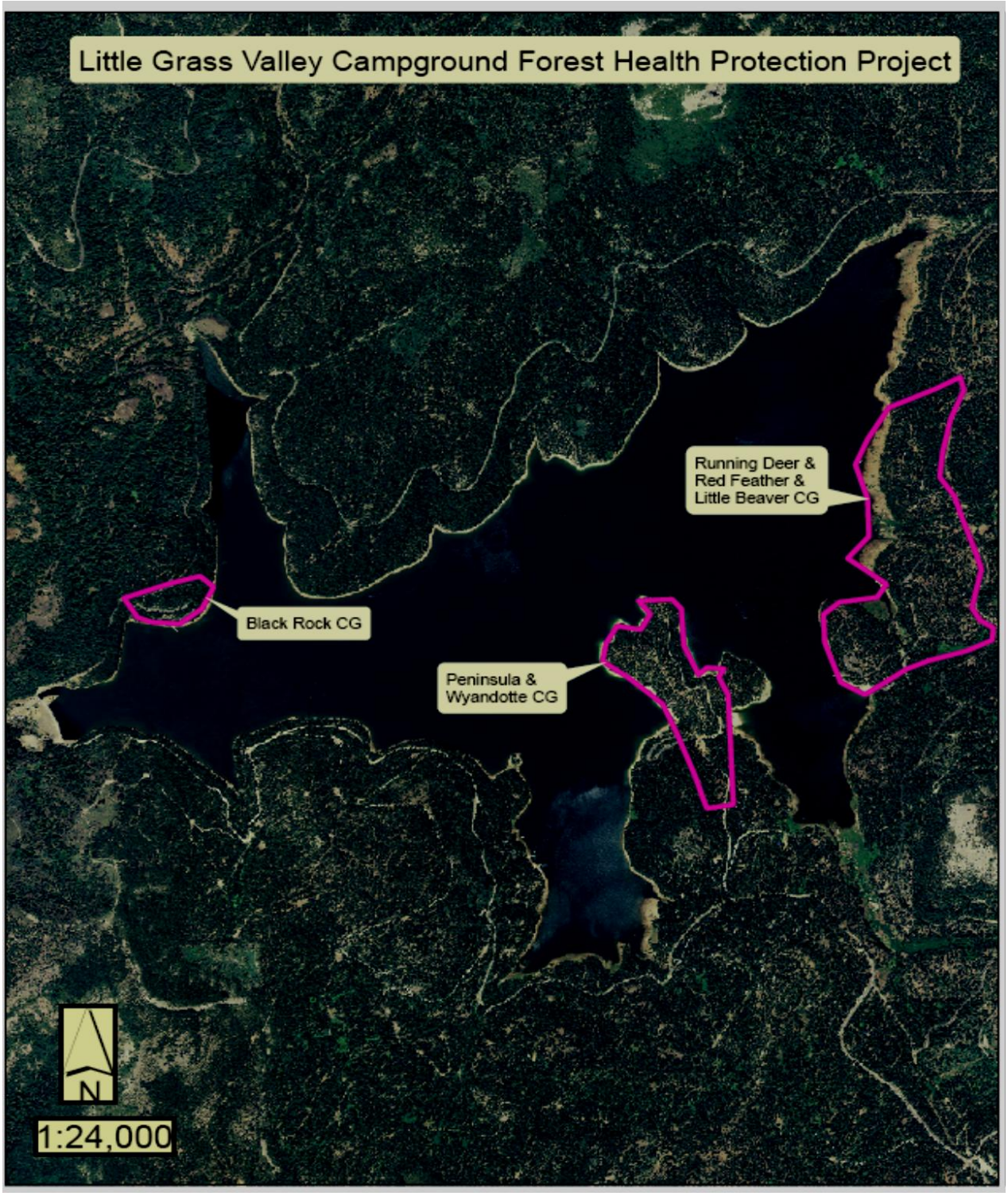
Perimeter Roadways in Partial Retention zones: Objective: Manage vegetation, hazard trees and restore forest health and scenic values while maintaining highly prized scenic values. Perform management activities so that they don't interfere with natural appearing landscape. Management activities are not dominant in the landscape, but not invisible either.

- Mark only take trees and put mark on the unseen side of the tree.
- Same treatments as above, within 150' of roadway only. Areas beyond 150 feet do not have mitigation requirements.
- Open stand treatments, i.e. treatments that create an open stand structure would maintain sufficient clumps of large trees to mimic natural park like stands with no low branches.
- Closed stand treatments need to leave sufficient spacing and full branching down to ground surface or would maintain some random trees and shrubs of sufficient density and spacing to appear as a natural closed stand, yet sufficiently reduce fuels.
- Mastication units would leave 3-5 random and variable sized trees per acre and chipped pieces would be less than 8" long. Vegetation would be cut as low to the ground as possible.
- Prescribed fire intensity would be managed sufficiently to limit scorch of canopy vegetation.
- Meander handline shapes on edges to avoid a hard, unnatural appearing edge and to mimic natural fire.
- Repair or restore handlines following prescribed fire where handline is visible from within 100 feet of the road edge.

