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Forest Service
Pacific Southwest
Region 5

Environmental Assessment

Grizz Project

Beckwourth Ranger District, Plumas National Forest,
Plumas County, California

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Glossary and Acronyms

Glossary

90th percentile weather conditions—high air temperature, low relative humidity, strong wind conditions and low fuel moisture content levels that historically have occurred on 10% of days in fire seasons. A 90th percentile weather day creates the potential for severe wildfire behavior. During a typical fire season, 90% of the days have less severe conditions and 10% of days have more severe conditions.

A-listed noxious weed—invasive plant species for which eradication or containment is required at the state or county level.

active crown fire—"A crown fire in which the entire fuel complex becomes involved, but the crowning phase remains dependent on heat released from the surface fire for continued spread" (Reinhardt and Scott 2001).

Area Thinning Zone —the area outside of the Defensible Fuels Profile Zone or Wildland Urban Interface.

B-listed noxious weed—invasive plant species for which eradication or containment is at the discretion of the county agricultural commissioner.

basal area—the cross-sectional total area of all tree stems at breast height (4.5' from the ground) over a given area, usually an acre.

Best Management Practices (BMP)—management practices that minimize degradation of surface waters from pollutants, including sediment from soil erosion. Refers specifically to the set of such practices developed jointly by the California State Water Resources Control Board and USFS Region 5 for application to forest land management in California.

C-listed noxious weed—invasive plant species for which eradication or containment is necessary only when found in a nursery or at the discretion of the county agricultural commissioner.

canopy base height (feet)—"The lowest height above the ground at which there is a sufficient amount of canopy fuel to propagate fire vertically into the canopy" (Reinhardt and Scott 2001). Canopy base height incorporates ladder fuels including brush, shrubs and understory trees. An increase in canopy base height results in decreased crown fire potential.

canopy cover—the degree to which forest canopy (forest layers above one's head) blocks sunlight or obscure the sky.

Chain—66 feet

Condition Class 1—Fire regime is within historic range and risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within the historic range

Condition Class 2—Fire regime has been moderately altered from the historic range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historic ranges by one or two return intervals. This would result in moderate changes to one of the following: fire size, intensity and severity and landscape patterns. Vegetation attributes have been moderately altered from the historic range.

Condition Class 3—Fire regime has been significantly altered from the historic range. The risk of losing key ecosystem components is high. Fire frequencies have departed from their historic range by multiple return intervals. This results in dramatic changes to one of the following: fire size, intensity and severity and landscape patterns. Vegetation attributes have been significantly altered from the historic range (RMRS GTR-87-2002).

crown/canopy base height—the height of the lowermost branches of the forest canopy above the ground.

crowning index (mph)—the 20 foot wind speed at which active crown fire is possible. An increase in the crowning index would indicate a reduced likelihood of an active crown fire moving through or into a stand.

cut-to-length system—as opposed to skidding whole trees or logs to a landing, a system of cutting logs to particular lengths (e.g. 20') and moving them to a landing on a wheeled forwarder. Reduces impacts to soils, requires less road construction and smaller landings and causes less damage to residual trees.

California Wildlife Habitat Relationships (CWHR)—a system developed jointly by the California Department of Fish and Game that classifies forest stands by dominant species types, tree sizes and tree densities and rates the resulting classes in regard to habitat value for various wildlife species or guilds.

CWHR Conifer Size and Canopy Closure definitions:

CWHR Tree Size			CWHR Canopy Cover		
CWHR	**Conifer Crown**	**dbh**	**CWHR**	**WHR Closure Class**	**Ground Cover**
1	Seedling Tree	<1"	S	Sparse Cover	10-24%
2	Sapling Tree	1-6"	P	Open Cover	25-39%
3	Pole Tree	6-11"	M	Moderate Cover	40-59%
4	Small Tree	12-24"	D	Dense Cover	60-100%
5	Medium/Large Tree	>24"			
6	Multi-layered Tree	Size class 5 over size class 4 or 3 trees w/ a 60% CC			

The crosswalk between CWHR and timber strata is as follows:

CWHR Timber Strata	CWHR Vegetation Type	Size Class (dbh)	Canopy Cover (%)
SMC4M	mixed conifer (SMC/MCH/DFR)	11-23.9"	40-59%
SMC5P	mixed conifer (SMC/MCH/D)	24-39.9"	20-39%
SMC5M	mixed conifer (SMC/MCH/DFR)	24-39.9"	40-59%
PPN4S	pine (EPN/PPN)	11-23.9"	< 20%
PPN4P	pine (EPN/PPN)	11-23.9"	20-39%
PPN4M	pine (EPN/PPN)	11-23.9"	40-59%
PPN5P	pine (EPN/PPN)	24-39.9"	20-39%
RFR4P	red fir (RFR)	11-23.9"	20-39%
RFR4D	red fir (RFR)	11-23.9"	60%+
RFR5M	red fir (RFR)	24-39.9"	40-59%
RFR5D	red fir (RFR)	24-39.9"	60%+
WFR3D	white fir (WFR)	6-10.9"	60%+

WFR4D	white fir (WFR)	11-23.9”	60%+
WFR5M	white fir (WFR)	24-39.9”	40-59%

defense zone—a buffer zone within the wildland-urban intermix generally ¼-mile wide around human habitation (residences, commercial buildings, administrative sites) in adjacent areas of flammable wildland vegetation. The desired condition for these zones is vegetation that makes ignition of crown fire highly unlikely and allows staging of fire suppression equipment and personnel to directly attack an approaching wildland fire. Stands should be fairly open and dominated primarily by larger, fire tolerant trees

defensible fuel profile zone (DFPZ)—zones approximately ¼-mile wide where fuel has been reduced. They usually are constructed along roads or ridge tops. They are intended to break up fuel continuity across the landscape and provide a defensible zone for suppression forces. Design criteria are described in the HFQLG EIS, appendix J, tables 1 and 2.

eastside—forest types growing on drier east side of the Sierra Nevada comprised of open stands of drought-resistant conifer species, most commonly Jeffrey pine.

end lining—extending a cable from a tractor and pulling a log to the tractor, rather than driving the tractor to each log in a harvest area.

Equivalent Roaded Acres (ERA)—the area of roads in a watershed that would produce the same rate of runoff and channel instability that the sum of all disturbances in a watershed cause. Acreages of different types of land disturbances are weighted according to the rate of runoff they cause relative to runoff caused by a native-surface road and the sum is the equivalent roaded area of the watershed.

fire regime—a combination of fire frequency and severity.

fire safe council—a local council (e.g. Plumas County) under authority of the California Department of Forestry and Fire Protection comprised of public officials and private interests formed for purposes of initiating and reviewing proposals for fuels reduction programs that may involve public and private land ownerships.

fireline—a zone in wildland vegetation types cleared of flammable material to inhibit or prevent the spread of fire.

fireline intensity (BTU/ft./sec.)—The measure of heat released per second from a one-foot wide section of the fuelbed extending from the front to the rear of the flaming front. Fireline intensity is a function of rate of spread and is related to flame length. It is used as an indicator of heat felt by a person standing next to the flame.

flame length (feet)—The distance measured from the tip of the flame to the middle of the flaming zone at the base of the fire. It is measured on a slant when the flames are tilted due to effects of wind and slope.

fuel moisture—The amount of water in a fuel, expressed as a percentage of the oven dry weight of that fuel. Fuel moisture content is often related to the size of the fuel, commonly referred to as 1-hour, 10-hour, 100-hour and 1,000-hour fuels. One hour fuels are < ¼” diameter. Ten hour fuels

are ¼" to 1" diameter. One hundred hour fuels are 1"-3" diameter. One thousand hour fuels are 3"-8" diameter. For example, a one hour fuel will take one hour to lose two-thirds of its moisture.

grapple piling—moving and piling logging slash (for burning) using mechanize equipment (a grapple).

hydrologic function—availability of water storage beneath the wetland surface

hydrophobic soil—soil that repels water. Often produced by intense wildfire which generally causes water to collect on the soil surface and increase surface runoff.

ladder fuels—fuels that provide a pathway for fire in ground fuels to ascend to the canopy of a forest stand. They comprise tall brush, small trees and lower branches of larger trees.

level 2 road—NFS roads intended for use by high-clearance vehicles, such as pickup trucks. User comfort is not usually a consideration. Roads are often subject to at least seasonal closure. Also called "maintenance level 2 road".

level 3, 4 and 5 roads—roads designed and maintained to accommodate passenger car use.

lithic scatter—a prehistorical heritage resource exhibiting flake stone artifacts.

management indicator species—species whose populations are believed to respond to management activities. They are chosen to represent specific habitat types.

mast—acorns, nuts, etc.

mechanical thinning—use of tractors, cable systems or helicopters to remove trees that have been cut by chainsaws or the use of feller-bunchers—wheeled vehicles with lopping shears or saws that cut and collect trees and carry them to a landing site.

off-base and deferred lands—federal Lands identified in the HFQLG Act as off-base or "deferred". The act excludes timber harvest and road construction on these lands.

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.\

over-stocked—condition of a forest stand where excessive number of trees has reduced total stand growth from the maximum possible amount. Trees are competing with one another for soil moisture and sunlight to the degree that growth of stand volume is suppressed.

partial retention—a visual quality objective of providing a natural-appearing landscape where management activities may be evident but must remain visually subordinate to the characteristic landscape.

passive crown fire—A crown fire in which individual or groups of trees torch out. Passive crown fire can vary in behavior from isolated torching to a nearly active crown fire.

piling and burning—piling harvest or thinning residues (branches and limbs) and burning 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.

rate of spread (chains/hour)—The rate at which fire moves through surface fuels. High rates of spread increase resistance to control for fire crews.

regeneration—tree seedlings and saplings that have the potential to develop into mature forest trees.

retention—a visual quality objective of providing a natural-appearing landscape where management activities are not visually evident to the casual forest visitor.

return interval—the average time period for the recurrence of a type of event (wildfire, flood, intense rainfall, etc.).

Riparian Habitat Conservation Areas (RHCA)—zones of specified widths along streams, bodies of water and wetlands which vary in width according to stream or feature type, as described the in Appendix L of the HFQLG FEIS (1999).

road decommissioning—culvert removal and removal of stream-crossing fills and regrading of the road prism to restore natural slope, natural contours and watercourse morphology.

sensitive area (for cumulative watershed effects analysis)—areas within 200' of perennial streams. These areas need special protection because they are more susceptible to adverse impacts. They are often closely associated with a body of waer or areas that are at a lower elevation than upland areas.

sensitive species—species listed as such by the regional forester of the USFS' Pacific Southwest Region because their populations are such that National Forest management actions could contribute to a trend toward eventual listing by USFWS/NMFS as threatened or endangered.

seral stage—a life stage of a plant community.

shade intolerant—species that require full, open sunlight on the forest floor to establish and grow (e.g. ponderosa pine).

shelterwood—a regeneration method under an even-aged silvicultural system wherein a portion of a mature stand is retained as a source of seed and/or protection during the period of regeneration.

site-potential trees—trees that growing at the maximum rate that the environmental conditions of a given site will allow. Trees on a site whose growth is not inhibited by competition from other trees.

slash—vegetative residue after a logging operation. Includes branches and tops of logged trees, broken branches of residual trees and broken residual trees.

snag—a dead standing tree.

special habitats—habitat types that are monitored if they are determined to be limited in distribution, particularly valuable as habitat for rare plants or wildlife or of concern for other reasons

spotting—the process of ignitions ahead of an advancing fire due to wind-borne firebrands.

standard operating procedures (SOP)—a set of environmental-protection requirements for the conduct of vegetation management activities that are imposed upon USFS contractors through contract provisions.

Streamside Management Zone (SMZ)—buffer zones along streams in timber harvest zones designated and managed in accordance with the 1988 PNF Forest Plan. Predate RHCAs and SAT guidelines.

subsoiling—any treatment to fracture and/or shatter soil with narrow tools below the depth of normal tillage without inversion and with a minimum mixing of the soil.

surface fire—A fire spreading in surface fuels.

thinning from below—a process of removing trees from a stand beginning with the smallest trees under desired conditions for crown base height and/or canopy cover is attained.

threat zone—a land-use allocation of SNFPA within the wildland-urban intermix generally extending about 1¼-mile beyond defense zones where vegetation should be treated to reduce the rate of wildfire spread and wildfire intensity.

threatened and endangered species—a species listed in either category by the USFWS or NMFS under provisions of the federal Endangered Species Act

timber strata—vegetative areas with similar species composition, tree size and density.

torching—ignition of an entire tree or a group of trees, isolated sufficiently from other trees so that a crown fire is not initiated with a stand.

treatment units—forest stands where vegetation management activities are proposed, including both DFPZ construction and GS timber harvest.

Threshold of Concern (TOC)—an estimate of the value of equivalent roaded area (ERA) in a particular watershed above which land disturbances begin to substantially impact downstream channel stability and water quality.

torching index (mph)—The 20 foot wind speed at which crown fire is expected to initiate. An increased torching index would indicate a reduced likelihood of torching in a stand, with a resultant reduction in crown fire potential.

underburning—prescribed fire in fuels on the forest floor that is intended to generally remain on the forest floor without consuming significant portions of the forest canopy.

upland areas—areas that are at a higher elevation than the alluvial plain or stream terrace (sensitive area)

westside—forest types growing on wetter, more humid west side of the Sierra Nevada, usually comprised of mixed conifer stands, most commonly ponderosa pine, Douglas fir, white fir, incense cedar, sugar pine and black oak or higher-elevation communities

wildland/urban interface (WUI)—an area where human habitation is mixed with areas of flammable wildland vegetation. It generally extends outward from the edge of develop private land into federal, private or state jurisdictions.

Acronyms

AOC	Area of Concern
AT	Area Thinning Zone
BA/BE	Biological Assessment/Biological Evaluation
BBS	Breeding Bird Survey
BEHMA	Bald Eagle Habitat Management Area
BMP	Best Management Practices (for protection of water quality)
CDFG	California Dept. of Fish and Game
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Cfs	Cubic Feet per Second
CWE	Cumulative Watershed Effects
CWHR	California Wildlife Habitats Relationships
DEIS	Draft Environmental Impact Statement
DFPZ	Defensible Fuel Profile Zone
dbh	diameter at breast height (4.5')
DOQ	Digital Orthophotoquad
EA	Environmental Assessment
EIS	Environmental Impact Statement
ERA	Equivalent Roaded Area
ETZ	Extended Treatment Zones
FEIS	Final Environmental Impact Statement
FIA	Forest Inventory Analysis
FOFEM	First Order Fire Effects Model
FONSI	Finding of No Significant Issues
FM	Fuel Model
FRLC	Feather River Lumber Company
FVS	Forest Vegetation Simulator
GIS	Geographical Information Systems
GPS	Global Positioning System
GS	Group Selection
Hef	Habitat Effectiveness
HFI	Healthy Forest Inititiative
HFRA	Healthy Forest Restoration Act
HFQLG	Herger-Feinstein Quincy Library Group
HFQLG FRA	Herger-Feinstein Quincy Library Group Forest Recovery Act
HRCA	Home Range Core Area (for spotted owls)
HSI	Habitat Suitability Index
HUC	Hydrologic Unit Code
IDT	Interdisciplinary Team
ITS	Individual Tree Selection
KV	Knutson-Vanderberg Act

LOP	Limited Operating Period
LRMP	Land and Resource Management Plan, as amended
LS/OG	Late Seral/Old Growth
LWD	Large Woody Debris
mbf	Thousand Board Feet (1 board feet = 12'x12'x1")
mmbf	Million Board Feet (1 board feet = 12'x12'x1")
MAI	May Affect but Is Not Likely to Adversely Affect Individuals or Their Designated Critical Habitat
MFFR	Middle Fork Feather River
MIS	Management Indicator Species
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NSAQMD	Northern Sierra Air Quality Management District
NTMB	Neotropical Migratory Bird
OHV	Off-highway Vehicle
PA	Proposed Action
PAC	Protected Activity Center
PFSC	Plumas Fire Safe Council
PLAS	Plumas Lassen Administrative Study
PNF	Plumas National Forest
PM	Particulate Matter
Psi	Pounds per square inch
PSW	Pacific Southwest Research Station
QMD	Quadratic Mean Diameter
RAC	Resource Advisory Committee
RAWS	Remote Automated Weather Station
RHCA	Riparian Habitat Conservation Area
RMO	Riparian Management Objective
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SAT	Scientific Analysis Team
SHPO	State Historic Preservation Officer
SMC	Sierra Mixed Conifer
SMZ	Streamside Management Zone
SNEP	Sierra Nevada Ecosystem Project
SNFPA	Sierra Nevada Forest Plan Amendment (both 1991 and 1994 amendments)
SOHA	Spotted Owl Habitat Area

SOP	Standard Operating Procedure
SOPA	Schedule of Proposed Actions
SQS	Soil Quality Standards
TOC	Threshold of Concern
UDL	Upper Diameter Limit
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFS PSW	U.S. Forest Service Pacific Southwest Region
USFWS	U.S. Fish and Wildlife Service
VQO	Visual Quality Objectives
WEPP	Water Erosion Prediction Project
WIFL	Willow Flycatcher
WNA	Will Not Affect
WNV	West Nile Virus
WPT	Western Pond Turtle
WUI	Wildland/Urban Interface
YFL	Yellow Legged Frog
%	Percent
“	Inches
‘	Feet

Chapter 1 Purpose and Need

1.1 Project Description and Location

The USDA Forest Service, Plumas National Forest (PNF), proposes to conduct land management activities in the Grizz Project area to reduce hazardous fuels, improve forest health, support the local communities, provide access needed to meet other project objectives and reduce transportation system impacts. Detailed descriptions of the Proposed Action and action alternatives are in Chapter 2. The Grizz Project area is located approximately four miles northwest of Lake Davis and seven miles southwest of Taylorsville, CA (Figure 1). The Grizz Project planning area is approximately 19,400 acres and treatment has been proposed for about 3,986 acres. Public involvement for this project began in April 2005 when it first appeared in the Schedule of Proposed Actions (SOPA). The NEPA scoping process began on August 23, 2006 with the publication of the legal notice of the Proposed Action (PA) in the *Portola Reporter*.

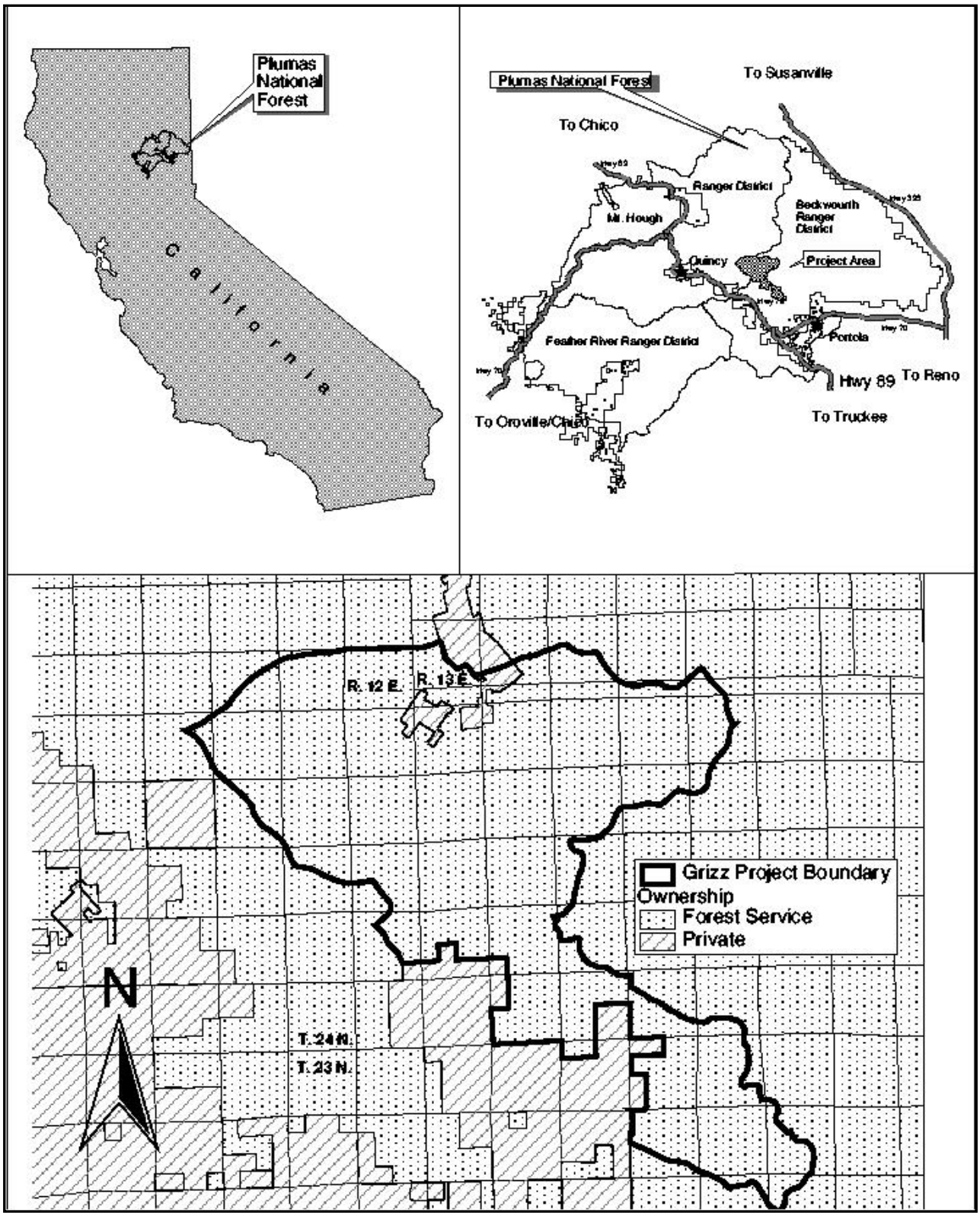

Figure 1 Grizz vicinity map.

1.2 Structure of the Grizz Environmental Assessment

The Grizz Project Environmental Assessment (EA) has been prepared to comply with the National Environmental Policy Act (NEPA) and the Council of Environmental Quality (CEQ) regulations. This document is structured to include all of the information required to be included in an EA by the CEQ regulations at 40 CFR 1508.9(b) and the Forest Service Handbook (FSH) at FSH 1909.15, 41.2.

This EA includes four chapters and an Appendix:

- Purpose and Need
- Alternatives Including the Proposed Action
- Affected Environment and Environmental Consequences
- Agencies and Individuals Consulted
- Appendices

1.3 Contents of Chapter 1: Purpose and Need

This chapter provides detailed information on the Purpose and Need for the Grizz Project and issues that were identified during scoping and public involvement activities. It also includes information on the project schedule, the responsible official and management direction.

1.3.1 Project Purpose and Need

This chapter provides an explanation regarding the background, purpose of and need for the Proposed Action and measures that will be used to track how successfully the Purpose and Needs are being met.

The measures under each Purpose and Need are used to track how well each action alternative successfully meets that Purpose and Need. Table 2.9 in Chapter 2 compares the measures across the different action alternatives and the No-action Alternative.

1.3.1.1 Purpose 1: Strategically Reduce Fuel Loads in Order to:

- Diminish the potential size and intensity of wildfires across the landscape.
- Contribute to the connectivity of and expand the larger HFQLG landscape level Defensible Fuel Profile Zone (DFPZ) network and other fuel treatments on public and private land.
- Increase firefighter safety and efficiency.

Measures

- Fire type (surface versus crown fire)
- Mortality (%)
- Surface fuels (tons per acre)

- Ground to canopy base height (feet)
- Flame length (feet)
- Rate of spread of fire (chains per hour)

Need for Action

Past vegetation management activities, fire suppression, insects, disease and a cyclic region wide drought (1980's) have left the Grizz Project area with an elevated risk of stand-replacing crown fire. Currently, the overstocked stands in the area are a cumulative result of past events and present a high fire hazard and threat to the surrounding forests and local communities. Surface fuels are currently composed of dead and down material. Ladder fuels with a low ground to canopy base height, composed of mostly true firs and are also contributing to the high fuel loading of the area. These current conditions make the possibility of a severe wildfire initiating and spreading out of control increasingly likely.

The presence of fuels in the Grizz Project area also threatens the connectivity of existing and planned fuelbreak treatments in the surrounding area. These planned and existing fuelbreaks are part of a larger strategic network on the PNF. The fuelbreaks are designed to protect communities within the area and to prevent wildfires from spreading across the forest. The Grizz Project serves as the connector between four planned and/or existing fuelbreaks.

The large amount of ladder and dead and down fuels is an existing condition that would require removal during fire suppression, thereby slowing progress by firefighters. In addition to the smaller diameter fuels, there are a few larger trees that are currently dead and dying and present a fire hazard. They would also need to be removed. Intense fire behavior with tall flame lengths and a fast rate of spread would make a direct attack by firefighters impossible. The heavy amount of fuel loading coupled with the inability to directly attack a fire would make successful containment of a fire within the project area exceedingly difficult, expensive and dangerous. An ignition within the project area has the likely potential to grow into a large crown fire that may affect a larger area.

Desired Condition

Reduce Crown Fire Potential

The desired condition is to prevent fires from spreading by breaking up fuels across the landscape. DFPZs are landscape level fuel reduction treatments designed to moderate wildland fire behavior and allow for efficient fire suppression. This is achieved through the reduction of canopy cover, surface fuels and by increasing the canopy base height by removing small diameter trees that act as ladder fuels. A desired canopy cover of 40% would create the desired crown separation that would help bring fires down from the canopy to the surface of the ground. This would also reduce the mortality of trees after a wildfire.

The DFPZs are generally ¼-mile to ½-mile in width taking advantage of naturally fire resistant landscape features such as roads, ridgelines, rocky slopes, wet valley bottoms and boundaries between PNF and private property. The desired stand condition within the DFPZ is open stands that are dominated by clumps of larger, fire tolerant trees. This would help reduce the potential for a crown fire that could spread across the landscape.

Fuel Treatment Connectivity

The desired condition is to have the Grizz DFPZ provide a linkage between current and planned DFPZs (Figure I-1). The principle behind DFPZ connectivity is to create a network of linear fuel treatments across the landscape where wildfire behavior would be modified. The Plumas, Tahoe and Lassen NF's have been creating a strategic network over seven Ranger Districts. This strategic network of DFPZs is being created in an effort to contain wildland fires while they are relatively small in size.

Firefighter Safety and Efficiency

The desired condition is to provide increased firefighter safety and efficiency through the reduction of fire behavior. Fires within a DFPZ would ideally be surface fires that are less than 4 feet in flame length. Decreased flame lengths, a slower rate of spread and reduced fire intensity in a DFPZ would let firefighters directly attack a fire, which is safer and more efficient than an indirect attack. Prior removal of hazardous fuels and a decrease in stand density would increase the fireline production rate during active suppression.

1.3.1.2 Purpose 2: Improve Forest Health Within the Grizz Project in Order to:

- Improve conifer growing conditions and resiliency to disturbance, reflecting historic Sierra conifer conditions.

Measures

- Number of acres that remain overstocked (greater than 70% of normal basal area)
- Number of acres within units not meeting desired canopy cover (40% or 50%, depending on DFPZ or Area Thin zone)
- Amount of acres of Sierra mixed conifer size class 4 (SMC4M) growing from an average 7" to 17" dbh in 20 years after treatment (40% canopy cover)
- Amount of acres of SMC4M type growing from an average of 7" dbh to 13" dbh in 20 years after treatment (50% canopy cover)

Need for Action

Although DFPZ treatments will focus on reducing and moderating fire behavior, forest health issues will also be addressed on a site specific basis. In addition to the DFPZ, areas outside of the DFPZ, known as the Area Thin, are also in need of treatment. Fire suppression and previous

timber harvesting have altered the area from its historic stand composition. Current stand composition is overstocked with white fir. Overstocked stands are at 70% or higher of normal basal area. Normal basal area is defined as the maximum site occupancy of trees per acre. As these stands reach 70%, the increase in stand density leads to decreased tree growth, potential for insect attack, reduced stand vigor, etc. The dense canopy cover in overstocked stands also encourages the growth of white fir instead of fire tolerant conifers such as pine. Today, the majority of the trees are in the 12-24" dbh range (CWHR size class 4). The combination of high tree density, alteration in species composition, tree size distribution and white fir mortality has degraded growth and vigor within the Grizz Projec area. Forest health and resistance to disturbance agents has been compromised.

Desired Condition

Improve the Health Condition of Conifer Stands

The desired condition for the Area Thin in the Grizz Project area is an "all-age, multistory, fire-resistant forest approximating pre-settlement conditions" (USFS 1999). A desired stand would have:

- Less canopy cover
- A decreased number of trees, particularly white firs
- Increased conifer growth rates.

The desired condition for the Area Thin units surrounding the DFPZ in the Grizz Project area is reduced stocking and a decreased percentage of white fir. Stands that are between 55% and 70% of normal basal area generally exhibit increased growth rates and resiliency to insect and disease. Opening up the canopy to 50% canopy cover (40% canopy cover in the DFPZ) will also give fire tolerant conifers such as pine an advantage in successful regeneration. Reducing the amount of trees per acre will reduce competition between trees and encourage the growth of larger trees.

1.3.1.3 Purpose 3: Emulate Small Natural Disturbances in Order to:

- Promote healthy conifer regeneration.
- Encourage the growth of shade intolerant and fire resilient conifer species.

Measures

- Acres of early seral stage habitat created (CWHR size class 0-2)

Need for Action

There is a lack of early seral stage habitat. The young forests or un-stocked patches throughout the forests are regenerating poorly. There are also small pockets of mortality scattered throughout the project area. The lack of large openings also prohibits the growth of shade intolerant, fire resilient species such as pine.

The lack of fire and a decrease in thinning has also had adverse affects to the forests within the Grizz Project. Relative to early historical forest structure, past management activities has left the Grizz Project area in a greater uniformity of age classes with less structural complexity. The stands in the Grizz Project are relatively even age and lack the variegated stand structure of the earlier forests.

Desired Condition

Reduced Pockets of Conifer Mortality

The desired condition is to regenerate small pockets of dead and dying trees in the Grizz Project. Removing the pockets of mortality and unhealthy trees removes wildland fire fuels as well as encouraging healthy conifer regeneration.

Increased Amounts of Fire Resilient Conifers

The desired condition is to create openings that tend to favor shade intolerant conifers regeneration such as pine. Being fire tolerant, an increase in pine would increase the project area's resilience to stand replacement fire. Regenerating pines in an uneven-age setting will break up canoy continuity and further reduce the risk of fire.

Balanced Age Classes with Greater Structural Complexity

The desired condition is to have trees of all different ages and sizes represented throughout the stand. This is also known as a balance of age class distribution. On a landscape-scale, there would be a wide range of trees from seedlings (early seral stage habitat) to large diameter trees with different vertical and horizontal structural components present.

1.3.1.4 Purpose 4: Reduce Fuel Loads in the Riparian Habitat Conservation Areas in Order to:

- Decrease the threat of stand-replacing fires destroying riparian and stream habitat.

Measures

- Fire type (surface versus crown fire)
- Mortality (%)
- Rate of spread of fire (chains per hour)
- Acres of RHCA treated

Some of these measures are identical to the ones used in Purpose and Need 1 in that they measure the fire behavior in the treated portions of the RHCA.

Need for Action

Currently, riparian habitat conservation areas (RHCAs) and their associated flora and fauna are at an elevated risk of loss due to a high potential for stand-replacing fire. As a result of past logging and fire suppression, RHCAs are overstocked, contain ladder fuels consisting of small trees and

brush and have excessive fuel loads. Important riparian habitat components and surrounding forests are at a high risk of loss due to the elevated potential of a crown fire. In the event of a fire, the mortality of trees would be high and important shade components would be lost. The Riparian Management Objectives (RMOs) in Appendix J of the HFQLG (USFS 1999) indicate that management of RHCAs should maintain or restore important riparian components such as water quality, diversity and productivity of riparian species and important aquatic habitats. A severe fire could destroy many of these riparian components.

In addition, the topography of some RHCAs (narrow and/or steep draws) can create a "chimney effect" which leads to hot and fast moving fires. This can compromise existing and planned fuel treatments such as Defensible Fuel Profile Zones (DFPZ).

Desired Condition

The desired condition is to reduce the potential for crown fires fires within. Stands in RHCAs would be mostly composed of larger, fire tolerant trees. Decreasing conifer stocking will encourage the development of larger, fire resistant conifers. This would decrease conifer tree mortality and slow the rate of spread of a fire if one were to occur within an RHCA.

1.3.1.5 Purpose 5: Reduce Transportation System Impacts in Order to:

- Maintain an effective and operable road system that meets natural resource objectives while meeting Forest Service needs and public use and enjoyment.

Measures

- Acres of restored hydrologic function
- Reduced number of stream crossings

Need for Action

Roads play a vital role in providing access for resource management needs as well as by the public for recreation use. However, unneeded and poorly located roads can impair and impact watersheds and other hydrologic resources.

Roads can contribute excessively to stream sedimentation when they are placed near RHCAs. For example, Forest Service System Road 24N60C is near and in portions of an RHCA. Forest Service System Road 23N22Y is also causing damage such as rutting and sediment transfers to RHCAs and SMZs. Roads can also impair hydrologic function. An increase in road density can result in greater impacts to water quality downstream such as increased riparian channel scour or higher sediment transfer. Overtime, these various negative impacts can add up and degrade the health of a watershed, RHCAs and Streamside Management Zones (SMZs).

Desired Condition

The desired condition is to minimize the impacts that roads have on the landscape while ensuring safe travel for forest users and provide a transportation system that is adequate for resource

management needs. Ideally, a watershed would have a low enough road density to be capable of sustaining peak flows without excessive erosion and stream channels would have adequate root mass to bind stream banks. Restoring hydrologic function and reducing the number of stream crossings would reduce watershed effects and meet the RMOs as directed by the HFQLG Act.

1.3.1.6 Purpose 6: Contribute to the Economy of the Local Community in Order to:

- Help sustain and maintain a stable economy.
- Create and sustain timber industry-related jobs in the local area.

Measures

- Total number of full-time jobs
- Sawlog volume (mmbf)
- Total employee related income (dollars)

Need for Action

Local factors influencing Plumas County's economy include isolation from urban job markets, reliance on natural resource-based industries and high seasonal fluctuations in employment. In this local economy, forest health and community health share interdependent goals.

The local community is dependent upon the forest products industry located within reasonable hauling distance from the project area. Since the mid-1980's, the number of sawmills within the area have dwindled from six to essentially one, located in Quincy. There is a "cogen" plant in Loyalton that only takes biomass material for the generation of electricity. Having a mill within reasonable hauling distance increases the practicality of implementing project activities reduces costs and supports the local economy.

Desired Condition

Community Stability

A predictable supply of timber related jobs and revenues would allow community members to settle within local towns and further contribute to the local economy. Timely timber sales in Yuba, Sierra and Plumas Counties contribute a proportional supply of timber to local communities that are highly dependent on the forest products industry.

Job Opportunities

A continuous, regulated flow of forest products would reduce the "boom and bust" cycle of jobs currently experienced by local communities. Timber related jobs provide "livable" wages to workers that allow them to stay and invest within a community.

1.3.2 Public Involvement and Scoping Issues

1.3.2.1 Public Involvement Process

Notice of the Proposed Action (PA) first appeared in the Plumas National Forest quarterly Schedule of Proposed Action (SOPA) issued April 2005 and has been updated in the SOPA each quarter since. The Beckwourth Ranger District started the NEPA scoping process with publication of the legal notice of the PA in the Portola Reporter on August 23, 2006. A total of 18 PA description packets (PA, figures and maps) were sent to various individuals, organizations, government agencies and tribes. The scoping period ended on September 22, 2006, although the District continued to receive and consider comments after this date.

The purpose of the scoping process was to inform the public about the Purpose and Need of the Grizz Project and the PA. The Forest Service received comments from three organizations (Table 1.1).

Table 1.1. Grizz Project scoping results

Entity	Representative	City	Date Received
Sierra Pacific Industries	Tom Downing	Quincy, CA	September 21, 2006
Sierra Nevada Forest Protection Campaign	Craig Thomas, Director and others	Sacramento, CA	September 22, 2006
Counties' QLG Forester	Frank Stewart	Chico, CA	October 6, 2006

1.3.2.2 Scoping Issue Development

An interdisciplinary team (IDT) of resource specialists assigned to the Grizz Project reviewed all of the public comments received as a result of the scoping process. Internal issues from IDT members were also reviewed and considered. These various issues were then separated into three separate groups:

- Major Issues
- Minor Issues
- Non Issues

Scoping comments that presented a point of disagreement, debate or dispute about the PA based upon effects were identified by the IDT as an issue. We identified key topics that covered the major themes in the comments then split them into either major or minor issues. The major issues became the basis for developing and analyzing additional alternatives to the PA (Alternative 1) and the required No-action Alternative (Alternative 2) described in more detail in Chapter 2.

Minor issues are based on valid cause and effect relationships, but with effects too low to drive the development of alternatives. Minor issues were addressed as mitigations or as alternatives considered, but not analyzed. Some of the following reasons for eliminating alternatives from detailed study included:

- Failure to meet the project Purpose and Need
- Technologically infeasible
- Decision(s) already made
- Remote or speculative

The other comments that were not determined to be significant issues were classified as non-issues. Non issues were identified as those that are:

- Outside the scope of the PA
- Already decided by law, regulation, Forest Plan, or other higher level decision
- Irrelevant to the decision to be made
- Conjectural and not supported by scientific or factual evidence

Comments identified as "concerns" were evaluated to determine those that could be addressed through further explanation of the PA or could be addressed through the effects analysis in Chapter 3. Some concerns were determined to be "outside the scope" of the project and/or did not fit within the Purpose and Need of this project. If the information was deemed necessary for the deciding officer to make a decision, that information was provided in this environmental document. In other instances, the information was already provided in the PA document.

In Chapter 2, each of these alternatives is first described then followed by the reason(s) for considering them in detail or elimination from detailed study and consideration. Based on internal and external issues, an additional five action alternatives were considered. Out of these five, three were developed, considered and not analyzed in detail. Two more were developed, considered and analyzed along with the PA and No-action Alternative. The significant external and internal issues were:

- The PA's current design has too much costly treatment which will reduce the cost effectiveness of the project.
- The DFPZ location in the PA fails to link up with future proposed DFPZs and will not provide connectivity across the landscape.
- Thinning and fuel treatment activities will lead to further habitat fragmentation and have a negative affect on California spotted owl foraging habitat.
- Without an alternative that implements the 2001 ROD, the decision maker will be unable to determine the difference in impacts to resources between the 2001 and 2004 Framework.
- Reduction of canopy cover below 50% and/or removal of trees larger than 20" dbh is not necessary to meet fuel reduction objectives.
- Removal of felled hazard trees will result in a loss of benefits to soil and wildlife in areas that are deficient of down logs.

1.3.3 Project Schedule

The Responsible Official expects to make a decision on the Grizz Project by August 2007. Implementation could begin as early as spring of 2008.

1.3.4 Responsible Official

The Responsible Official for the Grizz Project will be the PNF Forest Supervisor. The Responsible Official will decide whether to implement the Grizz Project as stated in the PA, as one of the action alternatives or not to implement the project at this time.

1.3.5 Management Background

This project is proposed according to management direction provided by the PNF Land and Resource Management Plan (LRMP) as amended by the Herger-Feinstein Quincy Library Group (HFQLG) 1999 Final EIS and Record of Decision (ROD), the 2003 HFQLG Supplemental EIS and ROD and the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) Supplemental EIS and ROD (USFS PNF 1988, USFS 1999, USFS 2003, USFS PSW 2004 a, b). The 2004 SNFPA required that land allocations and application of Standards and Guidelines embodied in the HFQLG ROD be preserved for the life of the pilot study. The pilot study provided for by the HFQLG Act was designed to test the effectiveness of certain resource management activities at meeting various ecologic, economic and fuel reduction objectives. Fuelbreak construction consisting of a strategic system of DFPZ is just one of the requirements of the Act. Other activities include group selection (GS), Area Thinning treatments (or Individual Tree Selection), as well as riparian management and restoration projects.

Chapter 2 Alternatives Including the Proposed Action

2.1 Contents of Chapter 2: Alternatives Including the Proposed Action

This chapter provides the reader with a detailed description of the PA, the No-action Alternative, the action alternatives and the Alternatives Considered but Eliminated from Detailed Study. Each section illustrates the differences between the alternatives and the issues that they respond to. In addition to the action alternatives, a No-action Alternative will be analyzed to determine the effects of taking no action.

Chapter 2 is organized as follows:

- Contents of Chapter 2
- Action and No-action Alternatives
- Comparison of Alternatives
- Other Affected Resources
- Project Specific Design Features/Mitigations
- Alternatives Considered but Eliminated from Detailed Study

Chapter 2 follows the Council on Environmental Quality (CEQ) regulations 1502.14 for implementing NEPA which requires the Forest Service to rigorously explore and objectively evaluate all reasonable alternatives and briefly discuss the reasons for eliminating any alternatives. This process was done with resource specialists in an interdisciplinary team (IDT) setting. The IDT discussed the potential benefits and costs of the action alternatives and Alternatives Considered but Eliminated from Detailed Study.

The alternatives were developed from significant internal and external issues that were derived from public scoping comments as discussed in Chapter 1. All action alternatives were designed to meet the Purpose and Needs in Chapter 1. Treatment actions proposed will often meet more than one Purpose and Need. For example, all Area Thin treatments will specifically meet Purpose 2: Improve forest health within the Grizz Project, as well as Purpose 1: Strategically reduce fuel loads and Purpose 6: Contribute to the local economy. In all of the actions proposed, multiple Purposes and Needs will be met as a result of treatment activities.

2.2 Alternatives

2.2.1 Alternative 1 (Proposed Action)

2.2.1.1 Developing the Alternative

Alternative 1 was the PA that was originally scoped to the public in August 2006. The PA would implement provisions of the HFQLG Act, SNFPA and the 1988 Plumas LRMP. The PA was designed to meet the Purposes and Needs discussed in Chapter 1. The PA is designed in order to do the following:

- Treat fuels within a DFPZ
- Treat forested areas outside of the DFPZ
- Implement group selections (GS)
- Treat fuels in the riparian habitat conservation areas (RHCA)
- Provide a transportation system that meets Forest Service and public access needs protecting riparian and hydrologic resources

The project analysis area encompasses approximately 19,400 acres of the PNF managed by the Beckwourth Ranger District (Figure 1), out of which 3,686 acres (approximately 19% of the project area) are actually being proposed for treatment.

The IDT worked through various earlier versions of of the proposed treatments. Earlier versions proposed much more treatment area (approximately 9,600 acres total) than the current PA. These earlier proposed treatments sought to fully implement the provisions of the HFQLG Act and planned to treat “every available acre”. However, further analysis showed that due to previous activities on private and federal lands, watershed health would be severely impaired if the proposed treatments were implemented. Through discussion among IDT, the treatments and treatment unit boundaries were revised to best meet the Purposes and Needs while maintaining the health of the watersheds. In addition, proposed treatments such as cable and helicopter logging were dropped due to the lack of volume needed to justify costly treatments.

2.2.1.2 Minor Corrections/Changes to the Proposed Actions

On August 22, 2006, the document titled “Grizz Project-Proposed Action, Purpose and Need” was mailed to the public. Since that time a few changes were noted in the PA. These corrections are reflected in the PA (Alternative 1) below. The changes are as follows:

- The PA had stated that mechanical thinning in RHCAs would be restricted to slopes less than 15%. This is incorrect. Mechanical thinning in RHCAs will be restricted to slopes less than 25%. This would apply to Alternative 1 and all of the action alternatives.
- Units 26 (54 acres) and 29 (46 acres) were dropped from all action-alternatives due to the confirmation of a goshawk proposed activity center (PAC) during the PA scoping period.

- Unit 83 will be changed from mechanical thin/group to grapple piling due to slope restrictions.
- Unit 194 was dropped from all action alternatives due to logistical problems with the transportation system.

There were several road corrections due to incorrectly attributing the "roads action" layer in the GIS database. In addition, there were road changes made as a result of the units mentioned above being dropped. The majority of the road work being proposed remains unchanged from the PA (Appendix B). The changes are:

- There will be approximately 7 miles of existing system roads decommissioned, instead of 6 miles. About 2 miles will be used for the project then decommissioned, instead of 2.5 miles.
- Roughly 17.25 miles of system roads will have reconstruction or maintenance instead of 24 miles.
- Only 0.4 miles of new system roads will be constructed, instead of 0.8 miles.
- Approximately 5 miles of temporary roads will be constructed, instead of 6 miles.
- About 0.25 miles of non-system roads will be decommissioned, instead of 1 mile being closed.
- Roughly 1.5 miles of system roads will be closed after use, instead of 2 miles.

2.2.1.3 Summary of Actions

The following tables summarize the PA for Alternative 1.

Table 2.1 Acres of treatment in the DFPZ within the Grizz Project area, not including equipment exclusion zones.

Treatment	Logging System	GS Acres	Treatment Acres	Total Acres
Thin*	Feller Buncher Mechanical	N/A	1,005	1,005
Thin/Group**	Feller Buncher Mechanical	58	744	802
Mechanical Fuels Treatment	Grapple Pile/Mastication	N/A	287	287
Underburn	Manual	N/A	12	12
			Total	**2,106**

*Units with mechanical thin treatments only
**Mechanical thin units with group selections throughout

Table 2.2 Acres of treatment in Area Thinning stands (outside of the DFPZ) within the Grizz Project area, not including equipment exclusion zones.

Treatment	Logging System	GS Acres	Treatment Acres	Total Acres
Thin*	Feller Buncher Mechanical	N/A	696	696
Thin/Group**	Feller Buncher Mechanical	52	616	668
Mechanical Fuels Treatment	Grapple Piling/Mastication	N/A	216	216
			Total	**1,580**

*Units with mechanical thin treatments only
**Mechanical thin units with group selections throughout

2.2.1.4 DFPZ Treatment

Mechanical Thinning

There are 1,005 acres of DFPZ units designated for mechanical thin (Table 2.1). Mechanical thinning within the DFPZ would follow Table 2 of the SNFPA ROD (2004b) for the HFQLG Pilot Project Standards and Guidelines (Appendix C). A thinning from below prescription would be utilized in most cases. There may be larger trees removed that are at high risk of mortality due to insects or disease. Fuel ladders would be reduced or removed. In westside stands, prescriptions would be designed to avoid reducing the existing canopy cover by more than 30%, retain at least 40% of existing basal area generally comprised of the largest trees and to retain a minimum of 40% canopy cover where available. Clumps of the largest fire-tolerant, healthy trees would be retained within a network of intermingled openings rather than employing uniform spacing between the residual trees. No trees ≥ 30” dbh would be removed except in cases regarding safety and operability due to Occupational Safety and Health Administration (OSHA) regulations. Forest Service Representatives must approve such removals and will be avoided where possible.

Where mechanical, ground-based harvest equipment is used, trees will be removed using whole tree yarding, effectively removing most limbs and tree tops from the stand. New skid trails may be necessary due to the use of whole tree yarding techniques in some stands. Whole tree yarding requires that skid trails be straighter than those used in the past since full length trees with all of their branches are hard to maneuver through the forest without damaging the residual stand. Mechanical felling would be restricted to slopes having a gradient of less than 35%. Exceptions may be made for short (less than 100’) pitches within the interior of units where slope exceeds this limit.

Mastication, grapple pile and/or underburning may follow thinning if needed to meet ladder and ground fuel-reduction objectives. This would occur within the lifetime of the project. For a further discussion of grapple piling and mastication, please see below under the “Mechanical Fuel Treatment” subsection.

Mechanical Thin and Group Selection

There are 802 acres of DFPZ units with both mechanical thin and GS (Appendix B, Table 2.1). These DFPZ units will follow the same thinning prescription as mentioned above under the "Mechanical Thinning" section. In addition to mechanical thinning, there will be ½ to 2 acre group selection openings within the units, a total of 58 acres, (Table 2.1). For further discussion regarding GS, please see below under the "Group Selection" subsection after the DFPZ section.

Mechanical Fuel Treatment

In 287 acres of units in the DFPZ where medium to large sized tree removal may not be necessary, mechanical fuel treatments will be used (Table 2.1, Appendix B). These treatments will generally be grapple piling or mastication and are well suited to units with a large amount of smaller sized biomass.

Grapple piling and mastication is applied where the trees to be removed are generally below sawlog size (11" dbh) and there is an excessive amount of down woody debris and/or shrubs that act as ladder fuels and compete with young trees. It is a versatile treatment and works well in areas that have been understocked due to mortality. Mastication and piling equipment can operate on slopes up to 40-45% without significant damage to soils, so this treatment can extend upslope beyond mechanical harvesting equipment. Mastication will be used to kill shrubs and undesirable small trees. Mastication does not immediately reduce fuel loading. Instead, it rearranges ladder fuels from a vertical position to a horizontal position in a manner that reduces the risk of crown fire initiation and allows for more rapid decomposition.

Grapple piling may be preceded by hand felling of undesired material (generally 11" dbh and less), which could include excess small trees and larger dead trees not being intentionally left as snags. In addition to piling the felled material, down material in excess of standards will be piled. Grapple equipment will also be used to uproot shrubs, reducing ladder fuels. Piles will be burned after mechanical treatment.

Underburn

There is one DFPZ unit (Unit 155) that is being proposed for underburn, for a total of 12 acres (Table 2.1). Underburn units usually have low fuel loading and only require burning to bring them into the desired condition. Like all burning done on the Beckwourth Ranger District, a burn and smoke management plan will be designed by fuels management specialists, coordinated with Northern Sierra Air Quality Management District (NSAQMD) and approved prior to ignition.

2.2.1.5 Area Thin Treatment

Mechanical Thinning

There are 696 acres of mechanical thin units within the Area Thin (Table 2.2). A thin from below prescription would be utilized in most cases, except for trees that are at high risk of mortality due to insects or disease. Silvicultural prescriptions in the Grizz Project area would emphasize the

removal of white firs over pine. Generally, sugar pine would be retained in thinned units with exceptions allowed for safety and operability. As with fuels treatments in the DFPZ, clumps of the largest fire-tolerant, healthy trees would be retained within a network of intermingled openings rather than employing uniform spacing between residual trees. A minimum of 50% canopy cover would be retained after treatment in westside units (Appendix C). No trees ≥ 30.0" dbh will be removed, except for operability. Forest Service Representatives must approve such removals and will be avoided where possible. Trees needed for snag recruitment to meet wildlife needs would be kept.

Mechanical felling outside RHCAs would be restricted to slopes having a gradient of less than 35%. Exceptions may be made for short (less than 100') pitches within the interior of units where slope exceeds this limit. Mastication, grapple pile, underburning and/or thinning may follow in the future if needed to meet project objectives. This would occur within the duration of the project.

Mechanical Thinning Group Selection

There are 668 acres of Area Thin units (Appendix B, Table 2.2) with both mechanical thin and group selection. These Area Thin units will follow the same thinning prescription as described above under the "Mechanical Thinning" section (Appendix C). Much like the DFPZ mechanical thin/GS units, there will be ½ to 2 acre group selection openings (a total of 52 acres, Table 2.2) within the units. For further discussion regarding GS and the difference in applications in the DFPZ versus Area Thin, please see below under the "Group Selection" section.

Mechanical Fuel Treatment

There are 216 acres of mechanical fuel treatment in the Area Thin (Table 2.2). These treatments will generally be grapple piling and mastication. Mechanical fuel treatment units in the Area Thin will generally follow the same methods as those described in the DFPZ.

2.2.1.6 General Group Selection Treatment

GS is a useful silvicultural treatment for improving forest health. GS can remove disease pockets to reduce the spread of forest pathogens. Groups will be located in areas of disease and tree damage if possible. GS would range in size from ½-2 acres in size and would generally remove all trees up to 29.9" dbh. Group selections would occur in both the Area Thin and the DFPZ treatment areas. Table 2.1 and Table 2.2 show how many acres of GS would occur within the DFPZ and Area Thin units. For example, there are 802 acres of DFPZ units that will be thinned and group selected. Out of those 802 acres, 58 acres will be in GS openings while the rest will be mechanically thinned.

DFPZ GS Versus Area Thin GS Treatment

Although GS in the DFPZ will generally follow the same prescriptions and meet the same Purposes and Needs as the GS in the Area Thin, there will be distinct differences. On April 25,

2005 the three HFQLG Forest Supervisors provided direction that stated in the DFPZ, GS treatments are not factored into the overall DFPZ canopy cover calculations. The effects of the GS openings will not be calculated in the overall canopy cover due to the desired condition to thin to 40% canopy cover in the DFPZ.

In the Area Thin, canopy cover calculations will factor in the canopy cover of the entire treatment area, including the additional canopy cover loss due to GS treatments.

2.2.1.7 General RHCA Treatment

RHCAs and stream management zones (SMZ) within the treatment units total approximately 357 acres. Treatments in these areas would include mechanical thinning, underburning, pile burning and/or a combination thereof. No GS would be permitted within RHCAs. In DFPZs and Area Thin, treatments within the RHCAs and SMZs would follow SOPs (Appendix D), the Riparian Management Objectives (RMOs, Appendix G) and the design features for all action alternatives including restrictions and guidelines to the following:

- Canopy cover
- Equipment exclusion zones
- Mechanical slope restrictions
- Landing and skid trail locations, etc.

Mechanical thinning would be restricted to slopes less than 25% within the RHCA. RHCAs vary in width, depending on the following factors as stated in the SAT guidelines:

- The top of the inner gorge
- To the outer edges of the 100-year floodplain
- To the outer edges of riparian vegetation
- To a distance equal to the height of two site-potential trees or approximately300’ horizontal distance if the stream is fish bearing; or one site-potential trees or roughly 150’ horizontal distance if the stream is perennial, which ever is greatest.

2.2.1.8 Maintaining the Transportation System

General Transportation Actions

Transportation improvements in the Grizz Project area would address the need for access to the forest while reducing resource damage. Resources potentially affected would include heritage, soils and water quality. Improvements to the transportation system would include:

- Decommissioning approximately 7 miles of existing system roads. About 2 miles of which will be used for the project then decommissioned. Decommissioning would include recontouring, removing drainage structures, subsoiling, restoring vegetative cover and/or blocking access.

- Reconstructing/maintaining roughly 17.25 miles of system and 1.25 miles of non-system roads. Reconstruction and maintenance would consist of brushing, blading the road surface, improving drainage and replacing/upgrading culverts where needed.
- Constructing 0.4 miles of new system roads.
- Constructing approximately 5 miles of temporary road (will be decommissioned after use).
- Decommission about 0.25 miles of non-system roads.
- Closing approximately 1.5 miles of system road after use.
- Hazard trees would be removed from along Level 3, 4 and 5 roads (generally, surfaced roads) and high-use Maintenance Level 2 roads (generally native-surface roads). Identification of hazard trees would follow guidelines in the Plumas National Forest Roadside/Facility Hazard Tree Abatement Action Plan (2007).

Decommissioning of roads would reduce equivalent roaded acres (ERA) values, thereby lowering cumulative watershed impacts and soil compaction. None of the roads proposed for decommissioning are needed for the long-term transportation system.

2.2.2 Alternative 2 – No-action Alternative

This alternative takes no action at this time to implement provisions of the HFQLG Act or National Fire Plan on this part of the Plumas National Forest. Current, on-going activities such as routine road maintenance, fire suppression and recreation would still occur in this area. However, treatments designed to help firefighters reduce the spread of crown fires, reduce hazardous fuels, improve forest health, support the local economy or reduce the impacts of roads would not occur.

The No-action Alternative serves as a “baseline” against which to compare the various impacts of the action alternatives. Since forest ecosystems are not static, it would still continue to change as a result of naturally occurring dynamic forces such as forest succession and wildfires. The current existing condition of high fuel loading, diseased and overstocked stands and road impacts would not be addressed under the No-action Alternative.

2.2.3 Alternative 3 – Maximum Treatment of the DFPZ and Area Thin

2.2.3.1 Developing the Alternative

Alternative 3 was developed in response to the following internal issues:

- The DFPZ location in the PA fails to link up with future proposed DFPZs and will not provide connectivity across the landscape.
- The PA’s current design has too much costly treatment which will reduce the cost effectiveness of the project.

Alternative 3 was developed after further reconnaissance of the project area during the PA scoping period brought up the two above issues. During this reconnaissance, there were changes made to the location of the future planned Ingall's DFPZ Project. This alternative responded to the issue of a changed Ingall's DFPZ location by adding more DFPZ units to the Grizz Project. This provided connectivity with the Ingall's DFPZ and contributed to the continuity of DFPZs across the landscape.

To make the project more cost effective and efficient Alternative 3 also revised treatments in the Area Thin. By dropping the uneconomical units, adding other units and modifying various unit boundaries, the cost effectiveness was increased. Any additional units and/or unit boundary changes were designed not to exceed a watershed's maximum threshold of concern (TOC).

Summary of Actions/Changes

The following is a summarization of how Alternative 3 differs from the PA:

- Additional DFPZ units were added to increase DFPZ continuity and effectiveness
- Area Thin units were modified to increase project cost effectiveness and efficiency

The following tables summarize the actions in Alternative 3.

Table 2.3 Alternative 3: Acres of treatment in the DFPZ within the Grizz Project area, not including equipment exclusion zones.

Treatment	Logging System	GS Acres	Treatment Acres	Total Acres
Thin*	Feller Buncher Mechanical	N/A	1,126	1,126
Thin/Group**	Feller Buncher Mechanical	76	979	1,055
Mechanical Fuels Treatment	Grapple Pile/Mastication	N/A	365	365
Underburn	Manual	N/A	12	12
			Total	**2,558**

*Units with mechanical thin treatments only
**Mechanical thin units with group selections throughout

Table 2.4 Alternative 3: Acres of treatment in Area Thinning stands (outside of the DFPZ) within the Grizz Project area, not including equipment exclusion zones.

Treatment	Logging System	GS Acres	Treatment Acres	Total Acres
Thin*	Feller Buncher Mechanical	N/A	629	629
Thin/Group**	Feller Buncher Mechanical	67	803	870
			Total	**1,499**

*Units with mechanical thin treatments only
**Mechanical thin units with group selections throughout

2.2.3.2 DFPZ Treatment

In Alternative 3, a total of 452 acres were added to better provide continuity with the planned Ingall's DFPZ network and to reduce the potential of a wildland fire spreading. These units were added in the northern and northeast corners of the Grizz Project boundary (Figure I-3). There is a total of 2,558 acres of DFPZ (Table 2.3) in Alternative 3.

2.2.3.3 Area Thin Treatment

Like the DFPZ treatment zone, there were changes in Area Thin units in Alternative 3 as compared to Alternative 1. The purpose of this was to increase the cost effectiveness of the Grizz Project and reduce unit costs. There were a total of 81 acres dropped in Alternative 3 (Table 2.4). This was a result of units being dropped and/or their boundaries modified to make them more economical to treat. These units will use the same prescription, canopy cover and basal area guidelines as Alternative 1. All mechanical fuel treatments (i.e., grapple pile and mastication) were dropped from Alternative 3.

2.2.3.4 Group Selection

In Alternative 3, there would be a total of 143 acres of GS which is 33 acres more than Alternative 1 (Table 2.3 and Table 2.4). GS in Alternative 3 would use the same prescriptions, Standards and Guidelines as Alternative 1.

2.2.3.5 RHCA Treatment

There will be approximately 332 acres of RHCA treatment in Alternative 3. The same design features for RHCA treatments in Alternative 1 would also apply to Alternative 3.

2.2.3.6 Maintaining the Transportation System

There were a few minor changes to the proposed transportation system actions. The changes are in response to changes in unit size and location:

- Approximately 1.5 miles more system road reconstruct/maintenance were added.
- Reconstruct an additional 0.10 mile of non-system temporary road.

2.2.3.7 Indicators of Responsiveness

The indicators of responsiveness to the issues that generated Alternative 3 are:

Issue 1- The DFPZ location in the Proposed Action fails to link up with future proposed DFPZs and will not provide connectivity across the landscape:

- A ranking system using DFPZ design considerations including topographical placement, road systems, existing conditions and adjacent DFPZs (Table 2.9).

Issue 2- The PA's current design has too much costly treatment which will reduce the cost effectiveness of the project:

- Economic measures including biomass, sawlog volume and cost to treat (Table 2.9).

2.2.4 Alternative 4 – Spotted Owl HRCA changes

2.2.4.1 Developing the Alternative

Alternative 4 was developed in response to the following external and internal issues:

- Thinning and fuel treatment activities will lead to further habitat fragmentation and have a negative affect on California spotted owl foraging habitat.

The 2004 SNFPA directs the HFQLG National Forests to implement the HFQLG Act and protect spotted owls through the management of protected activity centers (PACs) and spotted owl habitat areas (SOHA). PACs are protected areas surrounding known and suspected nest stands and are comprised of the best available 300 acres. Spotted owl home range core areas (HRCAs) surround PACs and provide supplemental habitat for owls to forage in. HRCAs are not a part of the owl conservation strategy during the HFQLG Pilot Project. However, to reduce further fragmentation and decreased quality of foraging habitat, Alternative 4 would not plan any activities within HRCAs except within the DFPZ, so that the fuels would strategically be reduced. Activities within the DFPZ/HRCA overlap would not have any FS, in order to minimize fragmentation. This alternative would reduce affects to HRCAs.

Summary of Actions/Changes

The following is a summarization of how Alternative 4 differs from the PA:

- DFPZ units from Alternative 3 will be retained
- Changes to treatments within spotted owl HRCAs within the Grizz Project boundary
    1. Drop all Area Thin units within HRCA boundaries.
    2. Keep all DFPZ units within HRCA boundaries but remove any GS
- Retain Area Thin units outside of the HRCA to help maintain the cost effectivness of the project.

The following tables summarize the actions in Alternative 4.

Table 2.5 Alternative 4: Acres of treatment in the DFPZ within the Grizz Project area, not including equipment exclusion zones.

Treatment	Logging System	GS Acres	Treatment Acres	Total Acres
Thin*	Feller Buncher Mechanical	N/A	1,175	1,175
Thin/Group**	Feller Buncher Mechanical	73	933	1,006
Mechanical Fuels Treatment	Grapple Pile/Mastication	N/A	365	365
Underburn	Manual	N/A	12	12
			Total	**2,558**

*Units with mechanical thin treatments only
**Mechanical thin units with group selections throughout

Table 2.6 Alternative 4: Acres of treatment in Area Thinning stands within the Grizz Project area, not including equipment exclusion zones.