Pacific Crest Trail (PCT) Zones: Objective: Preserve the natural landscape character and sense of wildness and solitude, to ensure the scenic integrity is preserved, enhanced or restored.

- Do not mark any trees within ¼ mile as seen from the PCT
- Mechanized timber harvest activities will be limited to areas greater than 1500 feet from the trail or outside the viewshed, i.e. downhill from trail and out of sight.
- Harvest area edges must conform to the topography and mimic natural openings and edges. Trees shall be left of edges to soften the harsh contrasts and exposed trunks of stark edges.
- Mechanized treatments may not be used within ¼ mile of the trail to preserve the setting and sense of solitude.
- Handcut and pile burning are acceptable for short term treatments. Piles must be burned within 12 months of creation.
- Handcut vegetation would be cut no higher than 6" above the soil surface and must be covered with duff , dirt or debris to hide or stain the newly exposed cut trunks.
- Tree and shrub masses would remain in strategic locations to act as screening, enhancement and feathering of treatment activities.
- Plantations would not be created within ½ mile visibility of the trail. Evidence of natural disturbances would remain, such as fire scars, etc.
- Stand regeneration treatments, ie. Group selections would be no larger than ¼- ½ acre in size when located within the foreground.
- The use of low intensity prescribed fire is a preferred method of fuels treatment and forest regeneration. Fire intensity would not be so high that canopy scorch occurs. Fire scarring on tree trunks is an acceptable outcome.
- Fire lines created for use of prescribed fire must not be straight line, but must meander to follow topography or vegetation masses that will remain. Following burning operations, fire lines must be restored by kicking, shoveling or raking dirt and duff back over the disturbed area.


PNF
Grass Flat Hazardous Fuels Reduction Project
Little Grass Valley Developed Recreation Site
T22N R8E
T22N R9E
T21N R8E
T21N R9E
Planning Area Boundary
Developed Recreation Sites
Sections
Townships
All lines are approximate
Scale is 1:21,000
NAD 1983 UTM Zone 10N
T:\FS\NFS\Plumas\Project\FRRD\GrassFlat2010\GIS\MXD\grass_flat_REC_SITE.mxd
Miles
0 0.25 0.5 1


Little Grass Valley Campground Forest Health Protection Project
Running Deer &
Red Feather &
Little Beaver CG
Black Rock CG
Peninsula &
Wyandotte CG
N
1:24,000

Plumas National Forest, Feather River Ranger District
BLACK ROCK
LITTLE GRASS VALLEY
VEGETATION MANAGEMENT PLAN
MAP 1 OF 3
PROPOSED TREATMENT UNITS
Lakeshore Trail
Black Rock Trail
Black Rock CG Trail
COUNTY ROAD
FOREST SERVICE ROAD
0
0.25
0.5
Miles
1:4,800

Plumas National Forest, Feather River Ranger District
WYNDOTTE, PENINSULA
LITTLE GRASS VALLEY
VEGETATION MANAGEMENT PLAN
MAP 2 OF 3
PROPOSED TREATMENT UNITS
Lakeshore Trail
Black Rock Trail
Black Rock CG Trail
COUNTY ROAD
FOREST SERVICE ROAD
1:6,000

APPENDIX C

Past, Present, and Future Foreseeable Activities

Timber harvest activities presented in this appendix are activities that occurred within the CWE analysis area (Subwatershed 1-3) within the past 25 years both on NFS land and private. Activities planned in 2013 besides the proposed action (not presented in this appendix) is considered future foreseeable actions and anything prior is considered to be past activities. The past NFS timber activities were derived from the FACTS (Forest Service Activity Tracking System) database. A GIS shapefile of Timber Harvest Plans (THPs) were attained from the California Department of Forestry and Fire Protection (CALFIRE) for the past and future foreseeable private timber harvest activities. Canopy change detection imagery was used in the analysis to determine areas that had past timber activities that weren't covered by the FACTS database and the THP shapefile. The canopy change detection imagery and aerial photos help to determine the year, aerial extent, and general harvest activity.

The acres and timber harvest activities (prescriptions) reflected in this appendix is as accurate as possible because the missing data gaps were filled in by the canopy change detection imagery and aerial photos.