Treatment	Logging System	GS Acres	Treatment Acres	Total Acres
Thin*	Feller Buncher Mechanical	N/A	373	373
Thin/Group**	Feller Buncher Mechanical	53	635	688
			Total	**1,061**

*Units with mechanical thin treatments only
**Mechanical thin units with group selections throughout

2.2.4.2 DFPZ Treatment

Like Alternative 3, a total of 452 acres were added to Alternative 1 within the DFPZ for a total of 2,558 acres in Alternative 4 (Table 2.5). However, there will be no GS in DFPZ units that are within HRCAs.

2.2.4.3 Area Thin Treatment

All Area Thin units entirely within spotted owl HRCAs were dropped. Units that were partially within HRCAs were adjusted up to the HRCA boundary. There was an approximate 686 acre reduction of Area Thin treatments dropped in Alternative 4 (Table 2.6), compared to Alternative 1 (Table 2.2). The remaining Area Thin units will be mechanical thin only and/or with GS (Appendix B). These units will use the same prescription, canopy cover and basal area guidelines as Alternative 1.

2.2.4.4 Group Selection

In Alternative 4, there would be a total of 126 acres of GS (Table 2.5 and Table 2.6). That is 16 acres more than Alternative 1. GS in Alternative 4 would use the same prescriptions, Standards and Guidelines as Alternative 1. There would be no GS in any DFPZ units that lie within HRCAs.

2.2.4.5 RHCA Treatment

There will be approximately 322 acres of RHCA treatment in Alternative 4. The same design features for RHCA treatment in Alternative 1 would also apply to Alternative 4.

2.2.4.6 Maintaining the Transportation System

There were a few minor changes to the proposed transportation system actions. The changes are in response to changes in unit size and location and include:

- Approximately 17 miles of new non-system temporary road will be constructed.
- There will be approximately 0.70 miles less of new temporary non-system road constructed.
- There will be about the same amount of system and non-system road reconstructed/maintained.

2.2.4.7 Indicators of Responsiveness

The indicator of responsiveness to the issue that generated Alternative 4 is:

- Acres of Suitable Habitat impacted in HRCAs (% affected, Table 2.9).

2.2.5 Comparison of the Alternatives

Table 2.7 profiles and summarizes the major activities of the alternatives, including the No-action Alternative. There are no “prescriptive” differences among the different action alternatives meaning there will be no changes to thinning approaches (thin from below), canopy cover changes for the DFPZ or Area Thin and follow the same Standards and Guides (Appendix C). What does change is the “footprint” of the action alternatives across the landscape.

Table 2.7 Profile matrix summarizing the major effects of the different alternatives, including the No-action Alternative.

Actions	Alternative 1	Alternative 2	Alternative 3	Alternative 4
DFPZ Treatments (acres)*				
DFPZ Thinning	1,005	0	1,126	1,175
DFPZ Thin/Groups	802 (58 acres are GS)	0	1,055 (76 acres are GS)	1,006 (73 acres are GS)
Mechanical Fuel Treatment	287	0	365	365
Underburn	12	0	12	12
Total	**2,106**	**0**	**2,558**	**2,558**
Area Thin Treatments (acres)*				
Area Thinning	696	0	629	373
Area Thin/Groups	668 (52 acres are GS)	0	870 (67 acres are GS)	688 (53 acres are GS)
Mechanical Fuel Treatment	216	0	0	0
Total	**1,580**	**0**	**1,499**	**1,061**
Grand Total	**3,686**	**0**	**4,057**	**3,619**

*This acreage amount does not include equipment exclusion zones and units not prescribed for treatment.
**HRCA- home range core area

Table 2.8 compares the road actions by the different action alternatives. The major difference between the action alternatives is the amount or road reconstruction/maintenance that is proposed. Reconstruction activities include brushing, blading the road surface, improving drainage and replacing/upgrading culverts where needed.

Table 2.8 Comparison of road activities in miles by the different action alternatives.

Road Action	Alternative 1	Alternative 3	Alternative 4
System Roads			
New construction	0.38	0.38	0.38
Close after use	1.38	1.38	1.38
Decommission	5.40	5.40	5.40
Reconstruction	17.14	18.53	17.18
Decommission after use	1.78	1.78	1.78
Close	0.63	0.63	0.63
Non-system Roads			
Decommission	0.22	0.22	0.22
Reconstruct temporary*	1.17	1.27	1.17
New construct temporary*	3.47	3.85	2.79
Existing temporary	0.45	0.45	0.45

*Temporary roads will be decomissioned after use

2.2.5.1 Purpose and Need Measures and Issues Indicators

Table 2.9 constrasts and compares how each action alternative meets the Purposes and Needs and the significant issues.

Reduce Hazardous Fuels

These six measures are outputs of the fire modeling program "Fire Management Analysis Plus" (FMA+) and predict how the fire behavior would react to the fuel reduction treatments within the DFPZ. They are contrasted to Alternative 2 (No-action Alternative) to show the differences between treating and not treating the fuels in the Grizz Project area. Indicators such as percent mortality, feet of flame length and tons of surface fuels are also used to describe desired fire behavior within the DFPZ in Appendix J of the HFQLG FEIS. For further discussion of these measures, please refer to Section 3.3, "Fire and Fuels" of this EA or the Fire and Fuels Report in the Grizz Project file.

The measurement indicator values are the same for all of the action alternatives. This is because the prescription for reducing fuels in the Grizz Project is the same, regardless of the action alternative. The upper diameter limit (UDL), slope restriction and marking prescription are all the same. What does change is the "footprint" or acreage of the treatment. The differences between the action alternatives are very subtle. FMA+ is a fire spread and behavior model and is not sensitive enough to detect these subtle changes or differences between the action alternatives. The model assumes fuel uniformity across the landscape when predicting fire behavior. The major difference is between treating and not treating the fuels. Under Alternative 2, fire behavior is much more extreme with an 80% chance of tree mortality, 24.4 foot flame lengths and over 26 chains (1,716') rate of spread expected in a wildland fire situation. With such high flame lengths and such a fast rate of spread under the No-action Alternative, ground based initial attack would not be a feasible option.

Fuel Loads in RHCAs

The measurement indicators for reducing fuel loads in the riparian habitat conservation areas (RHCAs) are the same as the ones used for reducing hazardous fuels. These measures indicate how fire would behave within the RHCA after fuels reduction treatment. As expected, the fire behavior is the same as the treated DFPZ. However, within the inner equipment exclusion zone, no fuel reduction treatments will occur in order to reduce impacts from ground based equipment. It is assumed that within this inner RHCA zone, fire behavior would be similar to Alternative 2. The fuel reduction treatments surrounding the inner RHCA should help reduce the threat of a crown fire within the inner RHCA. Considering the important habitat that RHCAs provide, any type of treatment to reduce fuels will help protect the RHCAs from large fires.

In general, all of the action alternatives contribute to protection of the RHCA. Although the fire behavior after treatment is expected to be the same for all action alternatives, each action alternative treats a different amount of RHCA. This is due to the placement of the units that vary by each action alternative. Alternative 1 treats the most RHCA and would provide the most

protection against fire. However, the other action alternatives treat no more than 35 acres less and would provide a similar area of protection against crown fires within the RHCA.

Improve Forest Health

These measures indicate how well the action alternatives improve forest health. Canopy cover is the degree to which the forest canopy blocks sunlight or obscures the sky. Canopy cover is also related to stand density. This concept is generally defined as how many trees occupy a unit of land area (acre). The more trees per acre, the higher the stand density and corresponding canopy cover, the more competition there is between trees for resources (i.e., water, sunlight and nutrients). Competition for resources can weaken trees making them more susceptible to insects and disease. Silviculturalists use the term “stocking” to describe how a specific stand density is meeting certain goals such as forest health or wood production. Overstocked stands tend to have trees that are competing too vigorously with each other for a limited amount of resources and are not exhibiting much growth. Understocked stands are not taking full advantage of the resources available. For the Grizz Project, between 55% and 70% of full stand density was considered to be a desired level of stocking that would allow stands to take full advantage of resources while not overly competing with each other. Within the acres treated, Alternative 4 leaves the least amount of acres above 70% of basal area (BA). Alternative 3 leaves 123 acres above 70% BA within treated portions and Alternative 1 leaves 165 acres. Although Alternative 4 treats less acres than Alternative 1, the units are placed in more efficient and cost effective locations. This resulted in fewer acres treated that stayed overstocked. Alternative 2 compares the PA “footprint” to no action and would leave 262 acres overstocked.

Thinned stands usually exhibit increased growth rates as the competition among trees is decreased for limited resources (i.e. water, sunlight and soil nutrients). This increase in stand vigor means that it will take less time to grow larger trees. Sierra mixed conifer (SMC) CWHR size class 4 is used as a measurement indicator to track how well stands respond to thinnings because it is the most represented stand type and size class in the Grizz Project. Treated stands within the DFPZ would grow from an existing dbh of 7” to a dbh of 17” in 20 years. In the Area Thin, stands would grow from an existing dbh of 7” to a dbh of 13” in 20 years. Trees will grow bigger in the DFPZ than the Area Thin due to the lower canopy cover guidelines in the DFPZ. A lower canopy cover guideline allows more trees to be removed during thinning. In the No-Action Alternative, stands would only grow from an existing dbh of 7” to a dbh of 10” in 20 years.

In the Grizz Project, Alternative 2 (No-action Alternative) would leave over 2,800 acres above the desired canopy cover of either 40% (DFPZ) or 50% (Area Thin). The action alternatives would leave between 47 to 63 acres over the desired canopy cover within the treated portions. These indicators respond to the amount of acreage proposed for treatment. Alternative 2 would leave more acres overstocked than any of the action alternatives. Alternatives 3 and 4 were developed in response to the issue of cost effectiveness. Units were added and dropped to create an alternative that would be cost effective and efficient. However, Alternative 4 was further

modified to avoid treatement within California spotted owl home range core areas (HRCA). Although Alternative 4 treats fewer acres than Alternative 3, it has a lower amount of acres left overstocked after implementation.

Emulate Small Natural Disturbances

Early seral stage habitat can occur when small disturbances "reset" succession back in forested stands. California Wildlife Habitat Relationship (CWHR) size class 0-2 (seedling to sapling tree size) trees are considered early seral stage habitat. Group selections can create similar habitat when implemented. With the exception of trees ≥ 30.0" dbh left behind, all other smaller size classes are removed. Early seral stage habitat is one of the age classes in uneven-aged forest management. For more information regarding GS and uneven-aged management, please see Section 3.2, "Forest Resources". Early seral stage habitat also affects various wildlife species in different ways in either benefical or disadvantageous ways. Section 3.6, "Wildlife Resources", addresses effects of early seral stage habitat to wildlife.

The acres of GS for each action alternative can be a proxy for how much early seral stage habitat is created. Alternative 3 creates the most early seral stage habitat. With Alternative 2, the imbalance in age class structure would continue. Areas of current mortality would still be at high risk in a wildfire due to heavy fuel loading.

Reduce Transportation System Impacts

These measures indicate how effective the road decommissioning activities are at reducing impacts to watersheds and streams. Decommissioning consists of the road grade being subsoiled and regraded to match the natural contour of the surrounding landscape.

Roads are sources of sediment and can impair hydrologic function. By decreasing the number of stream crossings within the project area, there are less sources of sediment transfer into stream channels. Hydrologic function can increase if a road is decommissioned. Increased hydrologic function is beneficial to a watershed as it restores the potential ability for a watershed to store water by decreasing the amount of runoff. The measures in Table 2.9 show the same value for all action alternatives because the amount of road proposed to be decommissioned does not vary. However, if none of the action alternatives were implemented, then none of the benefits of road decommissioning would be realized.

Contribute to Local Communities

Implementation of any of the action alternatives is expected to produce benefits for the local community. In addition to benefits such as a healthier forest and a reduced threat of wildfire, the Grizz Project will provide jobs and sawlog volume for the local mill that would contribute to the economy of the local communities.

Alternatives 1 and 4 would produce 94 jobs while Alternative 3 would produce the most jobs (103 jobs). Alternative 3 would also produce the most sawlog volume (7.1 million board feet). Alternative 1 would produce the least amount of volume and Alternative 4 is just slightly higher.

In terms of total employee related income, Alternative 3 would provide the most income while Alternative 4 produces the least amount of income. Overall, Alternative 3 contributes the most to the local economy.

Cost Effectiveness of the Project

The action alternatives were developed partially in response to the issue of cost effectiveness. The treatments within the Proposed Action (PA) were found to be too costly and not entirely effective. In response to this issue, the Area Thin treatment units in the alternatives to the PA were either relocated, altered or dropped in order to make them more effective and economical to treat. Total project cost, sawlog volume and biomass (weight) were found to be good measures as to how well the alternatives to the PA responded to this issue.

Sawlog volume (million board feet or "mmbf") is an important commercial forest product. It is generally considered to be trees 11" and greater in dbh. The higher the amount of sawlog volume, the more economically feasible a project can be. In the Grizz Project, Alternative 3 produces the largest amount of sawlog volume (7.1 mmbf), while Alternative 1 and 4 produce less (6.3 mmbf and 6.5 mmbf, respectively). This is due to the amount of acres in each treatment and their placement. Alternative 3 treats the most acres since units were placed in the most cost effective locations and therefore produce the most volume. Although the PA treats more acres than Alternative 4, it produces less volume because its units are not placed in the most optimal locations.

Biomass is considered to be the non-merchantable woody material found in the forest including logging slash, brush and trees below 11" dbh. This material is usually chipped and sent to a biomass plant where it is burned for electricity generation. Biomass can be expensive to treat and remove from the forest. Generally, too much biomass can make a forest vegetation management project uneconomical. Alternative 3 treats the most biomass (56 metric tons or "mtons") while Alternative 1 and 4 treat lesser amounts (48 mtons and 49 mtons, respectively). This is due to the amount of acres and the location of the units in the action alternatives.

The cost to treat per acre standardizes the cost of the project on a per acre basis. This measure shows how truly cost effective an action alternative is taking into consideration the cost to treat and how much area it affects. Alternative 3 is the cheapest to implement ($246/acre) while Alternative 1 is the most expensive ($265/acre). Alternative 4 is slighty more expensive ($249/acre) than Alternative 3 because it does not treat within HRCAs and there is less GS.

DFPZ Design Considerations

In addition to having a 40% canopy cover and reduced fuels, a DFPZ should also meet other design criteria that are more qualitative. The topographical placement of a DFPZ (i.e., rocky outcrops or steepness of slopes), what road systems access it, what the existing conditions are (i.e., current fuel loading and stand structure) and how it links up with other DFPZs are very important measures that cannot necessarily be analyzed and quantified by a fuel model. Often

these measures are judged according to a Fuels Specialist's experience and intuition. In all the action alternatives, the DFPZ design criteria are for topographical placement, road system access and existing conditions. However, Alternative 1 does not connect with the future planned Ingalls DFPZ. This is because during the scoping phase of the Grizz Project, the Ingalls DFPZ location was moved from a previously planned location. Alternatives 3 and 4 responded to this issue with the addition of more DFPZ units that provide connectivity with the Grizz Project and Ingalls DFPZ while maintaining connectivity with existing and planned DFPZs. Please refer to the "Fire and Fuels" Section 3.3 of the Grizz EA for further discussion regarding DFPZ design considerations.

Spotted Owl HRCA

The existing stands within the Grizz Project are very fragmented. Currently, the Grizz Project will not enter any spotted owl protected activity centers (PACs) in any of the action alternatives. PACs are protected areas surrounding known and suspected nest stands comprised of the best available 300 acres. However, the PA and Alternative 3 would treat spotted owl HRCAs that surround PACs and provide supplemental habitat for owls to forage in. The IDT felt that additional Area Thinning in HRCAs would further increase fragmentation in this already fragmented landscape, reducing habitat quality for owls in HRCAs.

To determine how effective the alternatives were at meeting this issue, the amount of HRCA affected by the action alternatives was used as a measure. Alternative 4 affects the least amount of HRCA because it only enters HRCAs when they overlap within the DFPZ and in these cases, only DFPZ thinning with no group selection would occur. This is allowed in Alternative 4 to meet the Purpose and Need for fuel reduction in the DFPZ. Alternatives 1 and 3 both treat HRCAs in the Area Thin and in the DFPZ as well as the placement of GS. Alternative 3 affects the most HRCA habitat. Although no acres would be treated, Alternative 2 is not without risk as no action is taken to reduce existing fuel levels.

Table 2.9 A comparison of Grizz Project action alternative meeting the Purpose and Need and Issues

	Alternative 1 (Proposed Action)	Alternative 2 (No-action)	Alternative 3	Alternative 4
Purpose & Need				
Reduce Hazardous Fuels in DFPZs and RHCAs				
Fire Type	Surface fire	Passive crown fire	Surface fire	Surface fire
Mortality (%)	4%	80%	4%	4%
Surface Fuels (tons)	5.00	12.02	5.00	5.00
Ground to Canopy Base Height (feet)	15	3’	15	15
Flame Length (feet)	1.4	24.4	1.4	1.4
Rate of Spread (chains per hour)	2.8	26.7	2.8	2.8
Area of RHCAs treated (acres)	357	0	332	322
Improve Forest Health				
The number of acres within treated units remaining overstocked (>70% of normal BA) (% of treated)	165 (5%)	262	123 (3%)	94 (3%)
Amount of acres of SMC4M growing from an average 7” to 17” dbh in 20 years after treatment (DFPZ)	680	0*	706	707
Amount of acres of SMC4M growing from an average 7” to 13” dbh in 20 years after treatment (Area Thin)	530	0*	604	406
The number of acres within units not meeting desired canopy cover for DFPZ and Area Thinning Zones (acres)	63	2,800	47	47
Emulate Small Natural Disturbances				
Acres of early seral stage habitat created (CWHR size class 0-2)	110	0	143	126
Reduce Transportation System Impacts				
Restored hydrologic function (acres)	26.4	0	26.4	26.4
Reduced number of stream crossings	26	0	26	26
Contribute to Local Communities				
Total Full-time Jobs	94	0	103	94
Sawlog Volume (mmbf)	6.3	0	7.1	6.5
Total Employee Related Income	$4,053,000	0	$4,426,00	$4,028,000

*SMC4M stands in the No-Action Alternative will only grow from 7” to 10” dbh in 20 years.

Table 2.9 (continued)

	Alternative 1 (Proposed Action)	Alternative 2 (No-action)	Alternative 3	Alternative 4
Issues				
Cost Effectiveness of the Project				
Biomass (mtons)	48	0	56	49
Sawlog volume (mmbf)	6.3	0	7.1	6.5
Cost to Treat/Acre	$265	0	$246	$249
Meeting DFPZ Design Considerations				
Topographical Placement	Yes	No	Yes	Yes
Road Systems	Yes	No	Yes	Yes
Existing Conditions (i.e., road locations, current vegetation types, rocky outcrops)	Yes	No	Yes	Yes
Adjacent DFPZ	No	No	Yes	Yes
Protection of Spotted Owl HRCAs				
Acres of Suitable Habitat impacted in HRCAs (% affected)	485 (13%)	0	701 (19%)	258 (7%)

2.2.6 Comparison of Alternatives to Affected Resources

In addition to the Purposes and Needs and Issues the extent and severity of impacts to all resources will be taken into consideration by the decision maker in choosing which alternative to implement. Table 2.10 displays the other affected resources in the Grizz Project area.

2.2.6.1 Heritage

All known and future discovered heritage sites are flagged and avoided. As a result, there will be no effect to heritage resources.

2.2.6.2 Botany

There are no threatened or endangered (T & E) botanical species present within the Grizz Project area. Therefore, there will be no effect to T & E species. There are four sensitive species of plants in the project area. The project may impact these plants but will not lead to a trend towards listing of any of these species. There are four special interest plant species found within the Grizz Project area. These special interest plants are not likely to be adversely affected by project activities. Project design and mitigation measures adequately protect these sensitive and special interest plants by eliminating or minimizing impacts. These mitigations apply to all of the action alternatives.

There is an overall moderate risk of noxious weed establishment as a result of Grizz Project activities. This determination of “moderate risk” is based upon the:

- Mapping of noxious weed species,
- Small size of existing known populations

- Continued treatment of known populations
- Implementation of the standard operating procedures (SOPs)
- Low intensity underburns

2.2.6.3 Wildlife

The various impacts to wildlife species of interest are summarized in Table 2.10. It compares and contrasts how the action alternatives will affect the habitat of the California spotted owl, northern goshawk, great gray owl, fisher and marten. With the exception of the impact of Alternative 3 to California spotted owl foraging habitat and great gray owl habitat, none of the action alternatives reduce any of the wildlife species of interest's habitats by more than 10% over the existing habitat. At most, only 120 acres of edge habitat will be created (Alternative 3) in spotted owl habitat. This is less than 1% of the spotted owl habitat that will be affected by the creation of edge. The greatest reduction in suitable habitat in HRCAs is 22%. In Alternative 4, there is only a 7% reduction of suitable HRCA habitat. Because of the design of each action alternative, mitigation features and SOPs, the Grizz Project will have a very minimal impact on wildlife species. The Grizz Project retains an average minimum of 90% of existing wildlife habitat.

2.2.6.4 Soils

Effective ground cover is necessary to prevent accelerated soil erosion. The Plumas National Forest Land Resource Management Plant (PNF LRMP) Standards and Guidelines for effective ground cover vary and depend upon the soil erosion hazard rating (USDA Forest Service 1988b). Minimum effective ground cover for soils with erosion hazard ratings of low, moderate, high, and very high, are 40, 50, 60 and 70 percent, respectively. In Table 2.10, the acres outside the standard for ground cover are predictions of the affects of the different alternatives to ground cover as a result of project implementation prior to any soil protection measures stated in the SOPs (Appendix D). Any predicted effects would most likely be very short lived during project implementation. Through the use of SOPs such as leaving chips on site to ensure ground cover standards are met, the effects to ground cover would be greatly reduced and temporary. Overall, there is a low risk that treated units would not meet the PNF LRMP threshold following treatment.

Timber harvest and biomass removal would require the use of skid trails and landings. All treatment units meet or exceed the recommended soil porosity guideline of 10% for the existing condition. However, some of the units are predicted to not meet the less than 15% percent skid trail and landing density threshold. The values range from 154 acres in Alternative 2 to 240 acres in Alternative 3. Because the areas proposed for treatment have been harvested before, it is expected that as many as three quarters of these existing skid trails would be used for the proposed harvest. This would reduce the area disturbed by the creation of new skid trails. After project implementation, any skid trails (temporary and existing) used would be subsoiled, therefore reducing the skid trail and landing density within the Grizz Project.

2.2.6.5 Thresholds of Concern

The threshold of concern (TOC) serves as a warning that cumulative watershed impacts may exist within a given watershed, which may adversely impact peak flows, water quality, and/or channel stability. A value of 100% TOC indicates that the watershed is at its threshold. The Region Five Soil and Water Conservation Handbook (USDA Forest Service 1988a) states, the TOC does not represent the exact point at which cumulative watershed effects will occur. Rather, it serves as a "yellow flag" indicator of increasing susceptibility for significant adverse cumulative effects occurring within a watershed. Susceptibility to negative impacts increase as a watershed approaches or is impacted beyond the TOC. If the watershed is approaching or above the TOC, a more thorough investigation of the activities planned within the watershed is necessary.

None of the subwatersheds are expected to exceed the TOC as a result of implementation of any of the action alternatives in the Grizz Project. The only watershed above TOC is the Bearing subwatershed (Table 2.10) and this is an existing condition as a result of activities in the past and on adjacent private land. There will be no planned treatment from any of the action alternatives in the Bearing subwatershed. Whether or not any of the action alternatives are implemented, the Bearing subwatershed would still be above TOC. All action alternatives in the Grizz Project were designed to minimize affects to watersheds and none of the subwatersheds will exceed TOC if the project is implemented. Alternative 3 takes the highest percentage of the Project area into the moderate high TOC, while Alternative 1 and 4 take less of the Project area inot the moderately high TOC category.

Table 2.10 Other affected resources in the Grizz Project area.

Other Resource Indicators	Alternative 1 (Proposed Action)	Alternative 2 (No-action)	Alternative 3	Alternative 4
Heritage				
Heritage Resources	No effect	No effect	No effect	No effect
Botany				
T & E Species	No effect	No effect	No effect	No effect
Sensitive Plants	May impact, but not likely to cause a trend towards listing	May impact, but not likely to cause a trend towards listing	May impact, but not likely to cause a trend towards listing	May impact, but not likely to cause a trend towards listing
Special Interest Plants	Not likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect
Noxious Weeds	Moderate risk	Moderate risk	Moderate risk	Moderate risk
Wildlife				
Acres of Suitable Habitat HRCAs (% remain)	3,176 (86.7%)	3,661 (100.0%)	2,960 (80.8%)	3,403 (92.9%)
Acres of California Spotted Owl Foraging Habitat (% remain)	22,479 (91.1%)	24,673 (100.0%)	22,080 (89.5%)	22,413 (90.8%)
Acres of California Spotted Owl Nesting Habitat (% remain)	7,397 (97.4%)	7,592 (100.0%)	7,390 (97.3%)	7,408 (97.6%)
Acres of GS Edge Habitat Created in California Spotted Owl Habitat	87	0	120	102
Acres of Northern Goshawk Nesting Habitat (% remain)	29,876 (92.6%)	32,265 (100.0%)	29,470 (91.3%)	29,821 (92.4%)
Acres of Great Gray Owl Nesting Habitat (% remain)	6,317 (93.1%)	6,786 (100.0%)	6,044 (89.1%)	6,181 (91.1%)
Acres of Fisher & Marten Denning Habitat (% remain)	10,875 (96.3%)	11,293 (100.0%)	10,797 (95.6%)	10,864 (96.2%)
Soils				
Acres Outside of Standard for Ground Cover	607	0	656	591
Acres Over Threshold for Skid Trail and Landing Density	222	154	240	216

Table 2.10 (continued)

Other Resource Indicators	Alternative 1 (Proposed Action)	Alternative 2 (No-action)	Alternative 3	Alternative 4
Thresholds of Concern (TOC)(%)				
Percent of the Project Area above Threshold*	3.0%	3.0%	3.0%	3.0%
Percent of the Project Area With a Moderately High TOC**	30.3%	12.1%	46.3%	33.6%
Percent of the Project Area With a Moderate TOC***	43.0%	26.8%	27.0%	31.2%

*Above 100% ERA, of Threshold of Concern (TOC)
**75% to 100% ERA, as of TOC
***50 to 74.9 ERA, of TOC

2.2.7 Design Features of the Action Alternatives

2.2.7.1 Design Features for all Action Alternatives

Reducing Hazardous Fuels and Improving Forest Health

Thinning

- Whole tree yarding will be used whenever possible in order to avoid the need for post-project slash treatment.
- Mechanical felling would be restricted to slopes having a gradient of less than 35% outside of RHCAs. Exceptions may be made for short (less than 100') pitches within the interior of units where slope exceeds this limit.
- Clumps of the largest fire tolerant healthy trees would be retained within a network of intermingled openings, rather than employing uniform spacing between residual trees.
- Emphasis will be placed on improving stand health by cutting diseased and insect infected trees or trees otherwise in poor health; a thin from below.
- No trees ≥ 30" dbh would be removed except in cases regarding safety and operability. Forest Service Representatives must approve such removals and will be avoided where possible.

Post-Treatment

- Hand-thinning, grapple piling, mastication and/or underburning may follow treatment if needed to meet ladder and ground fuel-reduction objectives in the DFPZ.

RHCA Treatments

- Units adjacent to meadows should retain conifers possessing one or more of the following characteristics in order to provide nesting and roosting habitat for raptors:

    - large limbs extending into the meadow
    - mistletoe brooms higher than 20’ from the ground
    - multiple tops
    - bole sweep
    - and snags
- No GS would be permitted in RHCAs
- Mechanical thinning would be restricted to slopes less than 25%.

Equipment Exclusion Zones

Equipment would be prohibited from entering equipment exclusion zones, but would be permitted to extend booms into these inner zones to remove material. Machinery would not be allowed to considerably damage residual stands or disturb soils. The exclusion zone will vary according to the RHCA type:

- A 25’-wide equipment exclusion zone for SMZs.
- A 50’-wide equipment exclusion zone for 150’-wide RHCAs
- A 100’-wide equipment exclusion zone for 300’-wide RHCAs

Canopy Cover Restrictions

- Canopy cover ≥ 40% would be retained in general, where available, and within the inner zones of the perennial fish-bearing stream RHCAs, canopy would remain ≥ 60%, where available.

Group Selection

- When calculating canopy cover for the DFPZ, GS treatments are not factored into the overall canopy cover.
- Impact of GS openings will be factored into overall canopy cover for Area Thin treatments.
- If not removed as part of a timber sale, non-sawlog material (biomass) would be piled and burned or decked and sold as firewood.
- Emphasis will be placed on improving stand health by placing GS in areas in poor health, if feasible.
- Mechanical felling would be restricted to slopes having a gradient of less than 35%. Exceptions may be made for short (<100’) pitches within the interior of units where slope exceeds this limit.
- No trees ≥ 30” dbh would be removed except in cases regarding safety and operability. Forest Service Representatives must approve such removals and will be avoided where possible.

Reforestation of Group Selection

- Group Selection will be replanted as necessary to insure adequate restocking. Healthy, advanced regeneration of appropriate species would be retained during harvest where practical. Areas with mistletoe or root disease infestation would be planted with alternative non-susceptible native species. GS areas will be site specifically evaluated to receive underburning, grapple piling or mastication post-treatment.
- GS areas will be evaluated after treatment; those units not meeting desired surface fuel and silvicultural site preparation conditions would be underburned, grapple piled and burned or masticated.

2.2.8 Specific Design Features for Each Alternative

All the action alternatives follow the same design features except for Alternative 4.

2.2.8.1 Alternative 4

Group Selection

- No group select would be allowed within California spotted owl home range core areas (HRCA).

2.2.9 Resource Specific Mitigations

2.2.9.1 Air Quality

Specific air quality mitigations for prescribed burning would include number of acres burned daily, preferred wind directions for smoke travel and weather conditions which would allow for smoke dispersal. This would allow for piles to dry before ignition and ceasing ignition if smoke dispersion conditions degrade. Monitoring of smoke transport is required by NSAQMD. These mitigations will be agreed upon with the NSAQMD and addressed in the Smoke Management portion of those burn plans developed for the Grizz Project.

2.2.9.2 Botany

The Grizz Project could potentially impact sensitive and special interest plant species, as well as unique and unusual botanical habitats. Implementation of the following mitigations greatly reduces the impact to botanical resources (Table 2.11 and Table 2.12). Occurrences will be considered control areas and flagged prior to implementation.

Table 2.11 Botany Protections by unit for the Grizz Project action alternatives.

Occurrence Number	Species	Mitigation
BOSP 11-001A	*Botrychium* sp.	Control Area
BOSP 11-001B	*Botrychium* sp.	Control Area
BOSP 11-001C	*Botrychium* sp.	Control Area
BOSP 11-001D	*Botrychium* sp.	Control Area
BOSP 11-001E	*Botrychium* sp.	Control Area
BOSP 11-002A	*Botrychium* sp.	Control Area
BOSP 11-002B	*Botrychium* sp.	Control Area
BOSP 11-003A	*Botrychium* sp.	Control Area
BOSP 11-004A	*Botrychium* sp.	Control Area
BOSP 11-004B	*Botrychium* sp.	Control Area
DINO 11-017F	*Didymodon norrisii*	Control Area
DINO 11-017G	*Didymodon norrisii*	Control Area
LUDA 11-081A	*Lupinus dalesiae*	Control Area
LUDA 11-081A	*Lupinus dalesiae*	Control Area
LUDA 11-081A	*Lupinus dalesiae*	Control Area
LUDA 11-082	*Lupinus dalesiae*	Control Area
LUDA 11-082	*Lupinus dalesiae*	Control Area
11-023	*Silene invisa*	Control Area
11-023	*Silene invisa*	Control Area
11-002	*Trichondon cylindricus*	Control Area
11-003	*Trichondon cylindricus*	Control Area
11-004C	*Trichondon cylindricus*	Control Area
11-004D	*Trichondon cylindricus*	Control Area

Table 2.12 Special habitats protections for the Grizz Project action alternatives.

Occurrence Number	Resource Zone	Prescription	Mitigation
Seep 001	Area Thin/ other	Mechanical thin/Group	Control Area
Seep 57	DFPZ	Mechanical thin	Control Area
Seep 81	DFPZ	Mechanical thin	Control Area
Spring 006	Area Thin/ other	Mechanical thin	Control Area
Spring 007	Area Thin/ other	Mechanical thin	Control Area
Spring 008	Area Thin/ other	Mechanical thin	Control Area
Seep 045	DFPZ	Mechanical thin	Control Area
Spring 002	DFPZ	Mechanical thin	Control Area
Seep 004	DFPZ	Mechanical thin	Control Area
Seep 005	DFPZ	Mechanical thin	Control Area
Seep 003	DFPZ	Mechanical thin	Control Area
Seep 035	Area Thin/ other	Mechanical thin	Control Area
Seep 036	Area Thin/ other	Mechanical thin	Control Area
Seep 037	Area Thin/ other	Mechanical thin	Control Area
Seep 047	Area Thin/ other	Mechanical thin	Control Area
Seep 048	Area Thin/ other	Mechanical thin	Control Area
Spring 019	DFPZ	Mechanical thin/Group	Control Area
Spring 020	DFPZ	Mechanical thin/Group	Control Area
Seep 018	DFPZ	Mechanical thin/Group	Control Area
Seep 028	DFPZ	Mechanical thin/Group	Control Area
Seep 026	DFPZ	Mechanical thin	Control Area
Fen 001	DFPZ	Mechanical thin	Control Area
Pond 001	DFPZ	Mechanical thin	Control Area
Seep 031	DFPZ	Mechanical thin	Control Area
Seep 027	DFPZ	Mechanical thin/Group	Control Area
Seep 030	DFPZ	Mechanical thin/Group	Control Area
Seep 032	DFPZ	Mechanical thin/Group	Control Area
Seep 034	DFPZ	Mechanical thin/Group	Control Area
Seep 030	DFPZ	Mechanical thin/Group	Control Area
Seep 029	DFPZ	Mechanical thin	Control Area
Seep 043	DFPZ	Mechanical thin	Control Area
Seep 055	Area Thin/other	Mechanical fuels Tx	Control Area
Spring 028	Area Thin/ other	Mechanical thin/Group	Control Area
Spring 029	Area Thin/ other	Mechanical thin/Group	Control Area
Spring 030	Area Thin/ other	Mechanical thin/Group	Control Area

Note: Some special habitats and rare plant occurrences will be in the same control area

2.2.9.3 Noxious Weeds

In order to prevent and/or reduce the spread of noxious weeds, SOPs will be applied such as requiring that all off-road equipment and vehicles be weed free, use of weed free seed sources and avoiding areas of known weed occurrences including outside the units and project area (Table 2.13).

Table 2.13 Grizz Project noxious weed occurrences.

Unit Number	Species	Occurrence Number	Mitigation
None	*Cirsium arvense*	075	Control Area
103	*Cirsium arvense*	076	Control Area
89	*Cirsium arvense*	077	Control Area
None	*Lepidium latifolium*	014-1	Control Area
None	*Lepidium latifolium*	005	Control Area
None	*Centaurea maculosa*	003	Control Area
None	*Centaurea maculosa*	010	Control Area

2.2.9.4 Heritage Resources

Detailed heritage resource information about the location, character, or ownership of a historic resource is withheld from disclosure because sharing this information may cause an invasion of privacy, may risk harm to the historic resources or may impede the use of a traditional religious site by practitioners [Section 304 of National Historic Preservation Act, 16 U.S.C. 470w-3(b)]. Therefore specific mitigations for heritage resources are not publicly documented.

2.2.9.5 Soil

The following treatment units: 5, 113, 156, 157, 175, 177, 204, 218, 220 and 223, would be reevaluated. Additional subsoiling would occur on skid trails, landings, and/or in group selection areas to reduce the extent of detrimental compaction below the existing pre-project condition. Soil protection measures in the SOPs would apply to all treatment units (Appendix D).

2.2.9.6 Wildlife

All of the action alternatives would have the appropriate Limited Operating Periods (LOP) identified in Table 2.14.

Table 2.14 Wildlife Limited Operating Periods (LOPs) for the Grizz Project.

Species	Location	Limited Operating Period
California Spotted Owl	Within 1/4 mile of a protected activity center boundary	March 1 through August 31
Northern Goshawk	Within 1/4 mile of territory or active nest site	February 15 thru September 15

2.3 Alternatives Not Analyzed in Detail

2.3.1 Alternative 5 – Fully Implement the 2001 SNFPA ROD

Alternative 5 was developed in response to the following issues:

- Without an alternative that implements the 2001 ROD, the decision maker will be unable to determine the difference in impacts to resources between the 2001 and 2004 SNFPA.

Even though there is no alternative that implements the 2001 SNFPA ROD, it has been analyzed and compared in previous projects. The Crystal Adams Project (USFS BRD 2001) and the Humbug Project (USFS BRD 2003) on the Beckwourth Ranger District were both planned and implemented under the 2001 SNFPA ROD. These two projects have served as comparison points for Grizz and implementation of the 2004 SNFPA ROD.

One of the major components of the 2001 SNFPA was the 20” upper diameter limit (UDL) over the majority of the forest, with higher limits in places like Urban Wildland Intermix Defense Zones and lower diameters in places such as Old Forest Emphasis areas. It also includes a number of other requirements such as higher canopy covers in certain areas, and no mechanical treatment in 25% of each stand in order to enhance stand heterogeneity.

The Crystal Adams Project (USFS BRD 2001) and Humbug Project (USFS BRD 2003), both on the Beckwourth Ranger District, were planned and implemented under the 2001 SNFPA. While the EA fuels modeling showed that many of the DFPZ fuels objectives could be met, field observations of these implemented projects have shown that the treatments yielded poor results in many areas (Crystal Adams HFQLG Project Evaluation Form, August 2006). Canopy cover is not reduced to the desired 40% and many ladder fuels remain, making the areas ineffective as DFPZs. In addition, the denser canopy cover and fuel ladders have resulted in higher mortality rates to the residual overstory during subsequent underburning or pile burning. The requirement to leave 25% of each stand without mechanical treatment has resulted in some illogical gaps in the DFPZ network and patches of heavy fuel loading, not meeting the Purpose and Need for fuel reduction in the DFPZ.

Fuel reduction treatments under the 2001 SNFPA not only failed to meet the fuel reduction Purpose and Need, but it was very costly to implement. Because of the 20” dbh UDL, thinning was restricted to smaller trees in this project. Due to the low value of these smaller trees, 100% of the Humbug Project mechanical thinning acres were offered under a service contract. In contrast, the Mabie Project, which implemented the 2004 SNFPA using a 30” UDL, only had 25% of its mechanical thinning acres offered under service contract. Based upon prior experience, the 2001 SNFPA failed to meet fuel reduction objectives while being too costly to implement and for these reasons, it will not be analyzed in depth.

2.3.2 Alternative 6 – Reduce the Upper Diameter Limit (UDL) Within DFPZ to 20” dbh and Increase the Minimum Canopy Cover to 50%

Alternative 6 was developed in response to the following issues:

- The Grizz PA unnecessarily reduces canopy cover below 50% and/or removes trees larger than 20” dbh to meet fuel reduction objectives.

Although fire modeling programs may indicate that a UDL of 20” and 50% canopy cover is sufficient to meet fuel reduction objectives, real world experience (Crystal Adams and Humbug Projects) shows otherwise. Often, there are trees larger than 20” that may compromise the effectiveness of the DFPZ. In addition to fuels reduction, a 30” UDL allows larger trees to be selected during thinning for forest health reasons. Previous analyses has shown that there is little difference in the quality of the residual habitat between a 20” and 30” UDL, but that a 30” UDL allows greater flexibility in removing dead and dying trees as well as a reduced economic cost. Previous projects on the Beckwourth Ranger District implementing the 2001 SNFPA ROD canopy cover and dbh restraints failed to meet the fuel reduction Purpose and Need.

It is rather difficult to model the differences in decreased fire risk between 40% and 50% canopy cover. Fire fighter experience has shown that lower canopy cover also allows better retardant penetration in fighting a wildland fire and increased crown separation which helps slow or stop the progress of crown fires. This is a positive effect of a lower canopy cover that fire modeling may not capture.

2.3.3 Alternative 7 – Hazard Trees Should be Felled and Left in Place to Provide Down Large Woody Debris

Alternative 4 was developed in response to the following issues:

- Removal of felled hazard trees will result in a loss of benefits to soil and wildlife in areas that are deficient in down logs.

Soil quality standards and large woody debris guidelines are followed prior to removal of large woody debris. Management guidelines prevent unnecessary removal of large woody material. Leaving fuel on the ground would not meet the fuel reduction Purpose and Need. In addition, hazard tree removal has already occurred on some roads making the retention of large woody debris a moot point in certain areas.

Chapter 3 Affected Environment and Environmental Consequences

3.1 Introduction

This chapter summarizes the physical, biological, social and economic environments of the Grizz Project area and the effects on this environment that would result from implementation of any of the alternatives. This chapter also presents the scientific and analytical basis for comparison of the alternatives presented in "Chapter 2: Alternatives."

Each resource section in this chapter provides a summary of the project-specific reports prepared by Forest Service specialists, which are incorporated by reference in this Environmental Assessment. The following reports and memoranda are incorporated by reference: Botanical Biological Evaluation, Botany Report and Noxious Weed Risk Assessment; Botany Management Indicator Species (MIS) Report, Biological Assessment/Biological Evaluation (BE/BA) for Fish and Wildlife; Wildlife MIS Report, Watershed and Soil Report; Forest Resources Effects Report; Fire and Fuels Report, Air Quality Report and the Heritage Resources Report. These documents are part of the project record on file at the Beckwourth Ranger District in Blairsden, California. Printed copies of the reports are available upon request by contacting Maurice Huynh, Project Leader, at (530) 836-2575.

3.2 Forest Resources

3.2.1 Introduction

The following assessment is summarized from the forest vegetation report for the Grizz Project, which is incorporated here by reference (USFS PNF BRD 2007a). This assessment addresses how the different alternatives impact forest health and vegetation. The different alternatives are measured by canopy cover, average diameter and basal area. Basal area is then related to appropriate stocking levels to maintain stand growth and health, including resistance to epidemic levels of insects and disease.

Analysis of the effects of the proposed treatments on forest vegetation is derived from changes in the key vegetation attributes of average tree diameter and the density measures of canopy cover and basal area. Tables are presented for each of the proposed types of treatments; thinning to 40% canopy cover in the DFPZ, thinning to 50% canopy cover in the Area Thinning and thinning to 11" dbh in the mastication and grapple pile treatments. The project area vegetation was sampled by stratifying the project area vegetation using the California Wildlife Habitat Relationships (CWHR) classification system. CWHR types are vegetative areas with similar species composition, tree size and density. Any discrepancies with other reports are due to rounding of acres and grouping of CWHR types.

3.2.2 Affected Environment

3.2.2.1 Scope of the Analysis

Geographic Analysis Area: The geographic areas used for this analysis are the stand (for attributes such as density and health) and the project area (for seral stage distribution). Individual trees interact in terms of competition and disease spread at the stand scale. Seral stage analysis and planning for uneven-aged management can be done at any 'landscape' scale so that using project area was sufficient and allows for an easy aggregation upward by combining projects without having any overlap.

Timeframe of Analysis: Modeling was taken out 20 years after project implementation. This is a reasonable maximum time interval before the stand would be entered again for treatment. DFPZ maintenance may require that stands be re-entered sooner, perhaps in 10 years.

3.2.2.2 Analysis Methodology

Much of our current direction gives us desired conditions in terms of canopy cover. Canopy cover is often utilized as an attribute for large scale analysis because it is an attribute that is part of the vegetation typing, i.e. a stand typed as "M" density has a canopy cover of 40-59%. It is of interest both to those interested in fire behavior as it pertains to sustained crown fire and to wildlife biologists as a habitat component. Canopy cover can be measured in several different ways but the measurements made by one instrument, calculated by regression analysis (made by ocular

estimate) have no comparison to measurements made in a different manner. Canopy cover is related to density and therefore, basal area, but is very dependent on stand history (i.e. was the stand open grown or dense early in stand development; has there been partial harvesting, etc.?)

Foresters typically use basal area (BA) to evaluate density due to ease and consistency of field measurement. Basal area is the area occupied by tree stems at 4.5' above the ground. A local correlation between BA and canopy cover for this project is derived using the modeling output for the purpose of developing marking guidelines. The stand is modeled to have the desired canopy cover (either 40 or 50%, depending on either DFPZ or Area Thin and vegetation type) harvested in a strict thinning from below, always removing the smallest trees first. The modeling output gives a BA that achieves the desired canopy cover. It is this basal area that becomes part of the marking guidelines.

Stocking is typically compared against normal basal area (Dunning and Reineke 1933). 'Normal' in this context is maximum site occupancy of trees (essentially 100%) and does not imply desired or even typical. 55% of normal is considered to be the low end of full site occupancy. Below this level, trees grow with little competition from other surrounding trees. Net cubic foot volume growth of wood is strongly related to stand density up to this level of 55% of normal BA. In other words, the addition of another tree to an acre increases the amount of wood produced on that acre. Above this level, there is a range over which density and growth is not related until a point of very high density (somewhere between 70-90% of normal, depending on the age of the stand) where stands begin to stagnate. Over this middle range, the amount of biomass being grown is basically constant. At the low end of this range biomass is being spread over fewer stems, i.e. fewer larger diameter trees. At the high end of the range, that same amount of biomass is spread to a greater number of smaller diameter trees. Trees are competing with one another for growing space and some lose out and die from lack of sunlight as they are shaded by other trees.

For maximum yield of wood and maintenance of vigor, stands are generally thinned to between 55% and 70% of 'normal' basal area. Young stands that still have height growth potential are managed at the low end of this range because of their ability to grow rapidly, increasing crown area by growing taller. At densities over 70% of normal, losses due to bark beetle mortality increase greatly.

Diameter can either be the quadratic mean diameter (the diameter of a tree with the average basal area) or overstory diameter. Overstory diameter is modeled using only the trees in the stand 5" dbh or larger and better estimates the diameter that would be typed from aerial photos where the smaller trees are not seen. It is used to make a correlation back to CWHR type. The quadratic mean diameter in this section is referred to as the "average diameter".

The project area vegetation was sampled by strata using the California Wildlife Habitat Relationships (CWHR) classification system. CWHR types are vegetative areas with similar species composition, tree size and density. CWHR types are defined in the Glossary. Sampling was done throughout the project area by strata for the 10 most common forested types, especially

the larger size classes that will be treated mechanically. Treatment units often contain several strata, as unit boundaries are most often based on topographic features and roads. Strata types sampled are displayed in Table 3.1.

Table 3.1 CWHR strata sampled in Grizz Project

CWHR Strata	Data Collection Plot Numbers	Project Unit CHWR acres	Percent of Total Unit Acres (%)
SMC4M/JPN4M	8,15,38,40,76,106	1563	38
SMC4D/JPN4D	84,100	184	4
RFR4M	1,2,14,22,53,80,93, 111,114,117,120	81	2
RFR4D	11,64,94	13	0
RFR4P	6,26,55,88,89,97,98, 113,115,116	207	5
RFR5S	5,18,21,2429,81,82, 124	14	0
WFR4M	7,19,32,39,42,45,46, 52,58,59,63,68,69,71, 77,79,91,102,108	386	9
WFR4D	20,23,30,33,36,48,95,112	223	5
WFR4P	44,47,49,54,65,66,67,73,99,103,109	292	7
Mixed 5M (WFR5M/RFR5M SMC5M)	17,27,60,118	174	4

The strata in Table 3.1 represent approximately 74% of the area treated. There is no data for the strata not sampled. Although collectively these strata amount to a significant number of acres, each individual type represents a very small percent of the area treated. Generally these strata are in stand types that are of less concern from a habitat standpoint due to small tree size or low existing stocking levels. The stand exam data was modeled using the Forest Vegetation Simulator (FVS, Dixon 2003) to predict the outcome of different treatments. Four prescriptions were modeled:

- No-action
- Thinning to 40% canopy cover in a DFPZ
- Thinning to a 50% canopy cover outside the DFPZ (Area Thinning)
- Thinning to an 11” dbh in mastication and grapple pile treatments

FVS models canopy cover by calculating the crown diameter of each tree based on dbh and species, arranging the trees on a given acre according to their position in the canopy. This value may or may not be similar to canopy cover measured in the field using an instrument such as a densitometer. Treatment units usually contain several CWHR types (as well as non-forest such as meadow or rock patches), as unit boundaries are most often based on topographic features,

resource zone and roads. Each action alternative has a combination of treatment types. Please see Table 2.7 for a comparison of the different action alternatives.

3.2.2.3 Current Conditions

According to FVS, the SMC4D, RFR4D and the mixed 5M types currently have stocking over 70% of normal. There are shade tolerant species such as white and red fir which are providing a continuous fuel ladder. Diameter growth and the development of stands into CWHR size class 5 is slow due to competition. The SMC4M type currently has an average diameter of 7”.

RFR4P, RFR4S and WFR4P types are significantly understocked. These stands have high fuel loadings, limiting natural regeneration and increasing fire risk. Pine is under represented in the stand composition. There is currently an imbalance in age structure. Stands are relatively even-aged. Areas of current mortality are at high risk of loss if a wildfire occurs due to the heavy fuel loading. Regeneration of currently under stocked areas, mainly in the fir types, is occurring slowly.

Although the size class distribution (Table 3.2) across the project area shows a lack of early seral habitat (CWHR size classes 0-2), there is a significant amount of young forest or under stocked patches scattered throughout the forest. These areas show up in the vegetation classification as S or P stands, sparse or poorly stocked, instead of size class 0-2. Currently, approximately 14% of the area is in CWHR size class 5 stands. Historically, stands of trees this size would have occupied approximately 50% of the landscape.

Table 3.2 Existing CWHR size class

CWHR Size Class (dbh)	Existing (%)	Existing (Acres)
0-2 (0-6”)	1	185
3 (6-11”)	8	1,427
4 (11-24”)	77	13,862
>5 (>24”)	14	2,452
Total	100	17,926*

*total acres of forested land, not including aspen, within project area

Relative to early historical forest structure, the existing forest has a greater uniformity of age classes and less structural complexity. Natural regeneration resulted in large areas dominated by 11-24” dbh trees (Table 3.2). Stands in this age/size class typically are less structurally complex than older/larger diameter stands and are still in the ‘stem exclusion’ stage of development. Currently, large tree (>24” dbh) density ranges from 5 to 29 trees per acre, averaging 15 (from the stand exam data), similar to the 5-30 large trees per acre in the pre-European period. Many stands have few snags or large down logs (Table 3.3). Down logs are usually managed by piece, rather than tons per acre. Our standards and guidelines recommend that we generally retain 10-15 tons/acre of large woody debris where available. This is equivalent to the number of logs listed in Table 3.4.

Table 3.3 Existing snags and down woody debris (DWD) by CWHR strata

CWHR Strata	Small Snags 15"-23.9" DBH tpa	Large Snags >24" DBH tpa	DWD 0-1/4"dia tons/acre	DWD 1/4"-1"dia tons/acre	DWD 1"-3"dia tons/acre	DWD 3"-11.9"dia tons/acre	DWD >/= 12"dia tons/acre	DWD Total tons/acre
SMC4M	14	4	0.41	1.27	2.14	3.63	3.49	10.94
SMC4D	8	0	0.64	1.95	2.97	7.21	7.03	19.80
RFR4M	19	6	0.56	1.91	3.34	7.16	6.00	18.97
RFR4D	20	7	0.63	1.79	3.02	6.57	5.26	17.27
RFR4P	6	6	0.54	1.67	3.00	5.61	3.23	14.05
RFR5S	10	6	0.63	1.62	2.27	5.48	4.86	14.86
WFR4M	17	9	0.55	1.54	3.22	5.62	2.51	13.44
WFR4D	16	7	0.55	1.56	2.74	5.20	3.53	13.58
WFR4P	9	13	0.57	1.78	2.65	5.04	3.27	13.31

Table 3.4 Approximate number of down logs needed to meet 10-15 tons/acre standard

Average DBH	Number of down logs
12	24 to 30
14	18 to 24
16	14 to 20
18	10 to 14
20	8 to 12
22	6 to 8
24	4 to 6
26	4 to 6
28	4 to 6
30	4 to 6
Greater than 30	2 to 4

3.2.2.4 Historical Context

The project area was extensively harvested during the period of railroad logging with subsequent natural regeneration, creating the current forest dominated by trees in the 80 to 100 year old age class. Since the larger, more vigorous, dominant trees with good form were typically harvested, being of higher value, the seed source available for natural regeneration was from poorer trees, resulting in a subtle degeneration of the genetic quality of the current stand. Species composition was shifted to the less valuable species such as fir and incense cedar since few larger pines were left to provide a seed source.

The majority of the Grizz Project is in higher elevation mixed conifer and fir vegetation types. Mixed conifer types have a frequent fire return interval, naturally burning in a mosaic fashion that perpetuates the mix of species that is characteristic of the type. Fire suppression in this type led to a higher percentage of shade tolerant species, primarily white fir, as well as an overall increase in stocking levels. These stands have been intensively harvested in the past 20

years by a succession of regeneration cuts in the form of shelterwoods, strip cuts and clear cuts, as well as the removal of scattered large overstory trees. At that time, Forest Service management emphasized maximizing growth and yield of forest products. Larger, older trees that were growing more slowly were replaced by plantations that would be intensively managed. Where there was an existing understory, usually dominated by the shade tolerant fir, old overstory trees were removed with the intention of harvesting the fir under a relatively short rotation (80 to 120 years). Under these intended conditions, there was a reasonable risk that the fir would not succumb to drought and/or insects.

Waves of salvage harvest occurred as insect epidemics hit during the drought of the early 1990's. Bark beetle mortality was extensive and many formerly overstocked stands were became under stocked and loaded with dead and down fuel. Mortality also occurred in dense pine stands, especially in lodgepole pine. Not all dead material was removed in salvage harvests, which generally remove only sawlog material due to the low value of dead trees. This increased fuel loading and adding to the risk of crown fires.

3.2.3 Environmental Consequences

3.2.3.1 Alternative 2 (No-action Alternative)

Defensible Fuel Profile Zones

Approximately 2,800 acres of the area proposed for treatment under the Proposed Action currently would not meet the desired canopy cover if not treated. Under the No-action Alternative, the DFPZ fire risk reduction strategy will not be implemented and existing stands will continue to be at risk of loss due to stand-replacing fire. According to FVS, the desired condition of 40% canopy cover or below would only occur in the RFR4P, RFR5S and WFR4P types (Table 3.5). In twenty years, only the RFR5S type will have canopy cover at or below 40%. No diseased trees would be removed under the No-action Alternative.

According to FVS, the SMC4D, RFR4D and the mixed 5M types are currently stocked at over 70% of normal (Table 3.5). These types will grow at a reduced rate and be at risk of mortality due to inter-tree competition and insects. In twenty years, the SMC4M and WFR4D types will also have a density greater than 70% of normal. Mortality in over-stocked stands will increase fuel loading and fire risk. Diameter growth will be reduced. Shade tolerant species will continue to develop in the understory, providing a continuous fuel ladder. Diameter growth and the development of stands into CWHR size class 5 will be slow due to competition. The SMC4M type, which currently has an average diameter of 7" will only develop to an average diameter of 10" in 20 years.

RFR4P, RFR4S and WFR4P types are significantly understocked and will remain so after 20 years. These stands have high fuel loadings, limiting natural regeneration and increasing fire risk. Pine will continue to be under-represented in the stand composition. Although individual trees in

these poorly stocked stands have the potential to grow to a large diameter, most of these stands will not develop the density associated with "old-growth" due to the lack of canopy cover.

Group Selection and Area Thinning

The imbalance in age class structure will continue (Table 3.2). Stands will remain relatively even-aged. Although there will be some progress towards a higher percentage of the area in larger (>24" dbh) trees, growth will be slow due to tree competition. Areas of current mortality will be at high risk of loss in a wildfire due to the heavy fuel loading. Regeneration of currently under-stocked areas, mainly in the fir types, will occur slowly.

Table 3.5 FVS modeled attribute changes between year 2006 and 2026 for the No-action Alternative for sampled CWHR types in the Grizz Project

CWHR Strata	Year 2006 Basal Area (ft2/acre)	Year 2006 Percent of 'Normal' Basal Area (%)	Year 2006 QMD dbh (inches)	Year 2006 Existing Canopy Cover (%)	Year 2026 Basal Area (ft2/acre)	Year 2026 Percent of 'Normal' Basal Area (%)	Year 2026 QMD dbh (inches)	Year 2026 Canopy Cover (%)
SMC4M	170	53	7	53	240	75	10	62
SMC4D	391	121	9	76	402	125	10	73
RFR4M	246	49	11	50	313	62	13	56
RFR4D	399	79	13	67	382	76	16	58
RFR4P	172	34	10	35	230	46	12	47
RFR5S	127	22	8	17	150	26	9	27
WFR4M	231	46	10	56	287	57	12	60
WFR4D	346	69	11	73	366	73	14	70
WFR4P	122	24	11	35	169	34	14	42
Mixed 5M**	283	78	5	62	323	89	6	67

Quadratic mean diameter of all trees, not the same as overstory tree diameter.
** The mixed 5M type is comprised of the SMC5M, WFR5M and RFR5M CWHR

3.2.3.2 General Effects of the Action Alternatives

Analysis of the effects of the proposed treatments is derived from changes in key vegetation attributes of average tree diameter and the density measures of canopy cover and basal area. Tables are presented for each of the proposed types of treatments: thinning to 40% canopy cover in the DFPZ, thinning to 50% canopy cover in the Area Thinning and thinning to 11" dbh in the mastication and grapple pile treatments.

Mechanical Thinning to 40% Canopy Cover in the DFPZ

In the DFPZ the objective is not to maximize growth but to create a condition that will bring crown fire to the ground and provide safer firefighting conditions. Stands may be thinned more heavily to meet this objective. Generally speaking, mechanical thinning is the preferred treatment to achieve both silviculture and fire risk reduction objectives due to the ability to remove trees of all sizes and the fact that the material is removed from the site, with only landing piles left to be burned.

The prescription willl be designed to meet the desired canopy cover, which is well within the basal area standards. In mechanical harvest units within the DFPZ, stands will be thinned to 40% canopy cover. The standard to leave a minimum '% of existing basal area' (30% for eastside pine and all other CWHR 4M and 4D classes; 40% for CWHR 5M, D, and 6 classes) is never more limiting than the diameter to achieve the desired canopy cover.

All types are at or below 70% of normal after the thinning (Table 3.6) and remain so for at least 20 years. In most stand types, thinning to a 40% canopy cover will under-stock the stand from the objective of maximizing timber yield. Some CWHR types are already under-stocked due to existing white fir mortality and salvage harvest. In these stands, the remaining clumps will be thinned, focusing on the removal of trees in lower crown classes (suppressed and intermediate) and those with poor crowns (less than 30% live crown ratio which is the percentage of the stem with live foliage), and consequently, poor capacity for future growth.

Thinning will increase the growth and vigor of the stands and reduce mortality due to decreased inter-tree competition and bark beetles. Since most of the stands are young enough to respond to release, diameter growth will be greatly accelerated at this level of stocking. For example, the SMC4M type (the most common type being treated in the project) would have an average diameter of 10" in 2026 if left untreated, but is expected to have an average diameter of 17" in 2026 when thinned to a 40% canopy cover (Table 3.6).

Table 3.6 Attributes post treatment and in 2026 for the 'Thin to 40% Canopy Cover' (DFPZ mechanical thin) prescription for stands in the Grizz Project (FVS modeled).

CWHR Strata	Post Treatment Basal Area (ft^2/acre)	Post Treatment Percent of 'Normal' Basal Area	Post Treatment QMD dbh (inches)	Post Treatment Canopy Cover (%)	Year 2026 Basal Area (ft^2/acre)	Year 2026 Percent of 'Normal' Basal Area	Year 2026 QMD dbh (inches)	Year 2026 Canopy Cover (%)
SMC4M	147	46	14	40	207	64	17	49
SMC4D	178	55	26	40	198	61	28	42
RFR4M	214	43	18	40	272	54	21	44
RFR4D	272	54	20	40	328	65	23	43
RFR4P	171	34	11	34	227	45	13	44
RFR5S	127	22	8	17	150	26	9	27
WFR4M	176	35	18	40	223	44	20	45
WFR4D	175	35	18	40	218	43	21	44
WFR4P	120	24	12	33	163	32	15	40
Mixed 5M	221	61	24	40	252	70	27	43

Insect pathogen activity and disease will be reduced in the stands by preferentially removing affected trees. In addition, the risk of insect mortality due to overstocking will be reduced over the long run. Thinning also allows for the re-introduction of fire without excessive tree mortality. Underburning will kill shrubs and small trees that create ladder fuels and maintain the desired lower stocking level.

Mechanical Thinning to 50% Canopy Cover in the Area Thin

Outside of the DFPZ, treatments will include mechanical thinning (pre-commercial and commercial), mastication and grapple piling to reduce the shrub component and existing dead and down fuel loading. Stocking levels will be lowered to a more fire and insect resilient level and remove trees at risk of mortality in the next twenty years. Due to the current size/age class distribution being heavily skewed to trees 11-23" dbh, the first step in moving to an uneven-aged distribution is to remove trees in this size class, particularly those in suppressed and intermediate crown classes. The effects will be very similar to that described for the thinning in DFPZ. Where

there is sufficient stocking in healthy trees, fir and mixed conifer stands will be thinned to a canopy cover of approximately 50% (Table 3.7).

Table 3.7 Attributes post treatment and in 2026 for the 'Thin to 50% Canopy Cover' (mechanical thin outside of DFPZ) prescription for stands in the Grizz Project (FVS modeled).