Timber Harvest Activities Derived from Aerial Photo Interpretation

	Ownership (Acres)		
Type of Activity and Year Implemented	**FS**	**Private**	**Total Acres**
1989	**50.19**	**6.57**	**56.76**
Clearcut	38.65	0.00	38.65
Commercial Thin	11.54	0.00	11.54
Unknown	0.00	6.57	6.57
1991	**5.37**	**0.00**	**5.37**
Clearcut	5.37	0.00	5.37
1993	**9.14**	**0.00**	**9.14**
Commercial Thin	9.14	0.00	9.14
2000	**24.36**	**0.00**	**24.36**
Mastication	17.88	0.00	17.88
Underburn	6.48	0.00	6.48
2003	**1.76**	**0.00**	**1.76**
Sanitation Salvage	1.76	0.00	1.76
2008	**5.66**	**0.00**	**5.66**
Precommercial Thin	5.66	0.00	5.66
Grand Total	**96.48**	**6.57**	**103.05**

Past Forest Service Timber Harvest Activities

Type of Activity and Year Implemented	Total Acres
1989	**79.73**
Stand Clearcut (EA/RH/FH)	79.73
1990	**143.69**
Site Preparation for Planting - Mechanical	79.73
Stand Clearcut (EA/RH/FH)	63.96
1991	**326.02**
Plant Trees	79.73
Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)	143.76
Site Preparation for Planting - Mechanical	63.96
Stand Clearcut (EA/RH/FH)	38.58
1992	**262.05**
Plant Trees	20.12
Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)	30.68
Site preparation for planting	72.31
Site Preparation for Planting - Mechanical	1310.03
1993	**267.42**
Plant Trees	137.30
Site Preparation for Planting - Mechanical	56.59
Stand Clearcut (EA/RH/FH)	20.83
Tree Release and Weed	52.70
1994	**98.86**
Plant Trees	71.77
Site Preparation for Planting - Mechanical	27.09
1995	**91.05**
Plant Trees	27.09
Site Preparation for Planting - Mechanical	16.75
Tree Release and Weed	47.21
1996	**140.95**
Plant Trees	16.75
Tree Release and Weed	124.20
1997	**155.31**
Area release and weeding	25.37
Fill-in or Replant Trees	56.59
Tree Release and Weed	73.34
1998	**50.38**
Area release and weeding	33.80

Tree Release and Weed	16.58
1999	**83.76**
Area release and weeding	83.76
Type of Activity and Year Implemented	**Total Acres**
2000	**16.58**
Tree Release and Weed	16.58
2003	**1293.28**
Burning of Piled Material	96.21
Commercial Thin	239.53
Other control of understory vegetation	282.76
Precommercial Thin	521.14
Rearrangement of Fuels	96.79
Tree Release and Weed	56.84
2006	**486.37**
Commercial Thin	50.07
Sanitation (salvage)	436.30
2007	**613.39**
Burning of Piled Material	436.30
Commercial Thin	125.38
Group Selection Cut (UA/RH/FH)	51.71
2008	**71.15**
Removal cut	4.87
Sanitation Cut	14.57
Site preparation for planting	51.71
2009	**202.18**
Mastication/Mowing	29.14
Piling of Fuels, Hand or Machine	31.70
Plant Trees	51.71
Precommercial Thin	73.20
Sanitation Cut	3.43
Thinning for Hazardous Fuels Reduction	13.00
2010	**367.18**
Burning of Piled Material	21.33
Commercial Thin	53.23
Group Selection Cut (UA/RH/FH)	5.80
Jackpot Burning - Scattered concentrations	13.00
Range Forage Improvement	29.26
Sanitation Cut	244.56
Grand Total	**4749.34**