CWHR Strata	Post Treatment Basal Area (ft^2/acre)	Post Treatment Percent of 'Normal' Basal Area	Post Treatment QMD dbh (inches)	Post Treatment Canopy Cover (%)*	Year 2026 Basal area (ft^2/acre)	Year 2026 Percent of 'Normal' Basal Area	Year 2026 QMD dbh (inches)	Year 2026 Canopy Cover (%)*
SMC4M	165	51	10	47	239	74	13	58
SMC4D	237	74	23	50	265	82	25	53
RFR4M	239	48	12	47	304	61	15	53
RFR4D	329	66	18	50	365	73	21	50
RFR4P	172	34	10	35	230	46	12	47
RFR5S	127	22	8	17	150	26	9	27
WFR4M	209	42	14	48	268	53	16	54
WFR4D	223	44	16	50	278	55	19	54
WFR4P	122	24	12	35	168	33	14	42
Mixed 5M	262	73	16	50	308	85	17	56

Immediately after thinning to a 50% canopy cover puts all the types except SMC4D, RFR4D, and the mixed 5M below 55% of 'normal' basal area, which will result in some loss of growth at the stand level. RFR4P, RFR5S, WFR4M and WFR4P are still below 55% in 20 years. At these lower stocking levels, diameter growth of individual trees will be enhanced. Thinning to 50% canopy cover keeps SMC4D and the mixed 5M type above 70% of 'normal' basal area and at risk for bark beetles. In another 20 years, SMC4M and RFR4D will also be above 70% of normal BA and become at risk to bark beetles. The SMC4M type would have an average diameter of 10" in 2026 if left untreated, but is expected to have an average diameter of 13" in 2026 when thinned to a 50% canopy cover.

Thinning to 11"dbh with Grapple Piling/Mastication

This prescription models the grapple pile and mastication treatments both within the DFPZ and Area Thinning zone. These treatments are proposed due to slope, watershed effects, lack of access, smaller diameter trees or other concerns. Twelve acres will be underburned with little to no effect on the forest vegetation. Table 3.8 displays the modeled results of this treatment. In SMC4D, RFR4D, WFR4D, WFR4M and mixed 5M types, thinning to 11" dbh would not reduce

the canopy cover to 40% (Table 3.8), so those types treated in this manner would not meet the desired condition for the DFPZ. After treatment, basal area would remain at or over 70% of normal for the SMC4D and mixed 5M types, putting the trees at risk of bark beetle mortality and greatly reducing diameter growth. In 20 years, in addition to those types, the RFR4D type is also at 70% of normal.

Table 3.8 Attributes post treatment and in 2026 for the 'Thin to 11" dbh' (mastication and grapple pile treatment) prescription for stands in the Grizz Project (FVS modeled).

CWHR Strata	Post Treatment Basal Area (ft^2/acre)	Post Treatment Percent of 'Normal' Basal Area	Post Treatment QMD dbh (inches)	Post Treatment Canopy Cover (%)*	Year 2026 Basal area (ft^2/acre)	Year 2026 Percent of 'Normal' Basal Area	Year 2026 QMD dbh (inches)	Year 2026 Canopy Cover (%)*
SMC4M	123	38	17	31	169	52	21	38
SMC4D	346	107	19	65	385	120	20	67
RFR4M	220	44	19	40	273	54	22	43
RFR4D	320	64	19	46	349	70	21	46
RFR4P	158	31	20	28	203	40	24	31
RFR5S	126	22	32	16	140	24	35	17
WFR4M	198	39	18	42	244	49	20	46
WFR4D	300	60	16	61	334	67	18	62
WFR4P	104	21	19	25	129	26	22	28
Mixed 5M	252	70	29	41	284	79	32	43

Group Selection Treatments

GS creates small 0.5-2 acre openings in the forest canopy. These openings would be designed to fit the terrain, existing vegetation, fuel conditions, stand health, wildlife habitats and other ecosystem conditions. Regeneration in the openings will either be natural or by planting. Silviculturally, one of the most significant features of GS is the effect that the surrounding stand has on the group. This effect can be both positive and negative. Positive effects include the potential for natural regeneration, sparing the expense of tree planting, and providing shade and site protection for the seedlings. The primary negative effect is the reduction of growth in the group due to competition for sunlight and moisture from trees on the edge. In a water-limited system such as the Sierra Nevada, the roots of trees on the edge can quickly fill in the opening. It is critical to monitor the regeneration in openings and to tend it aggressively, if necessary, by

supplementing with planting and/or releasing from competing vegetation. In DFPZ units that also have GS, canopy will drop below 40%, due to the groups. In Area Thinning, 50% canopy cover will be maintained, including the effect of the groups.

Under a regulated, uneven-aged GS, with a 200-year rotation (200-years is suggested for poorer sites under QLG and used here to simplify the example) and a 20-year interval, there are 10 age classes of trees, each occupying 10% of the area. It takes a different length of time to grow from one size class to another, given a managed stand. This distribution assumes that it takes size class 0 about 20 years to grow to size class 3, which then takes 20 years to grow to size class 4. Once a stand reaches size class 4, 1/3 of the stands will grow to become size class 5, while 2/3 will stay at size class 4. That portion of the stand that reaches size class 4, stays at 5 until harvested, then 10% become size class 0 every 20 years.

GS is intended to balance the age class distribution toward a regulated condition for uneven-aged management. An analysis of size class as a proxy for age distribution for stands within the project area shows that, as would be expected given the extensive logging around the turn of the century, there is a considerable amount of size class 4 (11-23" dbh) and a lack of larger diameter trees (Table 3.9). In the future, tree growth would move stands up in size class, especially in thinned stands. Some thinned stands would show an immediate jump up in size class due to the removal of smaller trees. Tree size would continue to increase as a result of decreased competition, leading ultimately to an increase in CWHR size class 5. Since many of the CWHR size class 4 stands are at the lower end of the size range for that class, 20 years of growth is generally not enough to move them into CWHR size class 5.

Not all of this area is actually available for harvesting timber. Besides the protections in place for various wildlife species and riparian areas, there are existing roads, not all of the area is forested (i.e., barren, grass and shrub), and some of what is forested is not of merchantable size or accessible for harvest, particularly if on steep slopes which require more expensive logging systems. By removing the acres that cannot practically be treated with GS, 7,645 acres remain. This translates into 44, 436 and 872 acres at the various harvest intervals described above.

In order to move the existing condition toward the desired age/size class distribution, most of the current size 4 needs to grow into size 5 to make up the deficit there. Thinning would accelerate this growth. Although the analysis shown above might seem to indicate a need to create additional early seral habitat, in reality the stands are already full of group selection sized patches. Much of the young/understocked forest in the project area is in patches too small to 'register' on vegetation type maps. Rather than showing a small patch as size class 0 or 1, the larger polygon is shown as poorly or sparsely stocked.

Table 3.9 The regulated vs. existing conditions and the effect of the Proposed Action and alternatives on size class distribution.*

Size Class	Age	Desired Condition**	Existing condition	Alternative 1	Alternative 3	Alternative 4
		% (Acres)	% (Acres)*	% (Acres)	% (Acres)	% (Acres)
0-2 (0-6"dbh)	0-20	10 (1,793)	1 (185)	2 (296)	2 (328)	2 (311)
3 (6-10"dbh)	20-40	10 (1,793)	8 (1,427)	8 (1,427)	8 (1,427)	8 (1,427)
4 (11-23"dbh)	40-100	30 (5,379)	77 (13,862)	77 (13,751)	77 (13,719)	77 (13,736)
5 (24" dbh+)	100-200	50 (8,965)	14 (2,452)	14 (2,452)	14 (2,452)	14 (2,452)

*This table reflects the immediate condition following the proposed treatments.
**regulated condition under uneven-aged management 200-year rotation

3.2.3.3 Differences Between the Action Alternatives

The primary difference in the action alternatives is the mix of treatments. Generally speaking, mechanical thinning is the preferred treatment to achieve both silvicultural and fire risk reduction objectives due to the ability to remove trees of all sizes and the fact that the material is removed from the site, with only landing piles left to be burned. Burning piles within a stand poses a risk to the residual trees. Piled material can also be a source of insect infestation at certain times of the year. The most beneficial alternative is that which treats the most acres mechanically.

Alternative 1 (Proposed Action)

This alternative treats 3,061 acres by mechanical thinning, thinning to a 40 or 50% canopy cover (depending upon land allocation), not including 110 acres in group selection (58 acres in DFPZ and 52 acres in Area Thin). Of these, 1,749 acres are in DFPZ and will be treated to the 40% canopy cover prescription. Table 3.10 displays the amount of each CWHR type grouping that is being treated by each prescription in Alternative 1.

Of the 501 acres of grapple pile/mastication/thin to 11" dbh treatment, 63 acres will not meet the desired canopy cover, due to the diameter limit. These treatments are proposed due to slope, watershed effects, lack of access, or other concerns. Twelve acres will be underburned with little to no effect on the forest vegetation.

All of the mechanically treated areas within the DFPZ will be under 70% of normal stocking post-treatment. In 20 years, all but the 43 acres in the mixed 5M types will still be below 70% of normal. In the Area Thin, all stand types except the 46 acres of SMC4D and the 114 acres of mixed 5M will be below 70% of normal post-treatment. In 20 years, in addition to the acres in those types, the 530 acres of SMC4M and the 11 acres of RFR4D will also be above 70% of normal. Five acres of SMC4D and mixed 5M types proposed for grapple piling/mastication will be above 70% of normal immediately post-treatment. In total, 165 of the treated acres will still be above 70% of normal immediately after treatment.

There will be 680 acres of the SMC4M type that will be treated to the 40% canopy cover prescription and will have an average diameter increase from 7-17" dbh 20 years post-treatment. 530 acres of this same type treated to the 50% canopy cover prescription will have a diameter increase from 7-13" dbh in the same time period.

Table 3.10 Acres of CWHR type by treatment in Alternative 1.

PA	RX			
CWHR	**40 % Thin**	**50% Thin**	**Grapple**	**Total Acres**
RFR4P	94	97	0	191
RFR4M	42	30	0	72
RFR4D	0	11	0	11
RFR5S	5	9	0	14
SMC4M	680	530	101	1,311
SMC4D	43	46	3	92
WFR4P	182	51	13	246
WFR4M	144	127	54	325
WFR4D	167	41	1	209
MIX5M	43	114	2	159
MISC.*	350	256	327	933

* All remaining CWHR types not sampled as part of stand exam

Group selection would treat 110 acres which would change to the early seral (0-2) CWHR class from size class 4 (Table 3.11) due to group selection. Table 3.11 shows the projected acres harvested by CWHR type.

Table 3.11 Acres of CWHR types harvested in group selection in Alt. 1

CWHR	Acres harvested in groups
RFR4P	11
SMC4M	72
WFR4M	15
WFR4P	12
total	110

Alternative 3

This alternative treats 3,537 acres by mechanical thinning, not including 143 acres of group selection. Of these, 2,105 acres are in DFPZ and will be treated to the 40% canopy cover prescription. Of the 365 acres of grapple pile/mastication/thin to 11" dbh treatment, 47 acres will not meet the desired condition, due to the diameter limit. Table 3.12 displays the amount of each CWHR type grouping that is being treated by each prescription in this alternative.

Table 3.12 Acres of CWHR type by treatment in Alternative 3.

ALT 3	RX			
CWHR	40 % Thin	50% Thin	Grapple	Total Acres
RFR4P	117	99	0	216
RFR4M	206	73	2	281
RFR4D	9	47	<1	56
RFR5S	19	5	55	79
SMC4M	706	604	27	1,337
SMC4D	43	46	3	92
WFR4P	186	50	4	240
WFR4M	191	137	42	370
WFR4D	160	38	<1	198
MIX5M	90	72	2	164
MISC.*	378	260	229	867

* All remaining CWHR types not sampled as part of stand exam.

All of the mechanically treated areas within the DFPZ will meet the desired canopy cover and be under 70% of normal stocking post-treatment. In 20 years, all but the 90 acres in the mixed 5M types will still be below 70% of normal. In the Area Thin, all stand types except the 46 acres of SMC4D and the 72 acres of mixed 5M will be below 70% of normal post-treatment. In 20 years, in addition to the acres in those types, the 706 acres of SMC4M and the 9 acres of RFR4D will also be above 70% of normal. Five acres of SMC4D and mixed 5M types proposed for grapple piling/mastication will be above 70% of normal immediately post-treatment. Twelve acres will be underburned with little to no effect on the forest vegetation. In total, 123 of the treated acres will still be above 70% of normal immediately after treatment.

There will be 706 acres of the SMC4M type that will be treated to the 40% canopy cover prescription and will have an average diameter increase from 7”-17” dbh 20 years post-treatment. 604 acres of this same type treated to the 50% canopy cover prescription will have a diameter increase from 7- 13”dbh in the same time period.

Group selection would occur on 143 acres which would change to the early seral (0-2) CWHR class from size class 4, due to group selection. Table 3.13 shows the projected acres harvested by CWHR type.

Table 3.13 Acres of CWHR types harvested in group selection in Alternative 3

CWHR	Acres harvested in groups
RFR4D	6
RFR4M	22
RFR4P	9
SMC4M	64
SMC4P	4
WFR4D	14
WFR4M	14
WFR4P	10
total	143

Alternative 4

This alternative treats 3,116 acres by mechanical thinning, not including 126 acres of group selection. Of these, 2,108 acres are in the DFPZ and will be treated to the 40% canopy cover prescription. Of the 365 acres of grapple pile/mastication/thin to 11" dbh treatment, 47 acres will not meet the desired condition, due to the diameter limit.

All of the mechanically treated areas within the DFPZ will meet the desired canopy cover and be under 70% of normal stocking post-treatment. In 20 years, all but the 90 acres in the mixed 5M types will still be below 70% of normal. In the Area Thin, all stand types except the 37 acres of SMC4D and the 52 acres of mixed 5M will be below 70% of normal post-treatment. In 20 years, in addition to the acres in those types, the 406 acres of SMC4M and the 11 acres of RFR4D will be above 70% of normal. Five acres of SMC4D and mixed 5M types proposed for grapple piling/mastication will be above 70% of normal immediately post-treatment. Twelve acres will be underburned with little to no effect on the forest vegetation. Table 3.14 displays the amount of each CWHR type grouping that is being treated by each prescription in Alternative 1. In total, 94 of the treated acres will still be above 70% of normal immediately after treatment.

There will be 707 acres of the SMC4M type that will be treated to the 40% canopy cover prescription and will have an average diameter increase from 7"-17" dbh 20 years post-treatment. 406 acres of this same type treated to the 50% canopy cover prescription will have a diameter increase from 7-13" dbh in the same time period.

Table 3.14 Acres of CWHR type by treatment in Alternative 4.

ALT 4	RX			
CWHR	40 % Thin	50% Thin	Grapple	Total Acres
RFR4P	117	74	0	191
RFR4M	204	21	2	227
RFR4D	10	11	<1	21
RFR5S	1	4	55	60
SMC4M	707	406	27	1,140
SMC4D	43	37	3	83
WFR4P	185	62	4	251
WFR4M	191	85	42	318
WFR4D	164	33	<1	197
MIX5M	90	52	2	144
MISC.*	378	223	229	830

* All remaining CWHR types not sampled as part of stand exam.

Group selection would occur on 126 acres which would change to the early seral (0-2) CWHR class from size class 4 due to group selection. Table 3.15 shows the projected acres harvested by CWHR type.

Table 3.15 Acres of CWHR types harvested in group selection in Alt. 4.

CWHR	Acres harvested in groups
RFR4M	18
RFR4P	9
SMC4M	60
SMC4P	5
WFR4D	10
WFR4M	14
WFR4P	10
total	126

3.2.3.4 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. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Additionally, by focusing on the impacts of past human actions there is a risk of ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects.

For forest vegetation it is not specifically necessary to consider the individual impacts of past harvests or natural disturbance since the current vegetation reflects the sum total of all that has happened. Given the extensive logging around the turn of the century, there is a considerable 'bulge' in CWHR class 4 (12-24" dbh) and a lack of larger diameter trees.

The cumulative effect of all of the activities impacting forest vegetation will be to reduce the number of acres in the current 'bulge' in CWHR size class 4. The activities in the adjacent areas under Forest Service management would be similar to those occurring in the project area.

Since the fate of QLG style uneven-aged management, group selection, is uncertain beyond the pilot project timeframe (currently ending in 2009), it is premature to suggest that the landscape would conform to the QLG vision in the long run. Whether the long-term strategy is even or uneven-aged management, the thinning activities will benefit either end by improving growth and reducing the risk of epidemic insect and disease outbreaks.

3.3 Fire and Fuels

3.3.1 Introduction

The following assessment is summarized from the fire, fuels and air quality report for the Grizz Project, which is incorporated here by reference (USFS PNF BRD 2007b). This assessment addresses the different alternatives' direct, indirect and cumulative effects to forest fuels, fire suppression efficiency and safety.

Fuels, as referred to in this analysis, consist of live and dead wildland vegetation that will support combustion. Wildland fuels are described by several factors that influence how easily they will ignite, how rapidly a fire will propagate and spread through them and how severely the fire will burn. These factors include size and shape, loading and horizontal continuity and vertical arrangement. Light fuels consist of shrubs, grasses and pine needles and often these fuels ignite easily and burn rapidly. Wildfires in light fuels react quickly to changes in relative humidity and wind. Heavier fuels are limbs logs and stumps larger than 1" in diameter, ignite and burn more slowly. Wildfires in heavy fuels are less influenced by wind and moisture changes, but are more difficult to control as they burn longer and with greater heat production. Fuel loading is the quantity of live and dead fuel in any given area, usually measured in tons per acre. Horizontal continuity is the manner in which fuels are arranged over an area. Patchy fuels have uneven distribution with barriers to fire spread such as rock or bare ground present. Uniform fuels are arranged throughout an area providing a continuous path for fire spread. Vertical arrangement is the distribution of fuels from the ground up. Ground fuels include deep duff, roots and organic material beneath the surface. Surface fuels consist of needles, leaves, downed logs, stumps, tree limbs and low shrubs lying either on or immediately above the ground. Aerial fuels are live and dead tree branches and crowns and tall shrubs above the ground.

Reducing surface fuel loading and reducing vertical fuel and horizontal continuity are two of the most effective means to reduce wildfire severity and enhance firefighter safety and efficiency. Removing surface fuels reduces fire intensity and increases the speed in which fireline can be constructed, as less fuel would need to be removed during fire suppression activities. Thinning aerial fuels removes the fuel "ladder" that can enable a surface fire to move into the canopy. A crown fire that enters an area that has been thinned and has less surface fuel loading will most likely drop from the canopy to the ground. In general, treating surface and aerial fuels creates an environment where wildfires would be more likely to be caught in the initial attack stage. An environment such as this enhances firefighter and public safety and firefighter efficiency.

3.3.2 Affected environment

3.3.2.1 Scope of the Analysis

Geographic Analysis Area: The boundary of the Grizz Project area forms the analysis area for pre- and post-treatment fire behavior and fire regime condition class. Cumulative effects were analyzed within the Grizz Project boundary, with the inclusion of DFPZs that connect to the Project. The Grizz Project boundary was used for analysis due to the project area's relative isolation from outside fire activity. Grizzly Ridge on the south and Mt. Ingalls to the north act as topographical barriers to fire spread into and out of the project area.

Timeframe of Analysis: Only projects from the past 25 years were considered, as it is difficult to detect evidence of older treatments in the project area. A complete list of all past treatments in the Grizz Project area is impractical to collect and would be too complex to analyze with existing tools. The existing fuel bed reflects the cumulative effects of past human and natural events.

3.3.2.2 Analysis Methodology

Fire Behavior

Pre- and post-treatment fire behavior for the Grizz Project was modeled using Fuels Management Analyst Plus (FMA+), Version 3 (Carlton 2005). Forest Inventory Analysis (FIA) tree list data collected for the Grizz Project was input into FMA and surface and crown fire behavior was modeled using Crown Mass. Post-treatment fire behavior as modeled reflects conditions immediately after all treatments are completed, including follow-up grapple piling and burning, mastication, or underburning of thinned units.

Inputs used to calculate pre- and post-treatment fire behavior are described below:

- Fuel models (FM)-For a more detailed discussion regarding fuel models, please see the discussion under "Affected environment: current conditions".
- Air temperature-This affects relative humidity and fuel temperature.
- Relative humidity (RH)-Directly affects fuel moisture. It is expressed as a percent.
- The wind speeds at mid flame are used in calculating fire behavior. 20-foot wind speeds, the winds which are 20 feet above the surface of the vegetation, are reduced to mid flame wind speed by a reduction factor. These reduction factors are based on whether the fuel bed is exposed, partially sheltered, or fully sheltered from the 20-foot winds.
- Fuel moisture-The amount of water present in fuels, expressed as a percentage of its oven dried weight. The lower the moisture content in a given particle of fuel, the more rapidly it will ignite. Finer fuels, those ¼" in diameter or less, respond rapidly to changes in humidity. Moisture contents in heavier fuels, those greater than 3" in diameter, tend to reflect seasonal trends.
- Slope- Steeper slopes have more extreme fire behavior.

The outputs model fire behavior under 90th percentile weather conditions in treated and untreated units. Units in Defensive Fuel Profile Zones (DFPZs) were modeled in the following stand types: Sierra mixed conifer, white fir and red fir. Area Thin units were also modeled for comparison. The DFPZ units were modeled post-treatment as thinned to 40% canopy closure with a follow up underburn. Area Thin units were modeled post-treatment thinned to 50% canopy closure.

Fuel Model 10 was used to model pre-treatment surface fuels, as this model best reflects the existing conditions in the proposed treatment units. Fuel Model 8 was used to model treated fuels that had reached the desired condition in terms of surface and ladder fuels. FMA runs were made with 30% slope, as this generally represents the slopes planned for mechanical treatment in the project area. More detailed descriptions of these fuel models is discussed under the "Affected environment: current conditions" section.

Fire behavior modeling outputs used in this analysis are site specific to the Grizz Project area, as local stand data was used. These outputs are only intended for use in the Grizz Project area. Modeled fire behavior gives a snapshot of a simulated fire event, so these outputs should be used only as a guide in concert with local fire behavior knowledge. Actual fire behavior can vary widely as fuels, topography and weather change.

Fuel models represent a homogenous condition. Actual fuel beds are much more variable in loading, arrangement and continuity. Fuel models used here are based on the most recent available Plumas National Forest geographic information system (GIS) coverage.

90th percentile weather conditions were used as inputs for modeling as required by the SNFPA ROD (2004). Data used in calculating 90th percentile conditions was taken from Smith Peak Lookout, a seasonal weather station near the Grizz Project area (Table 3.16). A wind reduction factor of .3 was applied to untreated stands. Treated stands received a wind reduction factor of .4. This lesser reduction is due to the opened canopy being less sheltered from the 20-foot winds. These wind reduction factors were applied to 20-foot wind speeds to show respectively sheltered and partially sheltered fuel conditions (Rothermel 1983).

Table 3.16 90th percentile weather for Smith Peak.

Weather Variable	Value
Maximum temperature, F	80
Minimum relative humidity, %	14
1 hour fuel moisture, %	4
10 hour fuel moisture, %	5
100 hour fuel moisture, %	6
1000 hour fuel moisture, %	7
20 foot wind speed, mph	12
Herbaceous fuel moisture, %	49
Woody fuel moisture, %	67
Years of data	1977-2002

The SNFPA (2004) and the Herger-Feinstein Quincy Library Group (HFQLG) use reducing flame lengths as one measure of success of fuels treatments. Flame lengths of 4 feet or less are

the desired condition. As flame length and fireline intensity are reduced by treating surface and canopy fuels, fireline production rates for ground crews increase, enhancing firefighter safety and the likelihood of successful containment of wildfires during initial attack (Table 3.17).

Table 3.17 Flame length, fireline intensity and fire behavior (NWCG Fire Behavior Handbook 1992).

Flame length (ft)	Fireline Intensity (BTU/ft/sec)	Description of Fire Behavior
0-4	0-100	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4-8	100-500	Fires are too intense for direct attack on the head with hand tools. Hand line cannot be relied upon to hold the fire. Direct attack on flanks with engines, dozers and retardant aircraft may be effective.
8-11	500-1000	Fires may present serious control problems-torching, crowning and spotting. Direct attack ineffective.
>11	>1000	Crowning, spotting and major fire runs are probable. Control efforts at the head of the fire are ineffective.

Other fire behavior outputs used as indicator measures include:

- **Flame length (feet):** "The length of the flame from in a spreading surface fire within the flaming front" (Carlton 2005). Flame length is measured from midway in the combustion zone to the average tip of the flames. The higher the flame length, the greater resistance to control and the higher likelihood of torching and crowning.
- **Surface fuel loading:** Surface fuels are all flammable materials lying on or immediately above the ground, including needles or leaves, duff, grass, small dead wood, downed logs, stumps, large limbs, low brush and small ladder fuels. Surface fuel loading is the amount of these fuels present in a given area and is usually expressed in tons per acre.
- **Rate of Spread (chains/hour)**: The rate at which fire moves through surface fuels. High rates of spread increase resistance to control for fire crews.
- **Ground to Canopy Base Height (feet):** "The lowest height above the ground at which there is a sufficient amount of canopy fuel to propagate fire vertically into the canopy" (Reinhardt and Scott 2001). Canopy base height incorporates ladder fuels including brush, shrubs and understory trees. An increase in canopy base height results in decreased crown fire potential.
- **Surface Fire:** A fire spreading in surface fuels.
- **Passive Crown Fire:** A crown fire in which individual or groups of trees torch out. Passive crown fire can vary in behavior from isolated torching to a nearly active crown fire.

- **Active Crown Fire:** A crown fire in which the entire fuel complex becomes involved, but the crowning phase remains dependent on heat released from the surface fire for continued spread. (Reinhardt and Scott 2001).

DFPZ Design Location Criteria

An additional consideration used in analyzing the various alternatives in the Grizz Project was the factors which are used to determine optimal DFPZ placement and utilization. When designing a DFPZ location, several factors are considered to optimize its effectiveness. They include:

- **Topographical placement:** Ideal locations would be ridge systems, which are normally topographic features used to contain wildfires, optimizing the use of aerial firefighting resources by opening the canopy for better penetration of retardant and allowing safer and more effective access to mechanized ground resources. Steepness of slope would also be a consideration.
- **Road Systems**: Ideal DFPZ locations also include existing roads, especially main routes. This provides safe access and an anchor point for incoming firefighting resources to engage wildfires.
- **Existing conditions:** DFPZs can utilize areas that have been previously treated or burned, or are naturally open areas of rock or minimal vegetation. It is beneficial when planning DFPZs to connect into such areas.
- **Adjacent DFPZs:** DFPZs should be placed where they will connect to adjacent DFPZs to establish cohesion for the entire DFPZ network.

3.3.2.3 Current Conditions

The Grizz Project lies mainly between Grizzly Ridge on the south and the southern slopes of Mt. Ingalls to the north and Turner Ridge to the northeast. Another segment of the Grizz Project lies to the south of Grizzly Ridge in the Happy Valley area. Elevation ranges from 7300 feet at the top of Grizzly ridge to 5800 feet in Little Grizzly Creek and 5700 feet in Happy Valley. The Grizz Project connects to four existing or proposed fuels treatments: Happy Jack (proposed) to the south, Freeman (proposed) to the southeast, Humbug to the southeast and the Ingalls Project (proposed) to the north. In addition, over 700 acres of private land, which is connected to the proposed Grizz DFPZ, was commercially thinned in the year 2000.

Most of the Grizz Project is in an area with higher elevation mixed conifer and fir vegetation types. The fire return interval in mixed conifer types is more frequent than in red fire and white fir dominated types and these stands were historically more fire resistant. These factors, in conjunction with the advent of organized wildland fire suppression, have increased dead and down fuel loading, with a resultant increase in potential fire size and intensity (Gruell 2001). For more information regarding the forest types, please see the “Forest Resources” section in this EA.

Fuel models (FM) are a set of parameters that defines the fuel input into the fire spread model. They are important as inputs into fire model programs used in this analysis. These models

represent the existing combination of the various characteristics which determine how a fire will behave in them: size and shape, size class distribution, loading in tons per acre, horizontal continuity, vertical arrangement and chemical content of the vegetation. The fuel models are grouped by determining what the primary carrier of the fire would be: grass, brush, timber litter, or slash. The current FM found within the Grizz Project are:

- **Fuel Model 1**: Less than 1% (159 acres) of fuel model 1 is in the project area. This model represents dry grasslands and savannas with little shrub or timber present. Fire behavior in FM 1 is fast moving with up to 4-foot flame lengths. In the Grizz Project area, this fuel model occurs in meadows along the Little Grizzly Creek Valley and along parts of Blakeless Creek and has some live fuel content which does not exhibit spread rates as great as the typical FM 1.
- **Fuel Model 2**: FM 2 makes up less than 1% (71 acres) of the Grizz Project area and is mostly found along the ridge to the south of Blakeless Creek. This model represents open shrub and timber stands with a grass understory. Grasses in FM 2 in the project area have similar fire behavior characteristics as FM 1 (see above). Fire behavior in FM 2 exhibits a lower rate of spread than FM 1, but can generate higher flame lengths (6 feet) due to dead litter from over story trees in the fuel bed.
- **Fuel Model 4**: Only 8 acres, or less than 1 % of the Grizz Project area, is represented by FM 4. This fuel model belongs to the brush group and is used to describe tall brush with a heavy dead component. Fire behavior in this fuel model can be extreme, with high rates of spread and flame lengths of 19 feet.
- **Fuel Model 5**: This model is present in approximately 17% (3,289 acres) of the project area. This is a brush fuel model. It is typically used to represent young green shrubs with little dead fuel component. Fire behavior in FM 5 is characterized by a low rate of spread and flame lengths of 4 feet or less. FM 5 is not a “problem” fuel type except during severe drought or high wind conditions. FM 5 is fairly well distributed through the Grizz Project area, with a concentration occurring in the northwest part of the project east of Grizzly Ridge.
- **Fuel Model 8**: FM 8 comprises 36% (7,110 acres) of the project area. This model having short needle conifer stands consisting of red and white fir and lodge pole pine having surface fuels of compact litter with little undergrowth and dead woody fuel. This fuel model is used to represent post treatment fuel conditions, as fire behavior is usually slower burning and of lower intensity. Flame lengths typically do not exceed 1 foot and initial attack is normally successful unless high winds are present. It predominates along the north slopes of Grizzly Ridge and on the upper slopes leading towards Mt. Ingalls.
- **Fuel Model 9**: FM 9 represents only 4% of the project area, or 824 acres, mainly around Happy Valley and on the slopes along the Little Grizzly Creek in the northwest part of the Grizz Project area. This model is similar to FM 8, representing long needle conifers such

as ponderosa and Jeffery pine. Rate of spread and flame lengths (2-3 feet) are slightly greater than FM 8 due to the more aerated nature of the litter. This model is used to represent post treatment conditions in eastside pine forest types. Initial attack in FM 9 is usually successful barring extreme weather conditions.

- **Fuel Model 10**: FM 10 comprises 38% (7,453 acres), the largest proportion of the Grizz Project area. Fire behavior in this fuel model is of the highest intensity of the timber fuel models. Conifer stands with heavy dead and down material and dense ladder fuels are typical. Crowning, torching and spotting are more frequent in FM 10. Flame lengths of 5 feet or greater are common and fires in FM 10 are at the threshold of control by direct attack. This model is frequently used to represent untreated, over mature or disease-ridden stands

The remaining 4% of the project area is classified as FM 98 and 99. These models represent water, rock, or barren land with no flammable vegetation. Summit Lake and the tailings deposited during mining operations are an example.

3.3.2.4 Historical Context

Analysis of Plumas National Forest GIS data for the period 1970-2005 indicates that the only large fire to have originated in the project area was the 1990 Walker Fire. The lightning caused Walker Fire to grow to 1,496 acres and originated approximately 1.5 miles west of Walker Mine. About ½ of this fire burned within the Grizz planning area. Two other large fires (>100 acres) have burned into the project area from outside. In 1927, a small part of a 281-acre fire burned into the southeastern portion of the project area near Happy Valley. A small part of a second fire affected the project area in 1929. That year, the 2,700 acre Nibley Stoddard Fire came over Grizzly Ridge from the southwest and burned into the upper reaches of Paradise Creek. During the period 1970-1996, 57 fires (9 human caused, 48 lightning caused) originated in the Grizz Project area, with the largest fire being the Walker Fire described above. Two other fires burned from 1-2 acres and the remaining fires all burned less than 1 acre. The north facing slope and wind sheltering effect of Grizzly Ridge tend to keep fire size small. The high public use and presence of nearby Smith Peak Lookout are also factors, as fires are easily detected and suppression action initiated quickly.

There has been a lack of large fires in recent history in the Grizz Project area. This raises a concern, since surface and ladder fuels have accumulated to the extent that stand replacing wildfires are increasingly likely. Only 12 acres of any of the action alternatives described below are targeted for underburning as their only treatment. This reflects the fact that fuel characteristics in this area are such that it is hazardous to introduce fire even in a controlled environment without prior treatment.

Prior to European settlement of the northern Sierra Nevada, fires occurred frequently in many forest types. Some fires were ignited naturally; others were anthropogenic, being ignited by the local Maidu tribe, who used fire for various food gathering and land clearing purposes. Mean fire

return intervals in red and white fir forest types range from 39-65 years (Agee 1993). Fire severity in this vegetation type can vary widely from low to high depending on topography, surface and ladder fuels and weather. Fire return intervals in Sierra mixed conifer averages between 1-25 years. Study plots in the Antelope Lake area, 15 miles north of the project area and representing a Sierra mixed conifer forest type, found a mean fire return of between 13-17 years. (Moody and Stephens 2002). These frequent low to moderate intensity fires created fire resistant stand structures as shown by photographic evidence and fire scar data (Gruell 2001; Moody and Stephens 2002).

3.3.3 Environmental Consequences

3.3.3.1 Alternative 2 (No-action Alternative)

Direct and Indirect Effects

Surface, ladder and crown fuels would not be treated, resulting in a decrease in fireline production rates over time as fuels continued to accumulate (Table 3.18). Table 3.18 is an average of the fire behavior outputs in the fire and fuels. Fuel Model 10 was used to model pre-treatment surface fuels, as this model best reflects the heavy fuel loading of the existing conditions in the proposed treatment units.

Table 3.18 Direct effects of the No-action Alternative

Measurement indicator	Output
Surface fuels (tons/acre)	12.02
Rate of spread (chains*/hour)	26.7
Flame length (feet)	24.4
Ground to canopy base height (feet)	3’
Fire type	Passive crown fire
Mortality (%)	80%

*1 chain = 66 feet

Without treatment of fuels, initial attack success would be reduced, as flame lengths and rates of spread would exceed firefighter capabilities for direct attack during 90th percentile (and greater) weather conditions. Torching and crowning indices, as well as canopy base height, would remain low, with a higher likelihood of passive and active crown fires. Mortality in untreated stands would exceed 80 percent in most cases.

There would be no improvement in either firefighter or public safety, or in fire managers’ capability to suppress wildfires under the No-action Alternative.

Cumulative Effects

No improvement in suppression effectiveness or firefighter and public safety would result from this alternative. No mitigation to the threat of wildfire events catastrophic to resource values will occur. Surface fuels would continue to accumulate from insect, disease and overstocking. Ladder fuels would continue to grow, lowering canopy base heights and increasing potential for crown fire activity.

No connectivity with adjacent DFPZs would occur, reducing their effectiveness and leaving gaps in the local DFPZ network. Fuels management work done on private lands would not be enhanced. Access for fire equipment would degrade as no additional road maintenance would take place.

The effects of past, present and reasonably foreseeable future projects include:

- Human caused ignitions from recreation users, woodcutters and OHVs would continue to increase. Natural ignitions caused by lightning strikes would continue. Initial attack success would degrade as surface and ladder fuels increase over time. Firefighter and public safety would be compromised. Severe resource damage resulting from catastrophic wildfires will become increasingly likely.
- Past timber sales in mixed conifer stands, which took place from 1980 to the present, have contributed to increased numbers of white fir, as desirable pine species were cut and removed. White fir stocking levels and residual slash from past harvests would not be reduced in Alternative 2, which would continue to inhibit the reestablishment of fire resilient conifer species such as pine.
- Severe insect infestations during drought conditions in the late 1980s occurred within and around the Grizz Project boundary. The resulting timber mortality created fuels conditions which would sustain catastrophic wildfire behavior. These infestations prompted several salvage sales from 1990 to the present. Much of the insect mortality was likely due to stress from overstocking within the timber stands. This condition would not be mitigated in this alternative. It would worsen over time as stands become or remain overstocked and may result in recurring future severe insect infestation events, with associated fuels conditions that would threaten catastrophic wildfires.
- Grazing would continue in the Grizzly Valley Community Allotment and the Chase Allotment and slightly reduce fine fuels. This would have a negligible effect on wildfire behavior and occurrence.
- Roadside snags would continue to be removed by woodcutters. Continued mortality from disease and insects would increase the amount of snags. Firefighter and public safety would degrade as a result.
- The Humbug DFPZ project to the south and the proposed Freeman DFPZ to the southeast connect to the Grizz Project. Connectivity within the local HFQLG DFPZ network would be compromised and a gap in treatments would be created. Treatments on adjacent private lands would not be as effective.

No improvement in existing conditions would occur as a result of this alternative.

3.3.3.2 General Effects of the Action Alternatives

Direct and Indirect Effects

The combination of mechanical treatments and underburning reduce surface, ladder and canopy fuels. Fuel Model 8 was used to model treated fuels that had reached the desired condition in terms of surface and ladder fuels. Flame length, rate of spread and fireline intensity all decrease substantially from the No-action Alternative. Torching and crowning indices increase, as does ground to canopy base height, indicating a reduction in the crown fire hazard. Mortality in the residual stand is decreased from the No-action Alternative. Fire type changes from passive crown fire to surface fire. In some cases it wouldn't be until after prescribed burning was completed that these fire behavior conditions would be met. There could be a period of up to 4 years where residual fuel from thinning activities would slightly increase flame length above the modeled post-treatment fire behavior. Whole-tree yarding would be used wherever possible to keep slash to a minimum. Post treatment surface and ladder fuels would improve fire behavior of the existing condition.

Fire behavior modeling outputs are shown below in Table 3.19 and are applicable for all the action alternatives (Alternatives 1, 3 and 4). All the action alternatives treat fuels using the same prescriptions. There is no difference in the prescription of the treatment activities in the action alternatives as all were designed to meet the Purpose and Need 1: Strategically reduce fuel loads. That is why all alternatives have very similar fire behavior outputs. Table 3.19 is an average of the fire behavior outputs in the fire, fuels and air quality analysis.

Table 3.19 Direct effects of all the action alternatives

Measurement indicator	Output
Surface fuels (tons/acre)	5.00
Rate of spread (chains/hour)	2.8
Flame length (feet)	1.4
Canopy base height (feet)	15
Fire Type	Surface fire
Mortality (%)	4%

The majority of the Grizz Project has fuel characteristics that require treatment prior to introducing underburns. All DFPZ units would be evaluated after treatment; those units not meeting desired surface fuel conditions would be underburned, grapple piled and burned, or masticated. Area Thinning and group selection units would be also evaluated and further treated as needed to meet desired conditions. Underburn mortality in brush and ladder fuels in these units would increase surface fuel loading short term as the dead material falls.

Treatments in DFPZ units would enhance firefighter safety and production rates by reducing flame lengths to less than 4 feet and rates of spread to levels where initial attack success is likely. Improved access to escape routes and safety zones would also benefit firefighter safety. Treatments would provide anchor points for initial attack on wildfires and for initiating prescribed fires. Opening the forest canopy would allow more effective use of aerially applied fire retardants. Area Thinning units would perform similarly to DFPZ units once all treatments were

completed. These Area Thin units would slow the spread of severe wildfires. There would be an improvement in the existing condition if any of the action alternatives were implemented.

Riparian Habitat Conservation Areas

Riparian Habitat Conservation Areas (RHCA) would be mechanically thinned within the reach of equipment booms. An equipment exclusion zone, extending 50 feet on either side of the centerline of the RHCA, would not be treated. The fire behavior would not be modified from the existing conditions in these exclusion zones. The untreated portion within the equipment exclusion zone would be similar to the No-action Alternative (Table 3.18). Fire behavior within the treated portion of the RHCA would resemble those of Table 3.19.

Cumulative Effects

Cumulative effects were analyzed within the Grizz Project boundary, with the inclusion of DFPZs that connect to the Project. Only projects from the past 25 years were considered, as it is difficult to detect evidence of older treatments in the project area. A complete list of all past treatments in the Grizz Project area is impractical to collect and would be too complex to analyze with existing tools. The existing fuel bed reflects the cumulative effects of past human and natural events.

All the action alternatives would increase the probability of successful and safe initial attack in the project area. Fuel treatments would remain effective for up to 10 years without additional entries. Treated DFPZ units would be monitored and maintenance would begin as surface fuels accumulate to 5-7 tons per acre and regeneration of understory vegetation occurs. DFPZs are designed to be effective for a period of ten years. Treated areas would have to be reentered to maintain desired conditions. Prescribed fire and mechanical treatments would be used to maintain DFPZs. Group selection units would also be monitored and grapple piled, masticated, or underburned as needed for regeneration.

Effectiveness of adjacent projects such as the Humbug and Happy Jack DFPZs to the west would be enhanced, providing connectivity to the remainder of the DFPZ network. Fuels management work done on private lands would also be enhanced. Road maintenance associated with the Proposed Action would improve access for fire suppression equipment.

The effects of past, present and reasonably foreseeable future projects include:

- Within mixed conifer stands, past timber sales from 1980 to the present have contributed to increased numbers of white fir as desirable pine species were cut. White fir stocking and residual slash from past harvests would be reduced within treatment units, which would allow the reestablishment of fire resilient species in mixed conifer stands.
- Severe insect infestations during drought conditions in the late 1980s occurred within and around the Grizz Project boundary. The resulting timber mortality created fuels conditions that would sustain stand replacing wildfire behavior. These infestations prompted several salvage sales from 1990 to the present. Much of the insect mortality was likely due to stress from overstocking within the timber stands. Treatments described in the Proposed

Action would reduce number of stems per acre within treatment units and lessen the likelihood of a recurring severe insect infestation in the future.

- Grazing would continue in the Grizzly Valley Community Allotment and the Chase Allotment and slightly reduce fine fuels. This would have a negligible effect on wildfire behavior and occurrence.
- Human caused ignitions from recreation users, woodcutters and OHVs would continue to increase. Natural ignitions started by lightning strikes would continue. The Proposed Action would increase initial attack success, particularly within treatment units. Treated areas would be effective as anchor points for fire suppression forces.
- Roadside snags would continue to be removed by woodcutters. Snag related injuries and spotting from burning snags would be reduced by the removal of smaller snags during treatment, which would add to firefighter and public safety.
- The Humbug and Happy Jack DFPZ projects to the west and the proposed Grizz DFPZ to the northwest connect to the Grizz Project. Continuity within the HFQLG DFPZ network would be maintained and treatment effectiveness enhanced by the Proposed Action.

The implementation of the action alternatives in combination with past, present and reasonably foreseeable future projects would reduce surface, ladder and crown fuels, improve firefighter and public safety and increase fireline production rates.

3.3.3.3 Differences Between the Action Alternatives

The main difference between the action alternatives is the amount of acres of DFPZ proposed and the strategic location of the alternatives. All the action alternatives treat fuels using the same prescriptions. There is no difference in the prescription of the treatment activities in the action alternatives as all were designed to meet the Purpose and Need 1: Strategically reduce fuel loads. That is why all alternatives have very similar fire behavior outputs (Table 3.18).

Alternative 1 (Proposed Action)

Fire Behavior

The fire behavior resulting from the proposed activities in Alternative 1 would expect to decrease as compared to the No-action Alternative. Surface fuels would be reduced to 5 tons/acre. The rate of spread of the fire would be approximately 2.8 chains per hour, the flame length would be reduced to 1.4’ and the canopy base height would be raised to 15’ and the dominant fire type would be a surface fire. Desired fire behavior conditions would be met on 2,106 acres of DFPZ treatment.

DFPZ Design Location Considerations

Alternative 1 meets most of the major factors in designating an ideal location for a DFPZ. However, due to relocation of the future planned Ingall’s DFPZ, the location of the Grizz DFPZ

under Alternative 1 will not link up with Ingalls. It lacks the fourth important element of DFPZ location considerations in that it does take advantage of all the adjacent DFPZs. There would be a gap in the fuel treatments and the network of DFPZs. For further discussion of DFPZ design location considerations, please see the “Analysis methodology” section. For further discussion of the relocation of the Ingalls DFPZ, please see “Chapter 2: Alternative 3” or “Alternative 4”.

Alternative 3

Fire Behavior

Fire behavior would be similar to Alternative 1. The only difference is that Alternative 3 treats 452 acres more of DFPZ for a total of 2,558 acres.

DFPZ Design Location Considerations

Alternative 3 meets all of the major factors in designating an ideal location for a DFPZ. It connects with all adjacent current and planned DFPZs including Ingalls. For further discussion of DFPZ design location considerations, please see the “Analysis methodology” section. For further discussion of the relocation of the Ingalls DFPZ, please see “Chapter 2: Alternative 3” or “Alternative 4”.

Alternative 4

Fire Behavior

Alternative 4 treats the same amount of DFPZ and would have similar fire behavior to that of Alternatives 1 and 3.

DFPZ Design Location Considerations

Would be the same as Alternative 3.

3.4 Air Quality

3.4.1 Introduction

The following assessment is summarized from the air quality report for the Grizz Project, which is incorporated here by reference (USFS PNF BRD 2007j). Air quality in the context of this document refers to the amount and type of emissions contained in smoke produced by prescribed burning and wildfires. Particulate matter is of the greatest concern as particulate emissions in smoke can affect both visibility and human health. It is important to plan projects in a way that will lessen the impacts produced by smoke emissions. All prescribed burning will need to be done in accordance with an approved smoke management plan approved by the Northern Sierra Air Quality Management District (NSAQMD). The smoke management plan requires burning with wind directions that transport smoke away from communities and the amount of acres burned daily are limited.

3.4.2 Affected Environment

Geographic Analysis Area: The Grizz Project lies 12 miles to the northwest of Portola, 4 miles southeast of Genesee Valley, 8 miles north of Blairsden/Graeagle and about 4 miles north of the Sloat/Cromberg area. The entire project area is contained within the Northern Sierra Air Quality Management District (NSAQMD). Portola is situated 12 miles southeast of the Grizz Project area. Under certain conditions, there is the potential that smoke produced from prescribed fire activities could intrude into Portola.

Timeframe of Analysis: The First Order Fire Effects Model (FOFEM) predicts smoke output on an acre per ton basis. The temporal boundary is irrelevant. In actual prescribed burning, smoke output is monitored on a daily basis and ignitions are adjusted to ensure the least impact.

3.4.2.1 Analysis Methodology

Smoke emissions from pile burning, underburning and wildfire were modeled using FOFEM (Reinhardt et. al.2000). This is a computer model used to predict smoke emissions (particulate matter or PM), fuel consumption, soil heating and mortality.

The wildfire was modeled under dry, summer conditions with a heavy fuel load to simulate a pre-treatment event. The underburn was modeled under moister, spring conditions with a light fuel load to represent the post-treatment fuel bed. The pile burn was modeled using moist, spring conditions with a typical fuel load.

The outputs from FOFEM include:

- PM 10: Particles 10 microns or less in size. Can become lodged in the respiratory system.
- PM 2.5: Particles 2.5 microns or less. PM 2.5 particles can become lodged in the deep part of the respiratory system and are most difficult for the body to expel.
- CO:Carbon monoxide prohibits blood from distributing oxygen throughout the body.

3.4.2.2 Current Conditions

Attainment status was derived from the 2005 NSAQMD Annual Air Monitoring Report. Currently, Plumas County is in non-attainment status for PM 10 (county-wide) and PM 2.5 (Portola valley only). According to the NSAQMD 2005 report, the major contributors to both the PM10 and PM2.5 levels include forest management burns, woodstoves, residential open burning, vehicle traffic and windblown dust. These problems can be relieved or exacerbated by local meteorology, winds and temperature inversions. The communities of Portola and Genesee Valley are subject to strong inversions and stagnant air conditions in the wintertime. Those conditions, coupled with intensive residential wood burning, can result in episodes of very high PM2.5 levels (NSAQMD 2005). Levels of PM 10 have been greatly decreased due to a reduction of non-EPA approved woodstoves in existing residences. This has the potential to contribute to the possibility of all of Plumas County being declared non-attainment for PM 2.5 under the Environmental Protection Agency's proposed standard. It is possible that smoke from prescribed fire could move down Little Grizzly Creek into Genesee Valley, 4 miles to the northwest.

3.4.3 Environmental Consequences

3.4.3.1 Alternative 2 (No-action Alternative)

Direct and Indirect Effects

There would be no prescribed burning, therefore no emissions.

Cumulative Effects

Wildfires occurring within the proposed project area would continue to have the potential to severely impact air quality (Table 3.20) and public health to the south along the Highway 70 corridor communities from Portola to Sloat and the Genesee/Indian Valley area to the northwest, depending on wind direction, fire size and fire duration. Wildfires consume all available fuel in the fuel bed. Emissions from a wildfire would occur in a concentrated event, under weather conditions with the potential to impact communities far from the Grizz Project area. Wildfire events and associated poor air quality impacting local communities can last for several weeks. For example, in the late summer of 1999, the 46,000 acre Mt. Hough Complex seriously affected the air quality in Quincy for more than 15 days. (NSAQMD Database: PM10 and PM2.5 Report; Quincy Site, 1999).The lack of fuels treatment would allow the potential for larter wildfires and associated large amount of smoke emissions to remain. Fire managers would have few options available to mitigate smoke impacts from a wildfire event.

3.4.3.2 General Effects of the Action Alternatives

Direct and Indirect Effects

Burning in the part of the Grizz Project near Happy Valley could potentially drift to the west down Long Creek and affect Sloat, about 4 miles away. The presence of Grizzly Ridge provides

Blairsden and Graeagle with some sheltering from emissions that would be produced from prescribed burning on this project. Migitation of smoke impacts would decrease the effects of prescribed burning. Emissions from the pile burn were similar to the wildfire, reflecting consumption of heavy fuels in both fire types (Table 3.20).

Table 3.20 FOFEM emissions per acre by fire type

Fire type	PM 10 (Lbs per acre)	PM 2.5 (Lbs per acre)	CO (Lbs per acre)
Wildfire	1879	1592	20988
Underburn	374	317	4170
Pile burn	1705	1444	18652

The First Order Fire Effects Model (FOFEM) assumes that the entire acre is involved in fire, thus it can over predict emissions. Wildfires and prescribed fires are patchier in nature, with a mosaic of burn intensities. Managers can choose when to light prescribed fire, metering out smoke under favorable conditions for dispersal. Lighting patterns can avoid stumps and logs and reduce smoke production.

Cumulative Effects

Fuel loadings is reduced in the treatment areas. Prescribed fires are of a lesser intensity and easier to control in a shorter span of time, resulting in less frequent and less intense smoke events. Future projects intended to maintain this section of DFPZ network would produce additional smoke emissions of limited intensity and duration.

3.5 Watershed and Soils

3.5.1 Introduction

The following assessment is summarized from the Cumulative Watershed Effects and Soils Assessment report for the Grizz Project, which is incorporated here by reference (USFS PNF BRD 2007f). This assessment addresses impacts to both the watershed resource and the soil resource.

Cumulative impacts may occur off-site and, in the case of the water resource, may affect downstream beneficial uses of water. Effects can be either beneficial or adverse and result from the synergistic or additive effects of multiple management activities within a watershed (USDA Forest Service 1988a, MacDonald 2000).

3.5.1.1 Watershed

Cumulative watershed effects (CWE) analyses have traditionally focused on impacts to downstream beneficial uses. These include aquatic habitat, hydroelectric power generation and domestic water supplies. Information has come to light that places considerable emphasis on near-stream disturbances and their site-specific biological effects as well as the downstream physical effects (Menning et al. 1996, McGurk and Fong 1995). This CWE analysis addresses effects to both near-stream and downstream uses by using the Region Five Cumulative Off-site Watershed Effects Analysis Method (USDA Forest Service 1988a).

3.5.1.2 Soils

Soils provide the nutrient and hydrologic foundation necessary to sustain terrestrial ecosystems. Soil productivity is generally considered to be the capacity of soils to produce plants. Indicators of soil productivity include soil cover, soil porosity and organic matter. Maintenance of soil cover is important to prevent accelerated soil erosion. Soil porosity is used to assess soil compaction. Organic matter in the soil and on the soil surface stores nutrients used by plants and organisms that inhabit the soil. Together, these factors address important physical, chemical and biological soil properties. Soil quality standards provide threshold values that indicate when changes in soil properties and soil conditions would result in long-term losses in inherent productivity or hydrologic function of the soil. Detrimental soil disturbance may result when threshold values are exceeded for certain soil properties. This assessment will evaluate cumulative impacts of past, present and future actions on the soil resource. In addition, standard soil mitigation measures are described, which apply to all action alternatives and can be referenced in Appendix B of the Grizz Project CWE and Soils Assessment Report.

3.5.2 Affected Environment-Watershed

3.5.2.1 Scope of the Analysis

Geographic Analysis Area: The geographic area examined for the CWE analysis consists of 28 subwatersheds, which encompass approximately 24,873 acres or about 5 percent of the Beckwourth Ranger District (Figures 2 and 3). With one exception, only subwatersheds greater than 400 acres were considered for this effects analysis. However, the Bowl subwatershed (263 acres) was also evaluated due to the amount of treatment proposed (82 acres of mechanical treatment), which consist of 31 percent of the subwatershed. With the exception of the four subwatersheds that are less than 400 acres (Walker, Mine, Tiny and Bowl), delineated subwatersheds range from 434 to 1,844 acres in size.

The assessment area for the Grizz Project is contained within three 6th field (Hydrologic Unit Code, or HUC 6) watersheds. One subwatershed is within the Hosselkus; eighteen subwatersheds lie within the Cascade; the remaining nine subwatersheds are within the Long Valley HUC 6 watersheds (Figure 2).

Timeframe of Analysis: The temporal bounds of the watershed effects analysis are typically 25 years. However, this value varies depending on the type of disturbance activity contributing to cumulative effects. Timber harvest activities were considered recovered after 25 years, so harvests occurring prior to 1981 were excluded from the effects model. These values reflect the period of time required for site recovery following these types of activities and events. Beyond this time frame, vegetation has generally had ample opportunity to reestablish and develop adequate crown cover to provide organic material to the soil. No temporal component was included for existing roads, regardless of when they were constructed.

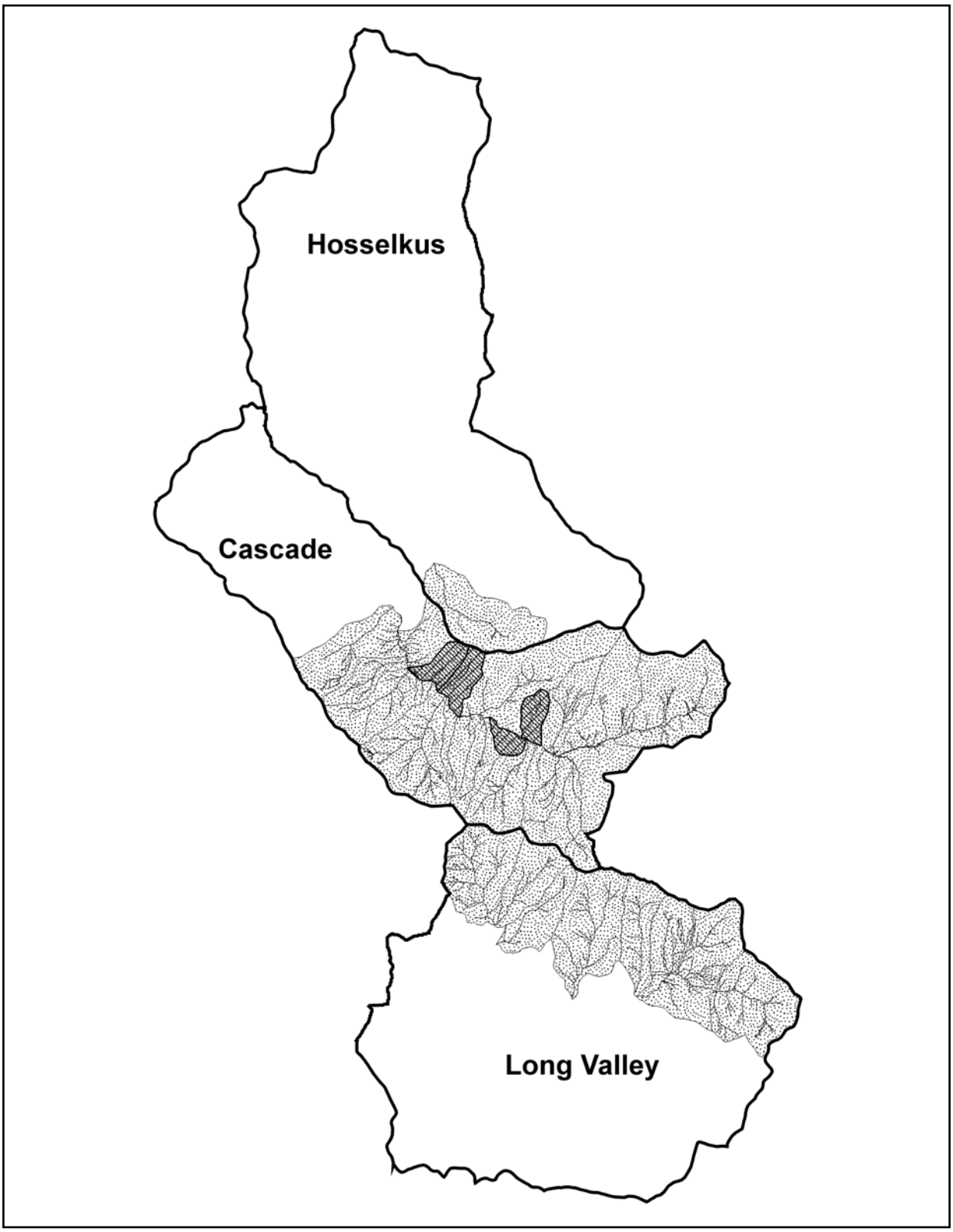

Figure 2 The three HUC 6 watersheds that encompass the Grizz Project Area (shaded gray) and subwatersheds less than 400 acres (cross hatched).

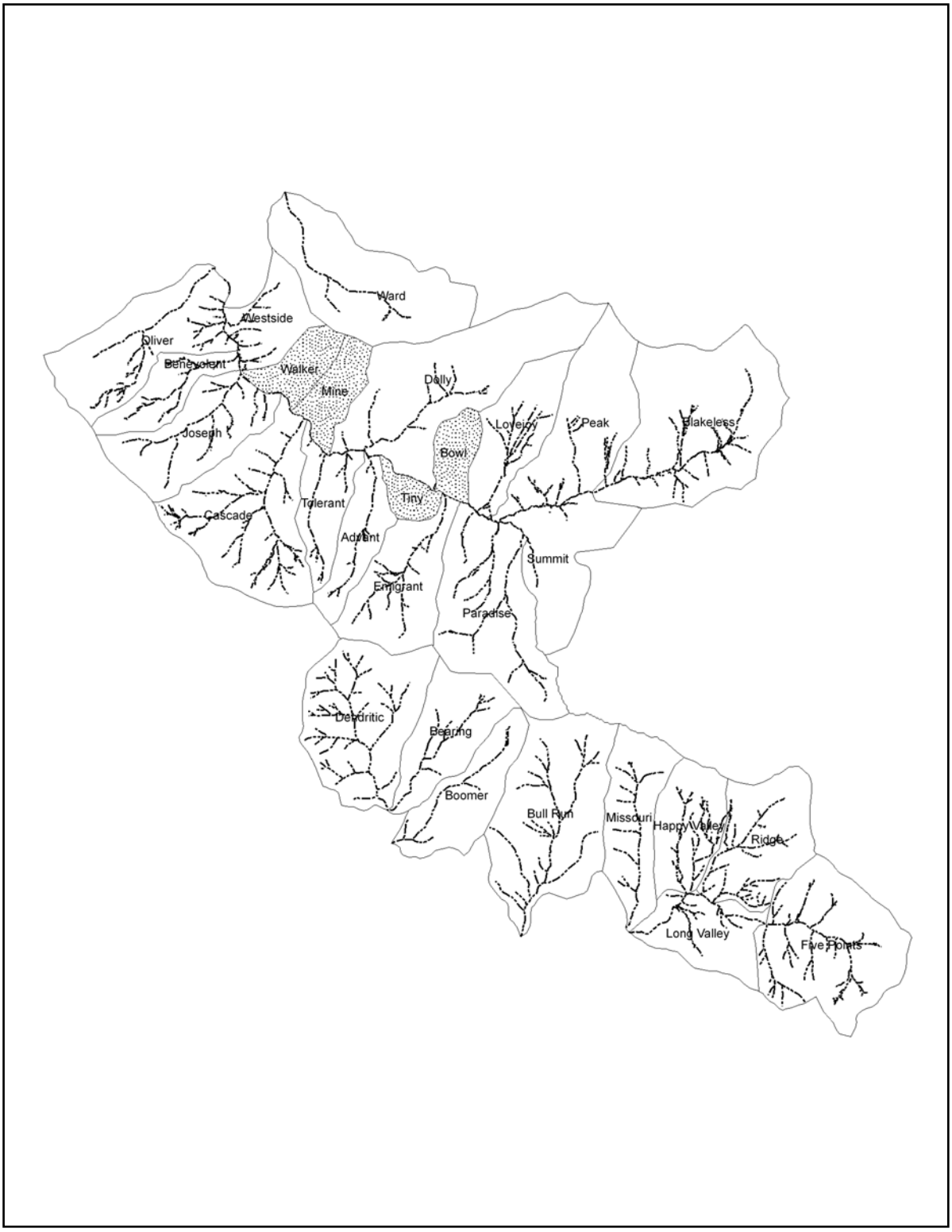

Figure 3 The Grizz Project analysis subwatersheds examined for cumulative watershed effects. The shaded subwatersheds are less than 400 acres in size.

3.5.2.2 Analysis Methodology

There are numerous methods for assessing the effects of land use activities on the landscape. A discussion and comparison of different methodologies can be found in documents such as, "A Scientific Basis for the Prediction of Cumulative Watershed Effects: Applicability of Available Methodologies to the Sierra Nevada and Research and Cumulative Watershed Effects" (Dunn et al. 2001, Berg et al. 1996, Reid 1998, USDA Forest Service 1988a). For the purpose of this CWE analysis, the effects of past, present and reasonably foreseeable future impacts were assessed using the Region Five Cumulative Off-site Watershed Effects Analysis (USDA Forest Service 1988a). Under this approach, the impacts of land management activities were evaluated on the basis of equivalent roaded acres.