Past Private Timber Harvest Activities

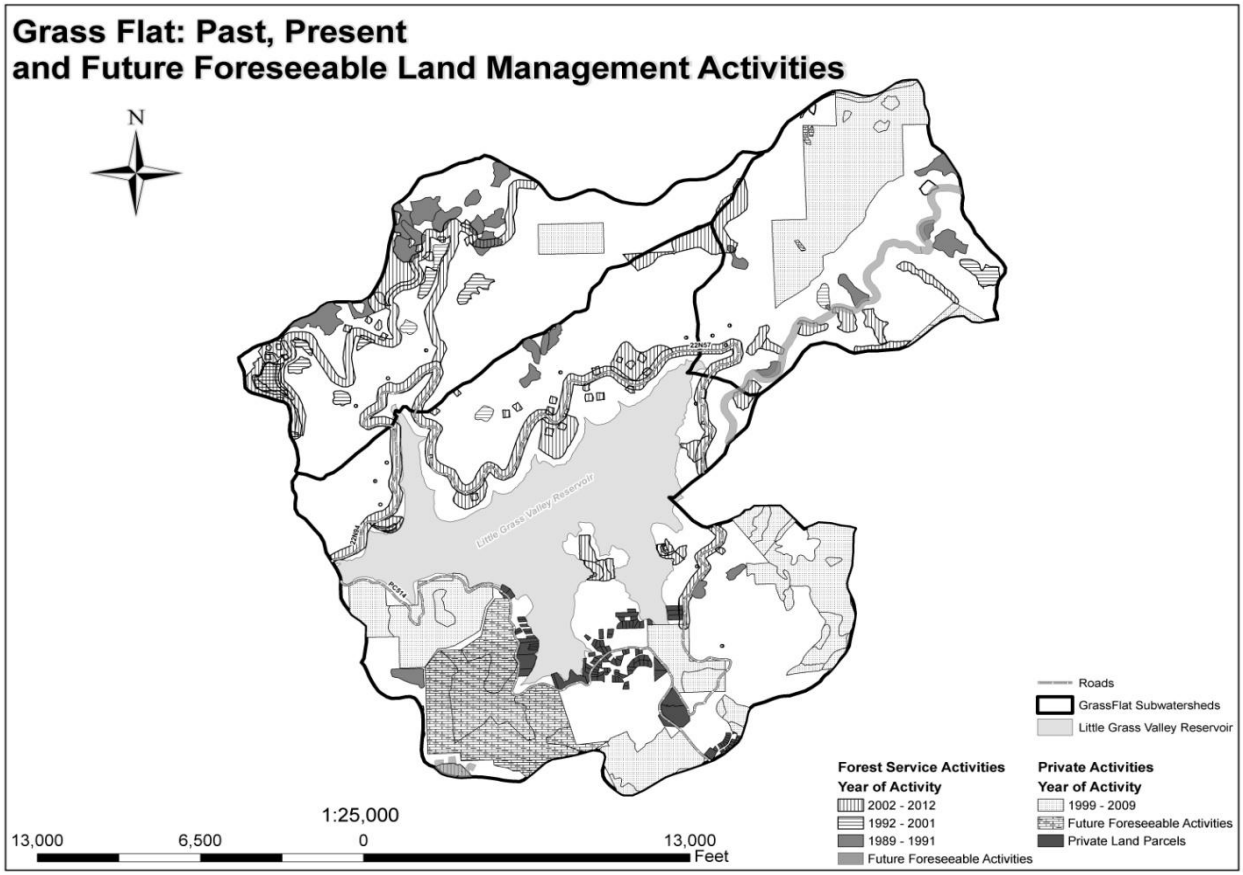
Type of Activity and Year Implemented	Total Acres
1999	**76.13**
Sanitation Salvage	76.13
2000	**117.88**
Shelterwood Removal Cut	117.88
2001	**186.26**
Sanitation Salvage	150.97
Selection	35.29
2002	**84.71**
Selection	84.71
2003	**232.86**
Group Selection	215.42
Shelterwood Removal Cut	17.44
2004	**531.72**
Clearcut	6.71
Commercial Thin	144.38
Group Selection	287.62
Selection	9.55
Shelterwood Removal Cut	83.46
2005	**775.02**
Group Selection	131.71
Rehabilitation - Understocked	7.18
Sanitation Salvage	16.60
Shelterwood Removal Cut	619.53
2006	**249.98**
Sanitation Salvage	249.98
2009	**224.31**
Clearcut	7.21
Shelterwood Removal Cut	217.10
Grand Total	**2478.87**

Future Foreseeable Private Timber Harvest Activities

Type of Activity and Projected Year of Implementation	Total Acres
2013	**680.01**
Clearcut	7.01
Group Selection	484.70
Shelterwood Removal Cut	188.30
Grand Total	**680.01**

Future Foreseeable Forest Service Timber Harvest Activities

Type of Activity and Projected Year of Implementation	Silvertip	Sugarloaf	Bald Mountain	Total Acres
2013	**134.56**	**110.09**	**0.00**	**153.56**
Group Selection	0.00	5.25	0.00	5.25
Hand Cut/Pile Burn	0.00	3.61	0.00	3.61
Roadside Hazard Tree Removal	134.56	0.00	0.00	134.56
Underburn	0.00	10.14	0.00	10.14
2012	**0.00**	**0.00**	**51.71**	**51.71**
Area release and weeding	0.00	0.00	51.71	51.71
2015	**0.00**	**0.00**	**51.71**	**51.71**
Area release and weeding	0.00	0.00	51.71	51.71
Grand Total	**134.56**	**110.09**	**103.42**	**256.97**


Grass Flat: Past, Present
and Future Foreseeable Land Management Activities
N
Little Grass Valley Reservoir
Roads
GrassFlat Subwatersheds
Little Grass Valley Reservoir
Forest Service Activities
Year of Activity
2002 - 2012
1992 - 2001
1989 - 1991
Future Foreseeable Activities
Private Activities
Year of Activity
1999 - 2009
Future Foreseeable Activities
Private Land Parcels
1:25,000
13,000
6,500
0
13,000
Feet