CWE Model Assumptions

The CWE method used in this analysis is a mathematical model that expresses land disturbance in terms of a common variable, ERA. "Equivalent roaded acres" (ERA) is a conceptual unit of measure used to assess ground-disturbing activities. One acre of road surface equals one ERA. Numeric coefficients are used to convert acres of management activities such as timber harvest, underburning and grazing to ERAs. For example, 1 acre of underburning equals 0.05 ERA.. In a given watershed, disturbances are added together to determine a cumulative ERA for that watershed. To calculate the ERA, acres of past ground disturbing activities were converted to ERA values based on disturbance coefficients multiplied by treatment area. Coefficients were applied to similar activities regardless of soil type, slope conditions, season of operation, or specific equipment characteristics. In calculating ERA contributions due to roads, all roads were assumed equal regardless of surface material (i.e., paved, graveled, native surfaced). The assessment of past timber harvest activities were restricted to events within the last 25 years. Acres of roads were calculated by assuming that all roads were 25 feet wide. Other assumptions included:

- The assessment of past fire events were restricted to events within the last 10 years based on visual observations, field surveys, published studies and aerial photo interpretation.
- Disturbances were calculated with Geographic Information System (GIS) programs, using Plumas National Forest modified corporate data files.
- Past public harvest activities were summarized from the Stand Record System (SRS) database, timber atlases and sale contracts.

In general while calculating the ERA contribution of the proposed harvest activities, all areas of treatment units were assumed to be treatable.

Dividing the total ERA by the size of the watershed yields the percent of the watershed in a hypothetically roaded condition. This value can serve as an index to describe impacts to

downstream water quality. An increase in the road density of a watershed can result in greater impacts to water quality downstream.

Higher ERA values are generally associated with higher peak flows that are more erosive and can lead to increased channel scour and higher sediment transport off-site. Stream channels in poor condition tend to be more sensitive to increases in peak flow since they are frequently lacking an effective root mass to bind streambanks and large organic debris to trap and retain the sediment moving through the system. These channels frequently become downcut (erode below the stable grade of the channel) so all flow is confined within the channel, unable to access the floodplain. Given these conditions, sediment is more readily eroded from these channels with subsequent deposition of sediment downstream.

Plumas National Forest watershed staff developed disturbance coefficients based on visual observations, field surveys, published studies, transects and aerial photo interpretation. Coefficients vary by management activity, silvicultural prescription, site preparation methods, type of equipment utilized and fire line intensity.

Watersheds and their associated stream systems can tolerate some level of land disturbance, but there is a point at which 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). The TOC is an indicator used to assess the risk of CWE's. The TOC is generally expressed as a percentage of watershed area. When the total ERA in a watershed exceeds the TOC, susceptibility for significant adverse cumulative effects are high. The cumulative ERA in a watershed is often expressed as a percent of the TOC. For example, in a 1,000-acre watershed where the TOC is 12 percent of the watershed area, 100 percent of the TOC represents a condition where the amount of disturbance is similar to 120 acres of road surface, 600 acres of mechanical harvest or 343 acres of group selects. For this analysis, the TOC was assessed for each subwatershed in terms of the percent of the area in a hypothetically roaded condition. As disturbances approach the TOC, there is an increased loss of soil porosity and soil cover, resulting in greater runoff potential and peak flows. Above the TOC, water quality may be degraded to the point where the water is no longer available for established uses, such as municipal water supplies or no longer provides adequate habitat for fisheries. In addition, stream channels can deteriorate to the extent that riparian and meadowland areas become severely degraded.

The TOC serves as a warning that cumulative watershed impacts may exist within a given watershed, which may adversely impact peak flows, water quality and/or channel stability. A value of 100% TOC indicates that the watershed is at its threshold. Values less than 100% indicate that the watershed is below its threshold, while values greater than 100% indicate that the watershed has exceeded its threshold. The Region Five Soil and Water Conservation Handbook (USDA Forest Service 1988a) states, the TOC does not represent the exact point at which cumulative watershed effects will occur. Rather, it serves as a "yellow flag" indicator of increasing susceptibility for significant adverse cumulative effects occurring within a watershed.

As a guide to the CWE assessment, when planned activities within forest watersheds result in increases in equivalent roaded acres of 25 to 30 percent of the TOC, we generally realize relatively small increases in peak flows. Given that the ERA threshold for the subwatersheds in this analysis is 12 percent of the watershed area, this would likely result from an increase of 3 to 4 percent ERA. In watersheds where streams are stable and ERA values (watershed disturbances) are not approaching threshold, such increases generally do not stress the system. However, where increases in ERA approach 40 to 50 percent of threshold (5 to 6 percent ERA or higher), stream channels are in poor condition, or ERA values are approaching thresholds of concern, a closer look at the activities planned within the watershed is important.

3.5.2.3 Current Conditions

Existing percent ERA values for the analysis subwatersheds by sensitive and upland areas currently range from 7 to 123 percent of the TOC (Table 3.21); the upland portion of the Bearing subwatershed is at 123 percent of TOC. The percent of TOC varies across subwatersheds because past land management practices, including those on private lands, differ in type and intensity. Table 3.21 illustrates the changes in ERA values for the analysis subwatersheds for the Grizz Project. The current ERA values, expressed as percent of the TOC, are shown under Alternative 2. Figures 4 and 5 show how the major land use activities contributed to the total ERA for each subwatershed. These activities include the existing transportation system, past private harvests, past public harvests and grazing. Past wildfires had no contribution to the ERA within any subwatershed and so they were not considered a major land use activity for this analysis. Reasonably foreseeable future projects were analyzed separately.

Table 3.21 Equivalent Roaded Acres (ERA), Presented as the Percent of the Threshold of Concern (TOC) for Each Alternative.

Analysis subwatershed by sensitive(s) and upland(U)	ERA (% of Threshold of Concern)			
	Alt 1 Proposed Action	Alt 2 No action	Alt 3 Action	Alt 4 Action
Ward (S)	24	24	39	39
Ward (U)	64	64	82	82
Westside (S)	31	31	31	31
Westside (U)	54	54	54	54
Oliver (S)	17	7	16	16
Oliver (U)	30	15	30	30
Bowl (S)	57	28	57	57
Bowl (U)	31	1	31	31
Benevolent (S)	50	25	38	38
Benevolent (U)	89	56	80	80
Joseph (S)	22	9	12	12
Joseph (U)	57	28	45	40
Cascade (S)	30	17	30	30
Cascade (U)	60	31	57	55
Tolerant (S)	37	22	37	37
Tolerant (U)	53	28	51	51
Dolly (S)	69	66	77	70
Dolly (U)	70	61	80	76

Analysis subwatershed by sensitive(s) and upland(U)	ERA (% of Threshold of Concern)			
	Alt 1 Proposed Action	Alt 2 No action	Alt 3 Action	Alt 4 Action
Peak (S)	80	72	80	80
Peak (U)	61	33	70	47
Lovejoy (S)	85	77	85	85
Lovejoy (U)	72	49	72	70
Advant (S)	31	21	31	31
Advant (U)	29	16	28	28
Summit (S)	57	51	57	57
Summit (U)	83	53	83	83
Emigrant (S)	45	27	45	45
Emigrant (U)	80	22	80	80
Paradise (S)	69	54	69	70
Paradise (U)	76	38	90	77
Blakeless (S)	69	54	69	69
Blakeless (U)	82	39	88	87
Dendritic (S)	26	26	26	26
Dendritic (U)	56	40	56	56
Bearing (S)	100	100	100	100
Bearing (U)	123	123	123	123
Boomer (S)	61	61	61	61
Boomer (U)	97	97	97	97
Bull Run (S)	84	84	84	84
Bull Run (U)	91	91	91	91
Missouri (S)	105	105	105	105
Missouri (U)	98	98	98	98
Happy Valley (S)	66	66	66	66
Happy Valley (U)	78	63	78	78
Ridge (S)	52	29	52	52
Ridge (U)	63	23	63	63
Five Points (S)	36	32	35	35
Five Points (U)	89	63	86	80
Long Valley (S)	71	53	71	71
Long Valley (U)	43	34	43	39

Currently there are two subwatersheds (Bearing and Missouri) that are above TOC (Figure 4 and 5). Three other subwatersheds: Boomer, Bull Run and Missouri are also either above (the sensitive portion of Missouri is at 105% ERA of TOC) or approaching TOC (Table 3.21). There will be no treatment activities planned for these subwatersheds in any of the action alternatives for the Grizz Project. ERA values for the entire subwatershed range from 6 to 120 percent of threshold; contributing percents by land use activity are presented in Figure 3.3 and and 3.4. A considerable amount of private and public timber harvest activity has occurred in many of the subwatersheds in the past decade. This is made evident by the number of subwatersheds approaching or exceeding TOC. These past activities within the analysis subwatersheds range from 3 to 106 percent ERA of TOC. As a result, some of these subwatersheds will not be entered in the Grizz Project.

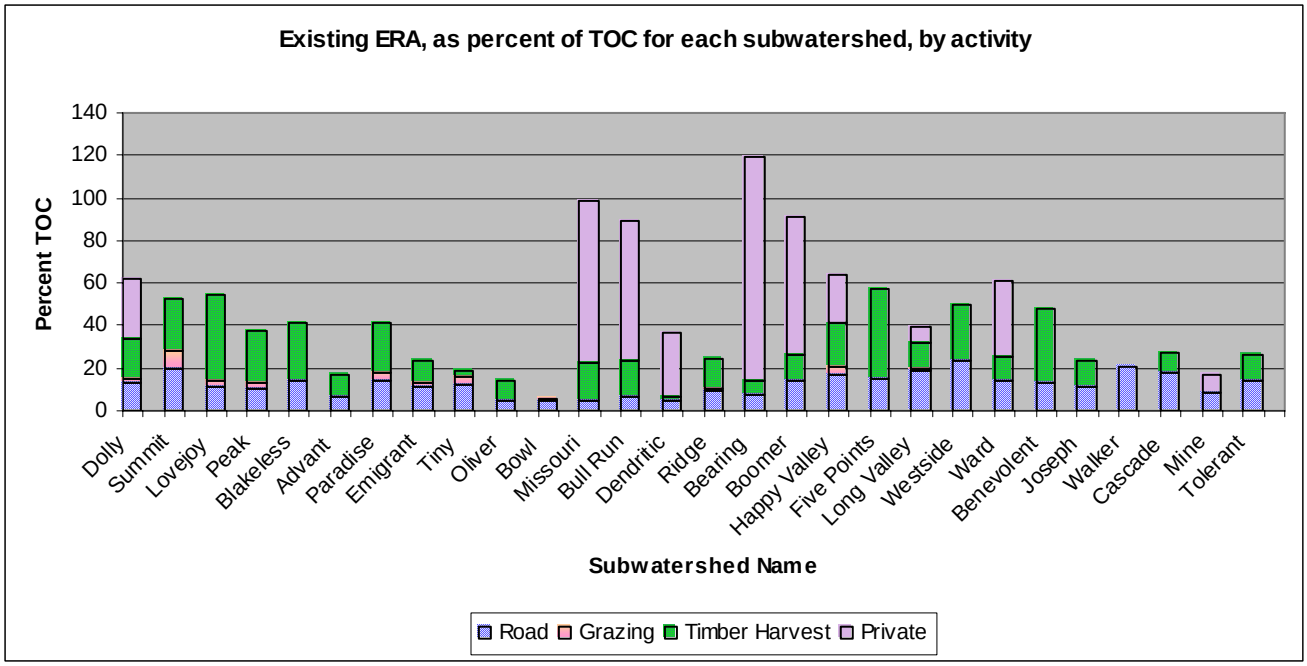

Figure 4 Alternative 2, the existing condition: Equivalent roaded acres (ERA), shown as a percent of TOC for each analysis subwatershed, broken down by activity. Analysis subwatersheds are shown by entire subwatershed.

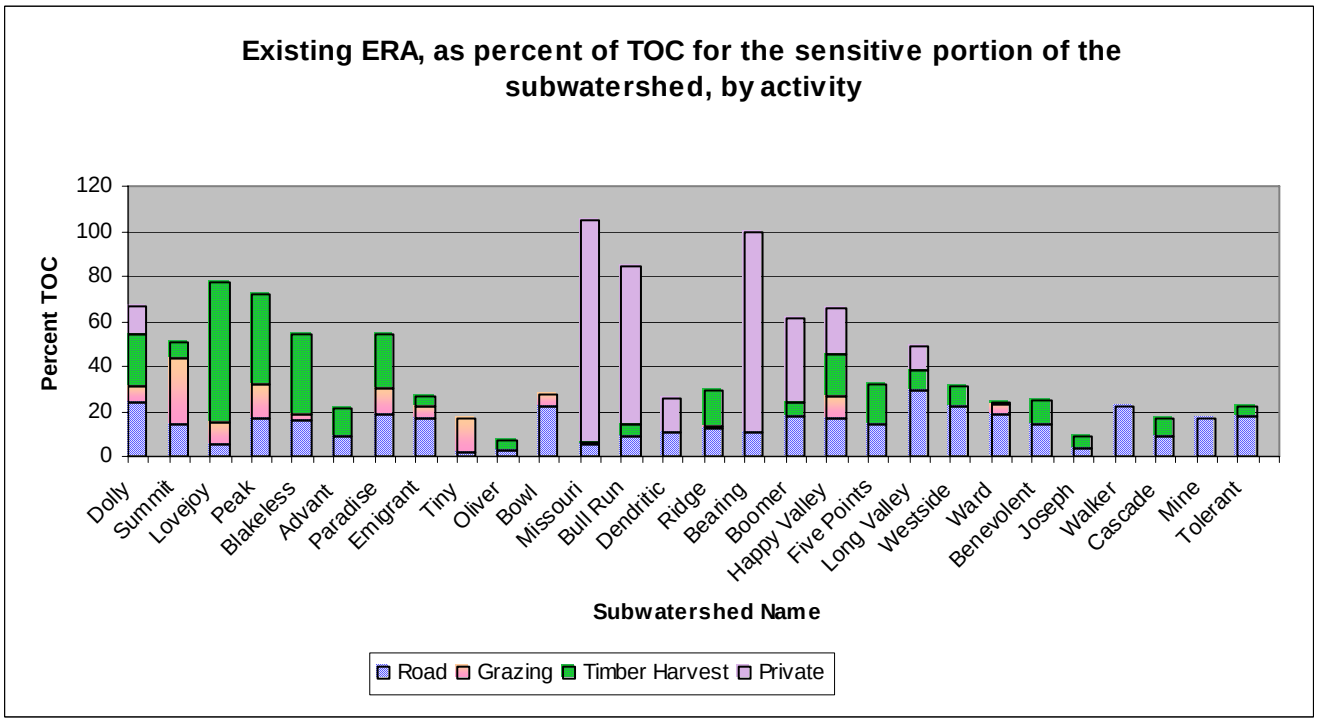

Figure 5 Alternative 2, the existing condition: Equivalent roaded acres (ERA), shown as a percent of TOC for each analysis subwatershed, broken down by activity. Analysis subwatersheds are shown for the sensitive portion of the subwatersheds.

Historical Context

Resources within the project area have long been utilized. Meadowlands were intensively grazed resulting in compaction and substantial surface erosion in the meadows and as a result meadow stream systems experienced degradation. Since that time period, most watersheds have experienced a slow recovery.

The history of logging in the project area is quite extensive and has been dated to the late 1800s. Timber harvesting had impacts on soils in several ways; compaction resulting from road, skid and landing construction; removal or displacement of topsoil; loss of soil due to mass movement or surface erosion. Soil chemical and biological processes were probably also altered.

3.5.3 Affected Environment-Soils

3.5.3.1 Scope of the Analysis

Geographic Analysis Area: Current soils conditions were assessed at the geographic treatment unit scale. Soils related information was collected during the 2006 field season, within 61 of the treatment units described in the PA (Figure 6). Six of these units were subsequently dropped from the project, therefore they are absent from the effects discussion of this report. Within each sampled unit, data was collected on line transects which traversed portions of the unit. Site specific treatment locations within units, such as placement of group selection harvest sites, were unknown at the time field surveys were done, which prevented soils assessment in the specific locations where treatment would occur. In addition, at the time of the soil productivity field assessment, locations for many of the treatment units, outside of the Grizz Defensible Fuel Profile Zone (DFPZ), were still under development. Therefore, soil assessment field surveys focused on units that were part of the DFPZ network.

Timeframe of Analysis: The current soils condition reflects the cumulative effects of past activities, regardless of when they took place. For example, if multiple activities have occurred in a given treatment unit over the past 50 years, it is not necessarily possible to separate the effects of older treatments from more recent ones. As a result, it is not practical to set a time constraint on those effects. The future timeframe for the soils analysis must extend until the resource has recovered from the impact of the proposed activities. The persistence of soil effects into the future can vary widely. For example, ground cover may recover within one to two years following a treatment. The effects on soil porosity, however, may last for decades. Thirty years was chosen as a future timeframe for soil effects. After this time, the degree and variability of soil conditions are expected to be similar to the No-action Alternative.

3.5.3.2 Analysis Methodology

The soil quality standards and guidelines that apply to this project exist at both the regional level (USDA Forest Service 1995) with the recommendations from the R5 Soil Quality Standards and at the forest level with the PNF LRMP's standards and guidelines (USDA Forest Service 1988b).

These standard and guidelines focus on protection and improvement of National Forest System lands for continuous forest and rangeland productivity and favorable water flows. To address these guidelines, this soil assessment focused on soil productivity measures including surface organic matter, soil cover, and soil porosity and compaction.

Surface fine organic matter consists of organic material on top of mineral soil, and includes plant litter, duff, and woody material less than 3 inches in diameter (USDA Forest Service 1995). According to the recommendation from the 1995 Forest Service Region 5 Soil Quality Standards, fine organic matter should cover at least 50 percent of the area. In addition, effective soil cover must be maintained to avoid detrimental accelerated erosion. Effective ground cover includes living vegetation, plant and tree litter, surface rock fragments, and applied mulches. The forest-wide soil standards and guidelines (USDA Forest Service 1988b) provide a guide for prescribing effective ground cover based on the Region 5 Soil Erosion Hazard Rating system (USDA Forest Service 1990). Minimum effective ground cover for soils with erosion hazard ratings of low, moderate, high, and very high, are 40, 50, 60, and 70 percent, respectively. To avoid land base productivity loss due to soil compaction, the forest level soil guidelines (USDA Forest Service 1988b) indicate that the area dedicated to landings and permanent skid trails should not exceed 15 percent of a timber stand unit. Detrimental soil compaction exists when soil porosity is reduced by more than 10 percent, relative to natural conditions (USDA Forest Service 1995). In addition to soil productivity, soil hydrologic function and soil buffering capacity are also addressed in this assessment.

A field crew assessed soil productivity measures in 55 of the proposed treatment units during the summer of 2006. The pre-treatment monitoring program that was implemented was adapted from the USDA Forest Service Region 5 Soil quality standards and guidelines (USDA Forest Service 1995). Changes made to the standard protocol were necessary to efficiently survey the large area within the DFPZ and to more accurately represent soil bulk density and existing disturbance. Factors evaluated include slope percent, ground cover percent, degree of soil disturbance, soil type, soil bulk density and the amount of downed woody debris present. As mentioned, site specific treatment locations within units, such as placement of GS or Area Thin, were unknown at the time field surveys were done. Therefore, soil assessment field surveys focused on units that were part of the DFPZ network.

Treatment units were stratified first by maximum soil erosion hazard rating (USDA Forest Service 1988c). In a given treatment unit, the number of point transects sampled in each erosion hazard rating class was determined by the total acres in each class. Within each unit to be sampled, transects were randomly selected. To prevent locating transects parallel to skid trails and thereby inadequately sampling them, transects were intentionally located so as to not run directly up and down a slope. In addition, transects were placed between system roads in order to concentrate sampling in the ground disturbing activity areas.

Each transect within a unit was divided into 20 equal increments where point measurements were obtained and recorded. At each point, slope percent, ground cover percent and soil

disturbance were evaluated. Slope percent was measured perpendicular to the transect with a hand held clinometer. Ground cover percent was estimated occularly within a 25 ft^2 area of the observer and classified as organic, rock, vegetation, wood, mixed, or bare ground. Soil disturbance was estimated within a 25 ft^2 area of the observer and classified on a scale from 0 to 3 with zero being undisturbed and three being extremely disturbed. Signs of disturbance included rutting and displacement of soil O and A horizons. At every fifth point along the transect, additional information on soil bulk density and downed woody debris was collected. Bulk density was measured by first removing the O horizon and top 2 cm of mineral soil. Then a 275.05 cm^3 soil core was used to collect a sample of mineral soil. The location of each soil sample was recorded and given a unique identifier with a Trimble GeoXT® GPS unit. Downed woody debris greater than 20 inches in diameter was occularly estimated within a 37 ft radius of the observer and classified on a scale of 1 to 5 based on decomposition state with one being fresh downed debris and five being almost completely decayed wood.

Soil sample locations that were recorded in the field was uploaded from the GPS unit into Pathfinder ® Office Software 3.1 and ultimately loaded in ESRI® ArcView GIS 3.3 or ArcGIS 9.0, ArcMap ™ software programs. The soil type where each sample was taken was then identified. Soil samples were dried at 105°C for 24 hours or until they no longer lost moisture weight. The final dry weight of soil samples was recorded and the dry weight was divided by the volume of soil collected to determine field bulk density. Porosity for each sample was then calculated using the relationship:

- Porosity = [sample volume - (sample dry weight / 2.65g cm-3)] / sample volume

Porosity and the numbers of large woody debris observed in the 37 ft radius were converted to number of pieces per acre using the following relationships:

- LWD/acre = (LWD / 4,298.66ft2) * (43,560.17ft2 / 1 acre) or (LWD/ 0.0987acres)

Data was analyzed using SAS© 9.1 for significant levels of existing disturbance in each unit, differences in bulk density and porosity between soil types, differences in bulk density and porosity between disturbance classes and for calculating means and 95 percent confidence intervals for slope percent, ground cover percent and large woody debris per acre within a unit.

Determining compaction by qualitative assessment can be difficult because undisturbed porosity is unique to soil type (Powers 2005). In addition, the quantitative soil bulk density sampling collected within the 55 sampled units and the resultant soil porosity percentages were calculated for existing conditions only, since no post treatment soil samples or data exist within the project area. Therefore, predicted percent increase of unit area in skid trails and landings were calculated for compaction and compared to the 2006 HFQLG soil monitoring report results. These results are further discussed in the action alternatives sections.

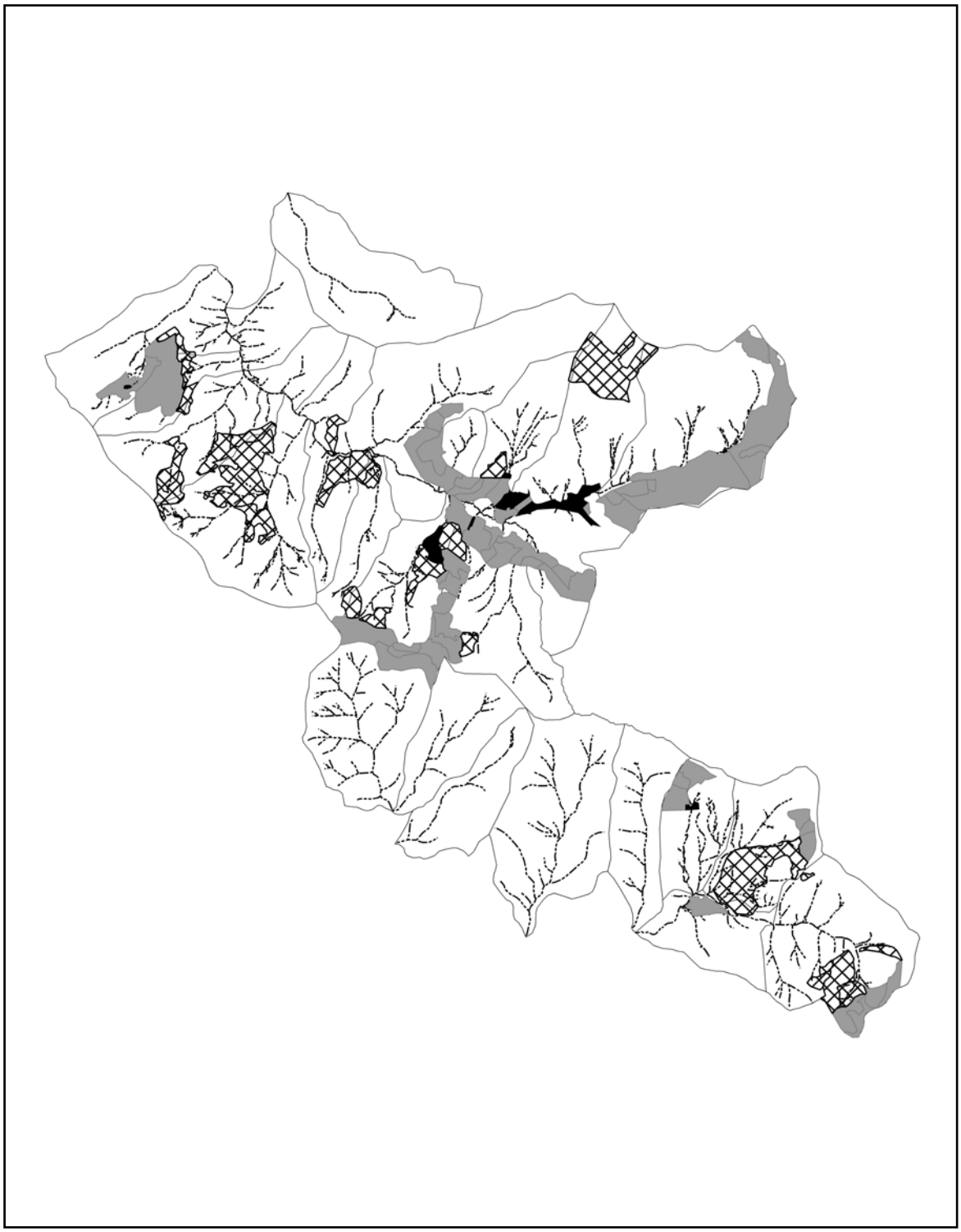

Figure 6 roposed Action treatment units including; proposed treatment units that were sampled for soil information (dark grey), units that were not sampled (hatch marks) and units that were not sampled because they were identified as “no treat” (black).

3.5.3.3 Current Conditions

Soil Cover

Currently, on average, 100% of the 55 treatment units meet the ground cover standard by meeting or exceeding the threshold.The PNF LRMP Standards and Guidelines for effective ground cover vary by the soil erosion hazard rating (USDA Forest Service 1988b). Minimum effective ground cover for soils with erosion hazard ratings of low, moderate, high and very high are 40, 50, 60 and 70%, respectively. However, units 197, 225, and 228 do not meet the standard when evaluated by their lower estimated percent cover. The 42 acres represented by these units is 2 percent of the sampled units and 1 percent of all the proposed treatment units within project area. The 2,795 acres within the 55 sampled treatment units represent 14 percent of the 19,409 acre project area and 57 percent of the total 4,943 acres of treatment units. The 4,943 acres of proposed treatment units include the combination of units from all alternatives excluding the no treatment units. Acres within internal exclusion zones (no proposed treatment) and 25 percent or greater slope restriction zones within the RHCAs were not omitted.

Soil Porosity and Detrimental Compaction

Soil porosity is the volume of voids compared to solids for a given volume of soil. The porosity of the soil is important for gas exchange and water movement into and through the soil. A total of 55 units were surveyed. By all estimates, 100 percent of units currently meet or are well below the recommended threshold. The acres represented by these units are 57% of the proposed treatment units and 14% of the project area. However, 10 of the 55 units surveyed are not expected to meet the less than 15% skid trail and landing density for the existing condition. The 154 acres represented by the 10 units are 34% of the sampled area and 3% of the project area.

In the pre-treatment evaluation, quantitative measurements of porosity were compared to qualitative assessments of soil disturbance defined by the Region 5 Soil Quality recommended thresholds. Ground based management activities can potentially reduce porosity by compacting the soil. However, it has been shown that compaction can have either a negative or positive effect on total productivity, depending primarily on soil texture (i.e. clayed soils showed the greatest reduction in porosity, loams were intermediate and sandy soils are generally enhanced) (Powers 2005).

It was found that undisturbed soil porosity differed by soil type and that compaction could be estimated across soil type using qualitative assessments, but only at the highest levels of disturbance. Also quantitative changes in porosity within soil type by disturbance class were difficult to determine because of the inherent variability in porosity found within each soil type. Our pre-treatment monitoring showed that porosity decreases with increasing disturbance, but that only class three disturbances, with a scale of 0 to 3 with zero being undisturbed and three being extremely disturbed, corresponds well with a detrimental decrease in porosity from undisturbed soil as defined by the derived soil bulk density threshold.

Organic Matter

Surface organic matter serves as a nutrient reservoir for plants and other organisms that inhabit the soil. Recommendation from the Region 5 Soil Quality Standards, states that fine organic matter should cover at least 50 percent of the area. Currently, on average 89% of the survey units meet or exceed the recommended threshold. However, on average, the following six units 3, 5, 82, 83, 84 and 88 do meet the threshold. The 483 acres represented by these units are 17% of the sampled units and 10% of the project area.

3.5.4 Environmental Consequences-Equivalent Roaded Acres

3.5.4.1 Alternative 2 (No-action Alternative)

Direct and Indirect Effects

Under the No-action Alternative, the existing condition would be maintained (Table 3.21, Figures 4 and 5). Given the assumption that fire, timber harvest, road construction and other watershed disturbance (other than those listed in the Appendix E) would not occur, watersheds would continue to regain their inherent hydrologic character as stand growth continues, ground cover conditions improve and porosity of compacted soils increases, therefore ERA values would slowly decline to a baseline level over time. Improvements would not be made to the transportation system and no roads would be obliterated or relocated out of riparian areas, therefore watershed benefits and reductions in ERA values would not be realized. An opportunity will be foregone to treat heavy concentrations of fuels that would reduce the fire hazard and potential for large fires.

In the short term, water quality and downstream beneficial uses would remain unchanged. As watersheds recover from past management activities, there may be small improvements in water quality. Some sections of streams within these watersheds in poor to fair conditions would experience a very gradual, long-term improvement in channel stability as peak flows and sedimentation rates moderate. However, in the absence of road improvements, decommissioning or obliteration, the transportation system would continue to be a large contributor of sediment to the stream network. The density of roads and road-stream crossings would continue to impact the hydrologic regime in these subwatersheds.

Given the current fuel loading and subsequent increase in fuel loading resulting from the mortality caused by disease, insects or overstocking there is the probability that a large, intense wildfire would occur. Such a fire would be intense, destroying vegetation, ground cover and large organic debris within stream channels. As a result of these fires peak flows may increase five to ten times above existing levels and sediment loads could increase up to 50 to 100 fold. On-site fishery habitat may be destroyed or severely reduced as the stream becomes devoid of cover, large organic debris and aquatic food. Elevated temperatures resulting from loss of vegetative cover adversely affect egg survival and the growth of both juvenile and adult trout. RHCAs would continue to function as unique habitat for wildlife and botanical diversity.