APPENDIX D

Unit Treatment Descriptions by Alternative

GRASS FLAT PROJECT

						ALTERNATIVE B[1] Proposed			ALTERNATIVE B-Modified[2] Preferred			ALTERNATIVE C[3] NonCommercial		
Unit	Total Acres	Acres w/o RHCA	CWHR		%CC	RX1	RX2	RX3	RX1	RX2	RX3	RX1	RX2	RX3
002	39	31	SMC5M	5M	56	MT40 %	ST	HCGP	ST	HCGP		HCGP		
004	18	16	SMC4M	4M	57	MT35 %	ST	HCGP	MT40 %	ST	HCGP	HCGP		
016	4	4	WFR4M	4M	57	MT35 %	ST	HCGP	MT40 %	ST	HCGP	HCGP		
017	19	19	SMC4M	4M		HCGP	ST		HCGP	ST		HCGP		
021	19	16	WFR5M	5M		HCPB	ST		HCPB	ST		HCPB		
029	16	14	WFR4P	4P	37	MT25 %	ST	HCGP	HCGP	ST		HCGP		
030	3	3	WFR4M	4M		HCPB	ST		HCPB	ST		HCPB		
031	4	3	SMC4P	4P		ST			ST			HCGP		
033	7	7	SMC4M	4M		ST	HCPB	PLT	ST	HCPB	PLT	HCGP		
037	4	3	WFR3D	3D		ST	PLT		HCPB	ST	PLT	NT		
038	5	4	WFR3D	3D		ST			ST			NT		
039	25	25	WFR3M	3M		HCPB	ST		HCPB	ST		HCPB		
040	13	12	WFR3M	3M		MAST	PLT		MAST	ST	PLT	MAST		
043	16	16	WFR4D	4D	69	MT40 %	ST	HCPB	HCPB	ST		MT50%	HCPB	
101	48	42	SMC4M	4M		HCPB			HCPB			HCPB		
102	18	17	SMC4M	4M		HCPB			HCPB			HCPB		
103	27	24	WFR4D	4D		HCPB	UB		HCPB	UB		HCPB	UB	
104	29	28	SMC3S	3S		HCGP			HCGP			HCGP		
105	13	11	WFR3S	3S		MAST	HCGP	UB	MAST	HCGP	UB	MAST	HCGP	UB
106	10	10	SMC4D	4D		HCPB	UB		HCPB	UB		HCPB	UB	
107	32	23	WFR4M	4M	56	MT35 %	HCPB	UB	MT40 %	HCPB	UB	MT50%	HCPB	UB
108	9	8	SMC3P	3P		MAST	ST	HCGP	MAST	ST		MAST		
109	10	9	WFR4M	4M		MAST	ST	HCPB	MAST	ST		MAST		
110	66	48	WFR4M	4M		HCPB	ST		HCPB	ST		HCPB		
111	33	30	SMC5M	5M	51	MT40 %	HCGP		HCGP			MT40%	HCGP	
112	5	5	SMC4M	4M		HCPB	UB		HCPB	UB		HCPB	UB	
113	32	29	SMC5D	5D	61	MT60 %	HCGP		HCGP			HCGP		

114	10	8	SMC4M	4M		UB	HCPB		UB	HCPB		UB	HCPB	
115	15	12	WFR3S	3S		MAST	HCGP	UB	MAST	HCGP	UB	MAST	HCGP	UB
116	8	6	SMC3M	3M		MAST	PLT RIP		MAST	PLT RIP		MAST		
117	6	5	SMC5D	5D		MAST	UB		MAST	UB		MAST	UB	
119	8	8	WFR4D	4D		MAST	ST		MAST	ST		MAST		
121	17	16	SMC4M	4M		HCPB			HCPB			HCPB		
123	5	5	WFR4M	4M		HCPB			HCPB			HCPB		
124	4	4	MRI3S	3S		HCPB	ST		HCPB	ST		NT		
125	12	12	SMC4M	4M	55	MT40%	HCGP		MT40%	HCGP		MT40%	HCGP	
126	11	9	SMC4M	4M		HCPB	UB		HCPB	UB		HCPB	UB	
127	6	5	WFR4M	4M		HCPB			HCPB			NT		
128	15	13	SMC3S	3S		MAST	HCGP	UB	MAST	HCGP	UB	MAST	HCGP	UB
129	15	15	MCP	MCP		MAST	HCGP	UB	MAST	HCGP	UB	NT		
130	7	7	WFR3S	3S		MAST	HCGP	UB	MAST	HCGP	UB	NT		
131	10	9	MCP	MCP		MAST	HCGP	UB	MAST	HCGP	UB	NT		
132	9	9	MCP	MCP		MAST	HCGP	UB	MAST	HCGP	UB	NT		
133	6	5	MCP	MCP		MAST	HCGP	UB	MAST	HCGP	UB	NT		
134	25	22	WFR3S	3S		MAST	HCGP	UB	MAST	HCGP	UB	MAST	HCGP	UB
135	1	1	MRI3S	3S		HCPB			HCPB			HCPB		
136	0	0	MRI3S	3S		HCPB			HCPB			HCPB		
692	52	41	SMC4M	4M		HCPB			HCPB			HCPB		
696	13	12	WFR5M	5M	59	MT40%	HCGP		HCGP			MT40%	HCGP	
700	50	45	SMC5M	5M	49	MT40%	HCGP		HCGP			MT40%	HCGP	
		4	SMC5M	5M		**GS**			**GS**			MT40%		
702	32	30	WFR4M	4M		HCPB	UB		HCPB	UB		HCPB	UB	
703	18	17	WFR4M	4M		HCPB			HCPB			HCPB		
738	33	27	SMC5M	5M	56	MT40%	HCGP		HCGP			MT50%	HCGP	
		4	SMC5M	5M		**GS**			**GS**			MT50%		
746	73	73	WFR3M	3M		UB	HCPB		UB	HCPB		UB	HCPB	
748	21	17	WFR4M	4M	43	MT35%	UB		MT40%	UB		HCGP	UB	
		2	WFR4M	4M		**GS**			**GS**			HCGP		
752	27	21	WFR5M	5M	41	MT40%	UB		HCGP	UB		HCGP	UB	
		4	WFR5M	5M		**GS**			**GS**			HCGP		
770	31	24	WFR4D	4D	61	MT40%	UB		MT40%	UB	bio	MT50%	UB	
		6	WFR4D	4D		**GS**			**GS**			MT5		

												0%		
782	20	10	SMC4M	4M	52	MT35 %	HCGP		MT40 %	HCGP		HCG P		
		4	SMC4M	4M		**GS**			**GS**			HCG P		
783	5	3	WFR5 M	5M	46	MT40 %			HCPB			MT4 0%		
862	8	8	WFR4 M	4M		UB	HCPB		UB	HCPB		UB	HCPB	
864	36	23	WFR4 M	4M	45	MT35 %	UB		HCGP	UB		HCG P	UB	
		2	WFR4 M	4M		**GS**			**GS**			HCG P		
866	18	18	SMC4M	4M		UB	HCPB		UB	HCPB		UB	HCPB	
868	7	7	SMC4D	4D		HCPB	UB		HCPB	UB		HCP B	UB	
870	11	11	SMC3S	3S		HCPB	UB		HCPB	UB		HCP B	UB	
872	47	38	SMC4M	4M	43	MT35 %	HCGP		HCGP			HCG P		
		8	SMC4M	4M		**GS**			**GS**			HCG P		
883	6	6	SMC5D	5D		NT			NT			NT		
884	12	12	SMC5P	5P		MAST	UB		MAST	UB		MAS T	UB	
886	10	4.5	SMC5M	5M	49	MT40 %	UB		HCGP	UB		HCG P	UB	
		1.5	SMC5M	5M		**GS**			**GS**			HCG P		
888	13	12	SMC4M	4M		HCPB	ST		HCPB	ST		HCP B		
890	10	5	SMC5M	5M	49	MT40 %	UB		HCGP	UB		HCG P	UB	
		2	SMC5M	5M		**GS**			**GS**			HCG P		
892	8	7	SMC4M	4M	49	MT35 %	UB		MAST	UB		HCG P	UB	
893	3	3	SMC3D	3D		HCPB	UB		HCPB	UB		HCP B	UB	
894	19	17	SMC5D	5D		MAST	UB		MAST	UB		MAS T	UB	
910	32	29	SMC4M	4M		MAST	UB		MAST	UB		MAS T	UB	
922	14	12	WFR5 M	5M	45	MT40 %	HCGP		MAST	ST		HCG P		
934	18	16	SMC5M	5M	44	MT40 %	UB		HCGP	ST	UB	HCG P	UB	
		2	SMC5M	5M		**GS**			**GS**			HCG P		
935	9	7	WFR3S	3S		MAST	HCGP	UB	MAST	HCGP	UB	MAS T	HCGP	UB
936	30	30	WFR4 M	4M		HCGP			HCGP			HCG P		
937	14	14	SMC3S	3S		MAST	HCGP	UB	MAST	HCGP	UB	MAS T	HCGP	UB
942	27	21	SMC5M	5M	45	MT40 %	HCGP		HCGP			MT4 0%	HCGP	
		4	SMC5M	5M		**GS**			**GS**			MT4 0%		
949	57	56	SMC4D	4D		HCGP	PLT		HCGP	PLT		HCG P	PLT	
950	21	21	SMC4D	4D		HCGP	UB		HCGP	UB		HCG P	UB	
951	35	34	SMC4D	4D		HCGP	UB		HCGP	UB		HCG P	UB	
952	14	14	SMC4M	4M		HCPB	UB		HCPB	UB		HCP	UB	

												B		
953	11	10	WFR4P	4P		HCPB			HCPB			HCPB		
954	15	14	SMC4M	4M		HCPB			HCPB			HCPB		
955	19	14	SMC4M	4M	52	MT35%	UB		MT40%	UB		MT40%	UB	
		2	SMC4M	4M		**GS**			**GS**			MT40%		
957	10	4	SMC4M	4M	52	MT35%	UB		MT40%	UB		MT40%	UB	
		2	SMC4M	4M		**GS**			**GS**			MT40%		
958	7	7	SMC4M	4M		HCPB	UB		HCPB	UB		HCPB	UB	
962	17	16	SMC4D	4D		MAST	HCGP	UB	MAST	HCGP	UB	MAST	HCGP	UB
966	21	20	WFR3P	3P		MAST	HCGP	UB	MAST	HCGP	UB	MAST	HCGP	UB
967	19	15	WFR5M	5M	46	MT40%	ST	HCGP	HCGP	ST		HCGP		
968	11	11	WFR5M	5M		MAST	ST		MAST	ST		MAST		
969	12	12	WFR5M	5M		MAST	ST		MAST	ST		MAST		
970	10	10	SMC3P	3P		HCPB	ST		HCPB	ST		HCPB		
971	20	20	WFR4D	4D		HCPB	ST		HCPB	ST		HCPB		
972	4	4	WFR3M	3M		HCPB	ST		HCPB	ST		HCPB		
973	14	12	WFR5P	5P		MAST			MAST			MAST		
974	14	14	WFR4D	4D		HCPB	ST		MAST	ST		HCPB		
979	8	6	WFR5D	5D	72	MT60%	UB		MT50%	UB		MT50%	UB	
		1	WFR5D	5D		**GS**			**GS**			MT50%		
980	57	44	WFR4M	4M	54	MT35%	UB		MT40%	UB		HCGP	UB	
		6	WFR4M	4M		**GS**			**GS**			HCGP		
983	10	9	SMC5P	5P	28	MT25%	UB		MAST	UB		HCGP	UB	
984	6	6	SMC4M	4M		HCPB	UB		HCPB	UB		HCPB	UB	
985	6	5	SMC4M	4M		MAST			MAST			MAST		
987	8	6.5	WFR5M	5M	59	MT40%	HCGP		HCGP			MT50%	HCGP	
		1.5	WFR5M	5M		**GS**			**GS**			MT50%		
988	8	8	WFR3S	3S		MAST	HCGP	UB	MAST	HCGP	UB	MAST	HCGP	UB
993	12	9	SMC4M	4M		HCPB	ST		HCPB	ST		HCPB		
995	7	5	SMC4M	4M	55	MT35%	ST	HCGP	MT40%	ST	HCGP	MT50%	HCGP	
996	9	2	SMC4M	4M	62	MT35%	HCPB	PLT RIP	MT40%	HCPB	PLT RIP	HCGP		
997	58	58	SMC4M	4M		HCGP			HCGP			HCGP		
998	24	24	SMC5P	5P	38	MT25%	HCGP		HCGP			HCGP		
999	17	12	SMC5M	5M	55	MT40%	ST	HCGP	MT40%	ST	HCGP	MT50%	HCGP	

978 A	6	5	WFR5 M	5M	53	MT40 %			MT50 %			MT4 0%		
978 B	2	2	WFR5 M	5M	53	MT40 %			MT50 %			MT4 0%		
	2007	**1814.0**												
						VOLUME=3.5MMBF with secondary ST with restoration			**VOLUME=2.7 MMBF with secondary ST with restoration**			**VOLUME=1.0 MMBF without secondary ST without restoration**		

APPENDIX E

Findings of No Significant Impact

The following is a summary of effects that were considered during the analysis process, not necessarily as issues, and not always totally quantifiable. All effects were determined to be consistent within the standards and guidelines identified in the Sierra Nevada Forest Plan Amendment ROD (2004), and the Herger-Feinstein Quincy Library Group FEIS and ROD (1999 and 2003), and the 1988 Plumas National Forest Land and Resource Management Plan (LRMP).

The environmental assessment must disclose information necessary to support a Finding of No Significant Impact (FONSI) to the environment. The following discussion is organized around the 10 Significance Criteria described at 40 CFR 1508.27. The following have been considered in evaluating intensity for this proposal:

1. **Impacts that may be both beneficial and adverse:**

The Forest Service proposes to benefit the rural community of La Porte by reducing the risk of wildfires by modifying fuels, constructing DFPZs, and eliminating safety hazards to the public such as diseased trees within the recreational area surrounding the Little Grass Valley reservoir. Temporary adverse effects during implementation may determine the need for traffic control and to implement air pollution standards for burning operations.

2. **Degree of effect on public health and safety:**

The action alternatives are designed to eliminate diseased trees within the recreation area which may pose a hazard to forest visitors. Down woody material from past activities in the campground areas will be piled and burned or removed as biomass further opening up trails to the reservoir, eliminating obstacles, and improving views. Initially there may be short term impacts as alternate campgrounds will be closed during the implementation of the project which is unavoidable due to the high elevation and seasonal weather. Extensive scoping did not reveal any issues or concerns associated with public health. All interested and affected parties will continue to be informed throughout the decision making and implementation process.

3. **Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas:**

The Grass Flat project is adjacent to the Pacific Crest Trail and visual continuity will be an important aspect of the design. Care will be taken to not impact canopy levels in the CWHR size Class 5M and5D. There are no prime farmlands or wild and scenic rivers in the project area. Cultural resources were identified during the development of the alternatives and monitoring and environmental commitments will be implemented during project construction to minimize the potential for adverse impacts to heritage resources. Riparian Management Objectives will be enforced to provide protection to sensitive riparian areas.

4. **Degree to which the possible effects on the quality of the human environment are likely to be highly controversial:**

Short term uses are expected to change the human environment during prescribed burning and logging/hauling operations. Long term effects would not appreciably change the human environment after fuel reduction operations have concluded.

Public input regarding the Proposed Action has been solicited during an extensive project planning process, distribution of the project scoping packet and public meetings have not produced concerns regarding effects on the quality of the human environment.

5. Degree to which the possible effects on the quality of the human environment are highly uncertain or involve unique or unknown risk.
The availability of natural resources contributes to the quality of life for many county residents. Many communities are closely tied to the forest through work and recreation. These communities are directly influenced by changes in the supply of resources produced from the forest, and by the forest production of firewood, game, scenic resources, and recreational opportunities. Implementation of the preferred alternative would cause no unavoidable or highly uncertain, unique, or unknown risks other than the effects already stated.

6. Degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration:
Fuels reduction is an integral part of the *Herger-Feinstein Quincy Library Group Forest Recovery Act,* mandated by Congress through 2012. The stated objectives within the Act are to both provide forest products to enhance rural community economic stability and provide wildfire protection to rural communities. Careful consideration is extended to each proposed project on an individual basis to ensure standards and guidelines are met for environmental protection.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts:
No individually or cumulatively significant impacts were identified for the preferred alternative. Any adverse impacts identified for the preferred alternative, in conjunction with any adverse impacts of other past, present, or reasonably foreseeable future actions will result in negligible to moderate impacts to natural and cultural resources.

8. Degree to which the action may adversely affect district, sites, highways, structures, or objects listed on the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources:
An intensive archeological inventory to identify districts, sites, or other properties eligible for listing to or included on the National Register of Historic Places was completed for this preferred alternative. No historic properties were identified within the project area.

All surveyed and inventoried cultural resource sites, including new sites discovered during operations will be protected from entry and excluded from any resource activities in compliance with the Preservation of American Antiquities Act, June 1906. The California State Historic Preservation Officer (SHPO) will be consulted concerning proposed activities in the project area. The Advisory Council on Historic Preservation (ACHP) will be consulted about measures to protect significant archeological sites from adverse effects, would any be identified. All significant and potentially significant Heritage resources within the scope of this project shall be protected from adverse effects through avoidance.

9. The degree to which the action may adversely affect an endangered and/or threatened species (TES) or its habitat that has been determined to be critical under the Endangered Species Act of 1973:
No threatened and/or endangered species have been identified within the Grass Flat Project area. If, during the implementation of this project evidence of TES species is determined, a qualified biologist will be called immediately to make the determination on the future of project implementation.

Forest Service Sensitive Species: It is the biologist's determination that the proposed activities within the Grass Flat Project area may affect individuals, but are not likely to result in a trend towards Federal listing or loss of viability. Direct effects are expected to be unlikely, and indirect and cumulative adverse effects are expected to be low by adhering to management directions, standards and guidelines, Best Management Practices, mitigations, and resource protection measures.

The U.S. Fish and Wildlife Service concurred with a determination that the preferred alternative is "not likely to adversely affect" endangered or threatened species and critical habitat (Letter dated Dec. 23, 2002). In order to minimize the potential for adverse effect on the federally listed endangered Southwestern willow flycatcher (Empidonax traillii extimus), project construction activities will not take place between May 1-September 1 between Gunlock Reservoir and Winsor Diversion. Alternatively, qualified biologists will conduct field surveys for Southwestern willow flycatcher prior to the start of project construction. Based on the findings of the field surveys and an assessment of potential impacts on this species, BLM will then reinitiate consultation with the U.S. Fish and Wildlife Service, under Section 7 of the Endangered Species Act.

10. Whether the action threatens a violation of federal, state, or local environmental protection law: The preferred alternative violates no federal, state, or local environmental protection laws. All populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benfits of, are not excluded from, and are not affected in a disproportionately high and adverse manner, by government programs and activities affecting protection of the environment.