Cumulative Effects

In the event of a future severe wildfire, affected areas may be highly susceptible to erosion and generate large pulses of sediment to stream channels (Elliot and Robichaud 2001). Sediment may be stored in channels for many years until peak flows mobilize the materials and move them downstream. Large runoff events often follow severe wildfires, resulting in increased peak flows.

3.5.4.2 Alternative 1 (Proposed Action)

Direct and Indirect Effects

While fire ignitions are expected to continue following the activities proposed in Alternative 1, fuel treatments are designed to give wildland fire managers "…a higher probability of successfully attacking a fire" (Agee et al. 2000). A future severe wildfire may have similar effects described under Alternative 2. However, implementation of Alternative 1 should reduce the likelihood and intensity of effects from such an event. This would be due to the enhanced ability of fire management to suppress, control and contain fires that start in the fuel treatments under 90th percentile weather conditions.

Under Alternative 1, the increase in ERA values range from 17 to 123 percent of the TOC, when sensitive and uplands are assessed separately (Figure 8). This would result in an increase in cumulative ERA values ranging from 3 to 58 percent of the TOC when sensitive and upland areas are assessed together. The ERA values for most subwatersheds, when sensitive and uplands are assessed together, remains below threshold, where values range from 19 to 99 percent. This is with the exception of the Bearing subwatershed that is at 120 percent of the TOC, which is a current condition; there will be no entry/treatment in this subwatershed. As a result, there are lower, moderate and higher risks that proposed treatments might stress the hydrologic system within individual subwatersheds (Table 3.21, Figures 7 and 8)

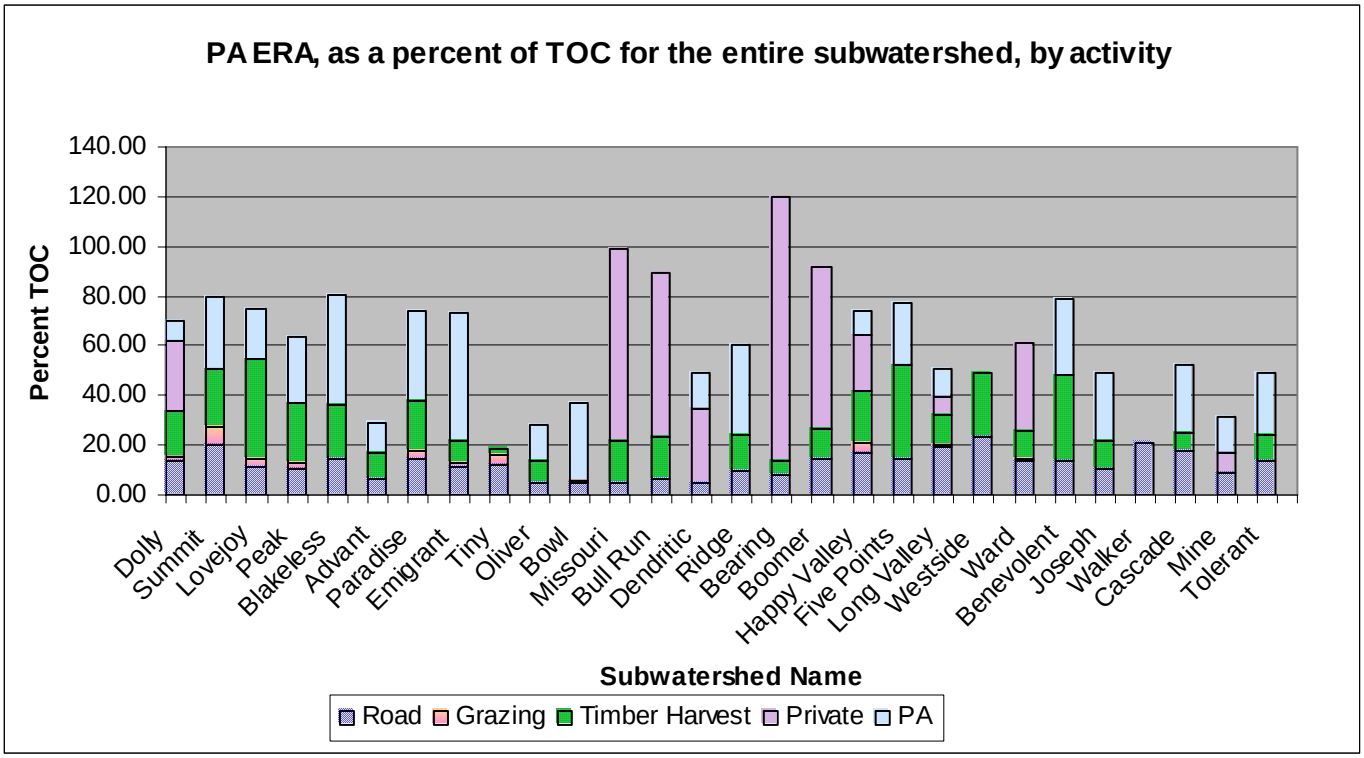

Figure 7 Alternative 1, the Proposed Action: ERA, shown as a percent area for each analysis subwatershed, broken down by land use. Analysis subwatersheds are shown for the entire subwatershed.

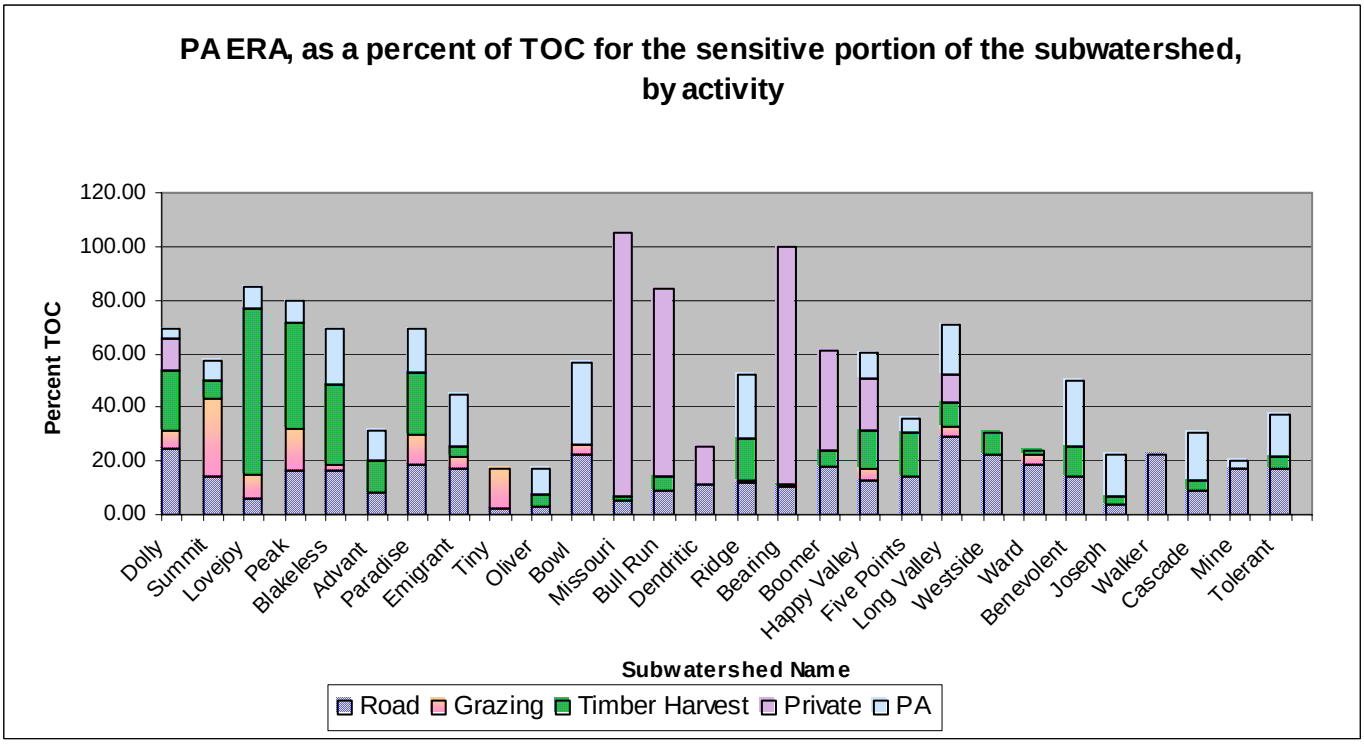

Figure 8 Alternative 1, the Proposed Action: ERA, shown as a percent area for each analysis subwatershed, broken down by land use. Analysis subwatersheds are shown for the sensitve portion of the subwatershed.

Road decommissioning may entail culvert removal, subsoiling of the roadbed, recontouring the hillslope and/or seeding the affected area. These measures help initiate revegetation and recovery of the road area. Over time, decommissioned roads produce less sediment and surface runoff to adjacent streamcourses. As a result, their contribution towards the ERA of a watershed is reduced.

Decommissioning 7.25 miles of roads would result in long-term benefits to watershed resources resulting from a reduction in road density. In addition, due to decommissioning of system and non-system roads, all action alternatives will have a total reduction of 26 road-stream crossings within the following subwatersheds: Five Points (-8), Long Valley (-1), Paradise (-4), Emigrant (-3), Tolerant (-1), Cascade (-2), Joseph (-3) and Blakeless (-4). Figures 7 and 8 show the modeled increase in disturbed area to each analysis subwatershed due to the treatment activities proposed in Alternative 1.

Road construction would create new sources of sediment and disruption of hydrologic continuity on affected hillslopes. Reconstruction would consist of brushing, blading the road surface, improving drainage and replacing or upgrading culverts where needed. Short term increases in sediment may be offset by long term improvements to water quality as a result of improved road drainage and stream crossings. Road closure does not include subsoiling and usually consist of barricading the road entrance with a gate, large rocks, signage, large woody debris and/or a combination of the above. Road closures are a preferred alternative to decommissioning from a fire and planning perspective. However, from a watershed perspective road closures remain on the landscape in a compacted state for many years and in some cases decades, eventually becoming less compacted as the road becomes revegetated.

Harvest activities may locally alter soil moisture regimes and subsequent water yield due to altered interception and evapotranspiration. Harvested areas would be more susceptible to erosion and sediment transport to the channel network. Implementation of Best Management Practices (BMP) would help mitigate these effects.

Cumulative Effects

Although most subwatersheds are well below TOC, the cumulative ERA values will exceed or approach the TOC in the Bearing, Missouri, Bullrun and Boomer subwatersheds. As a result these four subwatersheds would be at high risk for cumulative effects (ERA values ranging from 90 to 120 percent of the TOC). However, these subwatersheds are at high risk for cumulative effects due to the large amount of recent private and public timber activities that have of late occurred in these subwatersheds. Blakeless, Emigrant, Paradise and Ridge subwatersheds would also have a substantial amount of mechanical treatments (increase over existing of greater than one third of the subwatershed), so there would be a considerable amount of ground disturbance. In addition, one subwatershed would be at high risk for cumulative effects (75 percent of TOC in sensitive and 100 percent of TOC in upland) and seven subwatersheds at moderately high risk of cumulative effects (greater than 50 percent TOC in sensitive and greater than 75 percent in the

upland). Moderate increases in seven subwatersheds would raise the disturbance levels to a moderate risk of cumulative effects (Figures 7 and 8).

Detrimental effects that may result from increases in ERA include fluvial erosion from treated hillsides, resulting in chronic sedimentation. Primary factors leading to this are reduction of canopy cover, ground disturbance (particularly due to road effects) and loss of ground cover. Silvicultural prescriptions for the project include harvests, underburning, grapple piling and mastication. Under these prescriptions, there would be canopy retention and surface vegetation recovery that would provide inputs to ground cover. The group selection treatment would create small forest openings with associated disturbance from skid trails, site preparation and transportation needs, such as temporary roads. The most likely effect of increased fluvial erosion is a decline in coldwater fish habitat quality via infilling of pools, embedding of spawning gravels and related effects to aquatic insect communities.

3.5.4.3 Alternative 3

Direct and Indirect Effects

A future severe wildfire would have the effects described under Alternative 2, but implementation of the Alternative 3 should reduce the likelihood of such an event. The direct and indirect effects in Alternative 3 would be very similar to Alternative 1.

Under Alternative 3, the increases in ERA values were predicted to range from 3 to 58 percent of the TOC over existing values when sensitive and upland areas of the subwatersheds were assessed separately. This would result in cumulative ERA values ranging from 12 to 123 percent of the TOC when the sensitive and uplands are assessed separately. The TOC in most subwatersheds when the entire watershed is assessed together is below threshold and values range from 19 to 99 percent. However, as mentioned before the Bearing watershed exceeds the threshold at 120 percent due to recent private timber harvest activities that have occurred in the watershed. As a result there are lower, moderate and higher risks that these treatments may stress the hydrologic system within individual subwatersheds (Table 3.21, Figures 9 and 10). Road actions are presented in Alternative 1 and are the same for all action alternatives.

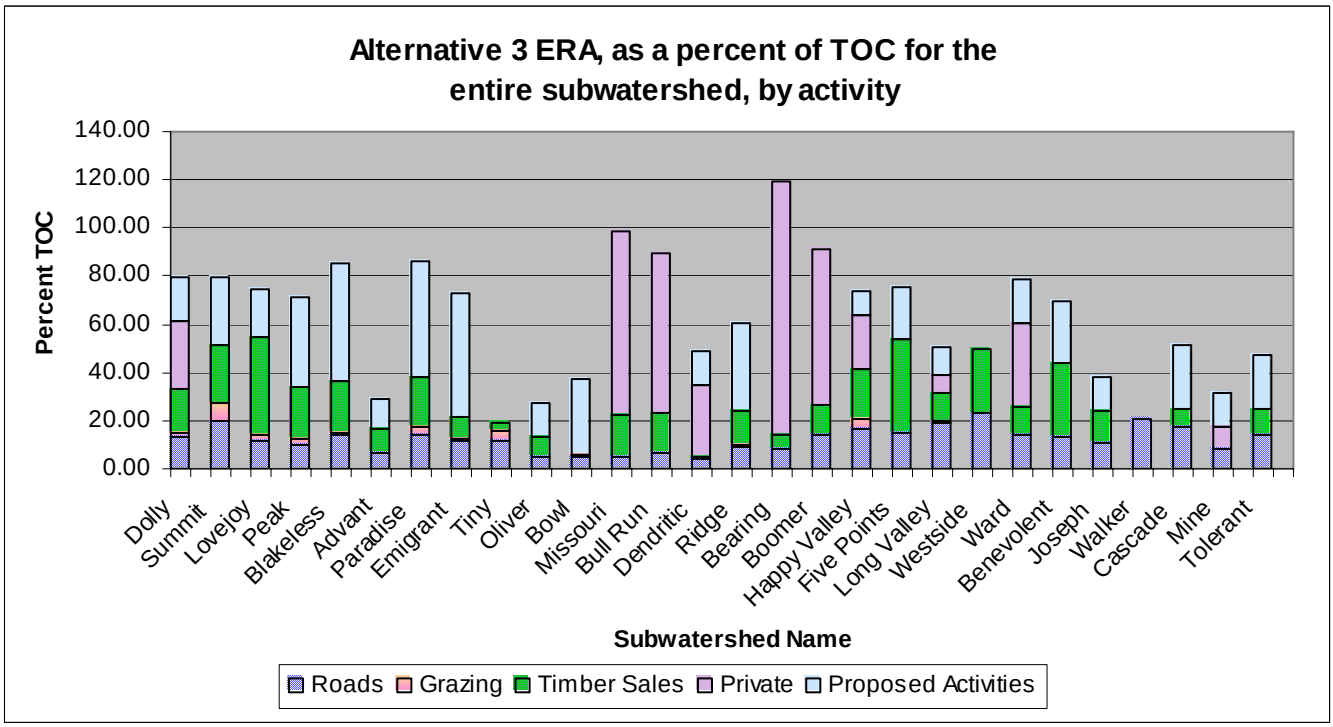

Figure 9 Alternative 3: Equivalent roaded acres (ERA), shown as a percent area for each analysis subwatershed, broken down by land use. Analysis subwatersheds are shown by entire subwatershed.

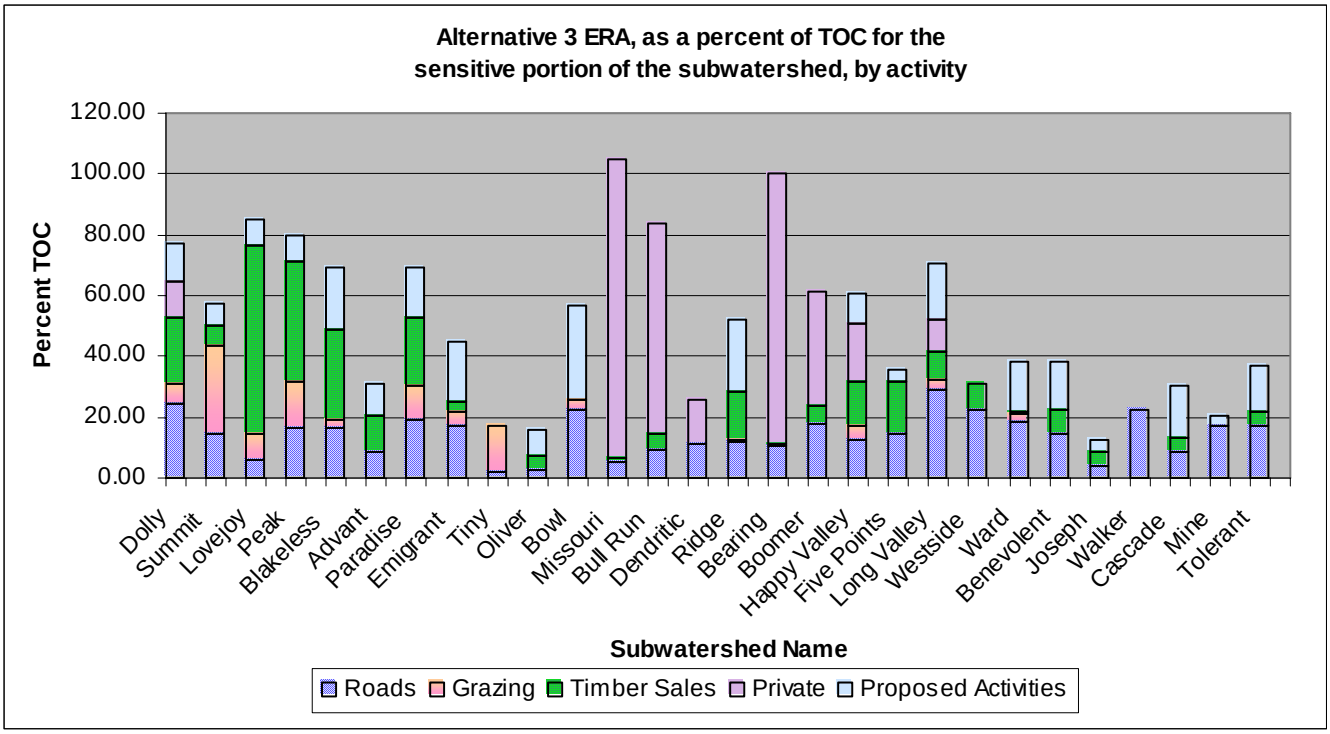

Figure 10 Alternative 3: Equivalent roaded acres (ERA), shown as a percent area for each analysis subwatershed, broken down by land use. Analysis subwatersheds are shown for the sensitive portion of the subwatershed

Cumulative Effects

Many of the cumulative effects are expected to be very similar to Alternative 1. The risk of detrimental effects in the analysis subwatersheds are displayed above (Figures 9 and 10).

The cumulative ERA values will exceed the TOC in the Bearing subwatershed. Three subwatersheds would be at high risk for cumulative effects (75 percent of TOC in sensitive and 100 percent of TOC in upland). ERA increases would leave eight subwatersheds at moderately high risk of cumulative effects (greater than 50 percent TOC in sensitive and greater than 75 percent in the upland). Moderate increases in eight subwatersheds would raise the disturbance levels to a moderate risk of cumulative effects.

3.5.4.4 Alternative 4

Direct and Indirect Effects

The direct and indirect effects in Alternative 4 would be very similar to Alternative 1. Under Alternative 4, the increases in percent ERA values are predicted to range from 3 to 58 percent of the TOC when sensitive and upland areas are assessed separately. When assessed together, the cumulative percent ERA values, in most subwatersheds, are below threshold, where values range from 19 to 99 percent. However, as mentioned previously the Bearing subwatershed exceeds the TOC, at 120 percent, due to recent private timber harvest activities that have occurred there. As a result there are lower, moderate and higher risks that these treatments may stress the hydrologic system within individual subwatersheds (Table 3.21, Figures 11 and 12). A future severe wildfire would have the effects described under Alternative 1, but implementation of the Alternative 4 should reduce the likelihood of such an event.

As with Alternatives 1 and 3, there would be 7.25 miles of road decommissioning with Alternative 4. In addition, due to decommissioning of system and non-system roads, all action alternatives will have a total reduction of 26 road-stream crossings throughout the analysis subwatersheds.

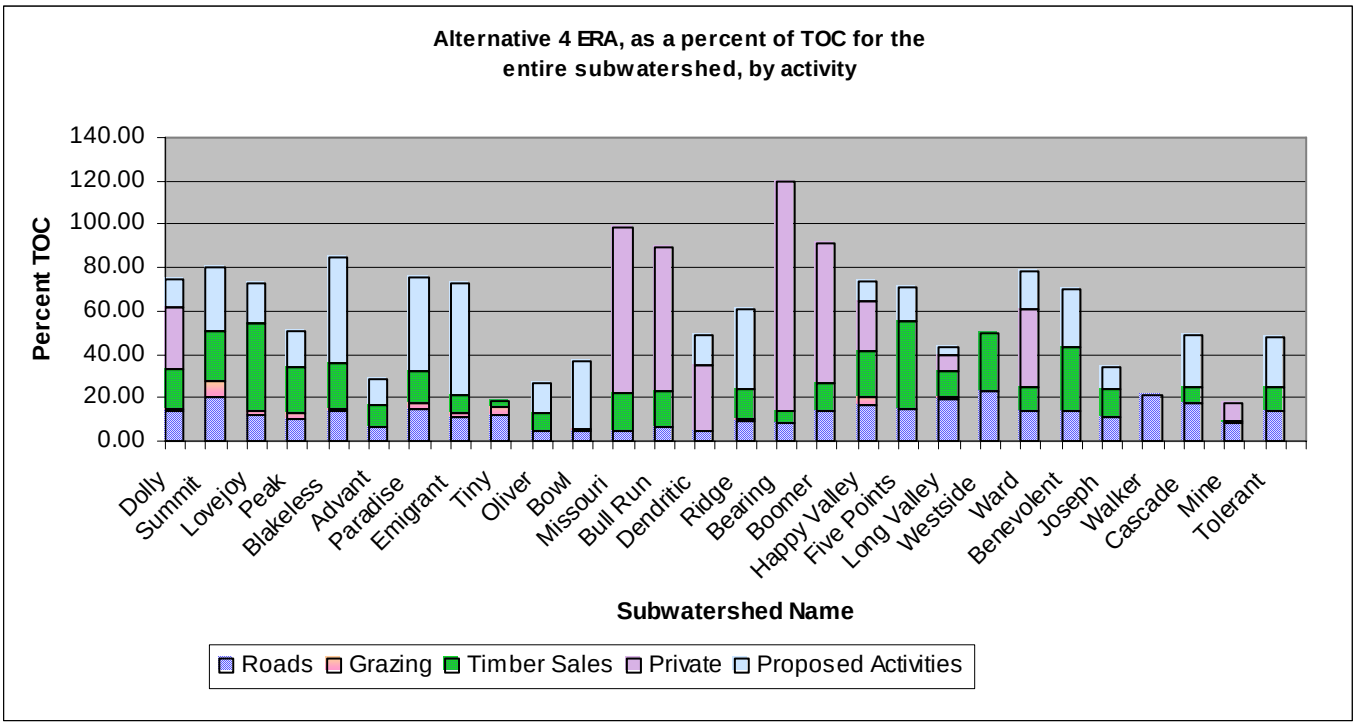

Figure 11 Alternative 4: Equivalent roaded acres (ERA), shown as a percent area for each analysis subwatershed, broken down by land use. Analysis subwatersheds are shown by entire subwatershed.

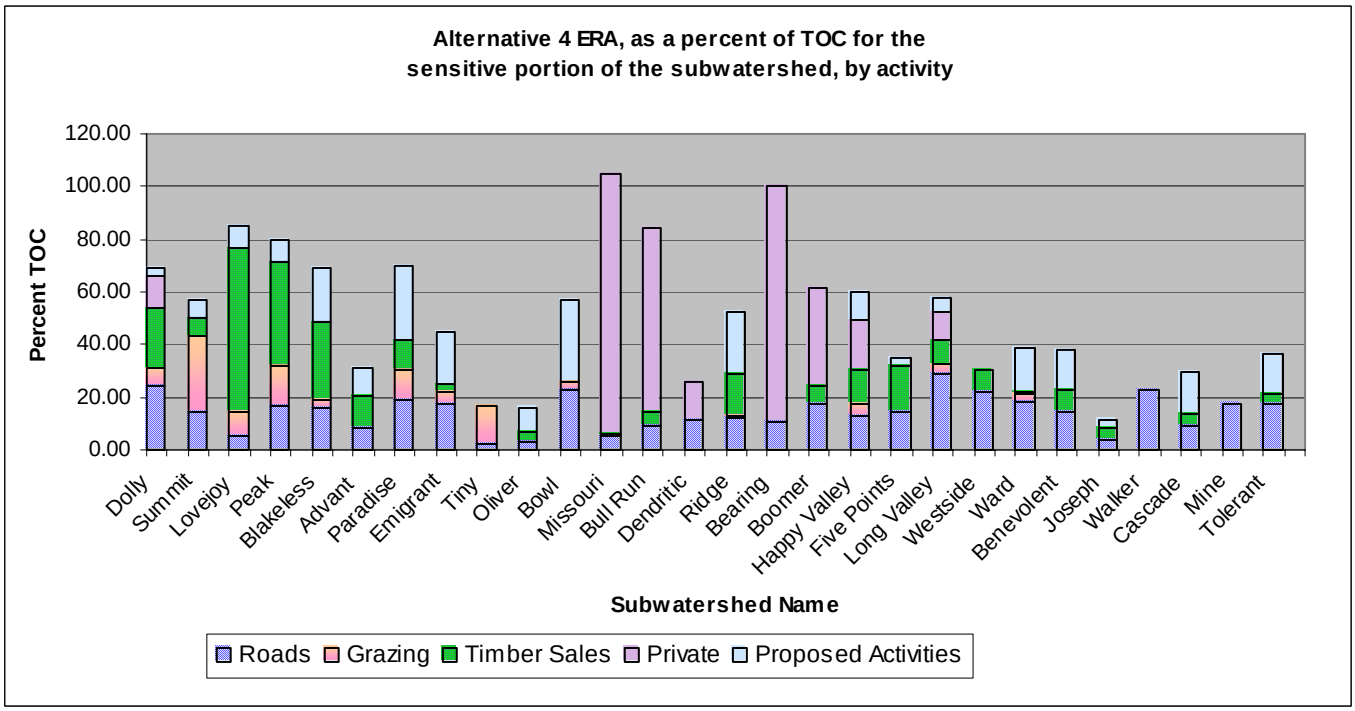

Figure 12 Alternative 4: Equivalent roaded acres (ERA), shown as a percent area for each analysis subwatershed, broken down by land use. Analysis subwatersheds are shown for the sensitive portion of the subwatershed.

Cumulative Effects

Many of the cumulative effects are expected to be very similar to Alternative 1. The cumulative equivalent roaded acres (ERA) values associated with Alternative 4, would not exceed the threshold of concern (TOC) in any subwatershed. The Bearing subwatershed exceeds the TOC, but it is not related to the increase in cumulative ERA values from any of the alternatives. As a result one subwatershed would be at high risk for cumulative effects (75 percent of TOC in sensitive and 100 percent of TOC in upland). ERA increases would leave eight subwatersheds at moderately high risk of cumulative effects (greater than 50 percent TOC in sensitive and greater than 75 percent in the upland). Moderate increases in eight subwatersheds would raise the disturbance levels to a moderate risk of cumulative effects.

ERA increases in other subwatersheds means those subwatersheds would be at higher risk of cumulative effects (Table 3.21, Figure 11 and 12).

3.5.5 Environmental Consequences-Soils Effects

3.5.5.1 Alternative 2 (No-action Alternative)

Soil Cover

Direct and Indirect Effects

For the present condition of soil cover, please see the previous section “Current Conditions: Soil Cover”. Under the No-action Alternative, soil cover can be expected to increase as organic materials accumulate on the soil surface.

As a result of increased soil cover, the risk of soil erosion may decline on forested hillslopes. Soil cover dissipates the energy of falling raindrops through interception. At higher velocities falling rain causes rain splash, a force that sets soil grains in motion. The litter layer acts as a sponge increasing storage capacity and slows the velocity of overland flow. At high velocities overland flow results in rain-wash, another erosive force. Without vegetative cover, an intense storm can generate huge quantities of sediment from hillsides (Cawley 1990). Reduced soil erosion helps retain soil nutrients and a favorable growth medium on site.

Cumulative Effects

Under the No-action Alternative, soil cover can be expected to increase as organic materials accumulate on the soil surface. This description of limited disturbance within watersheds assumes that fires are controlled to spots less than 5 acres over the next 20 to 30 years.

However, a future catastrophic wildfire, or a high severity fire, would likely consume organic materials on the forest floor and reduce soil cover below the PNF LRMP standard in the affected area. If soil cover is reduced to bare soil following a wildfire, the soil would be more susceptible to erosion. In addition, fire can volatilize organic compounds in the soil, some of which migrate down a temperature gradient and condense on soil particles below the surface (DeBano 1990). As

a result, hydrophobicity (a non-wettable layer) can develop below the surface. This repellant layer can greatly reduce infiltration rates. During a precipitation event, soil above the non-wettable layer can become saturated and erode downslope due to rill formation and raindrop splash. Factors such as soil texture, slope and post-burn precipitation intensity will affect the degree and type of post-fire erosion. Dry, coarse grained soils are particularly susceptible to this type of fire-induced hydrophobic condition (Clark 1994).

Soils Porosity and Detrimental Compaction

Direct and Indirect Effects

For the present condition of soil porosity and detrimental compaction, please refer to the previous discussion under the section (Current Conditions: Soil Porosity and Detrimental Compaction". Under the No-action Alternative, the extent and degree of compaction are expected to decline slowly over time. This process may take several decades in forested environments (Grigal 2000). Root penetration, extension and decay, along with the burrowing action of soil dwelling animals and freeze thaw (occurs when water in cracks and joints of rocks freeze and expand), would contribute to the increase in soil porosity and decrease in compaction. In addition, incorporation of organic matter into the soil by biological processes such as invertebrate and vertebrate soil mixing and decomposition would help reduce soil bulk density and the degree of compaction in affected areas over time.

Cumulative Effects

In the absence of future timber harvests, road construction, or other compacting activities, soil compaction is expected to decline and soil porosity to increase as described above. In the event of a future wildfire, severe soil heating may cause physical changes in soils, including a reduction in soil porosity (Clark 1994).

Soil Organic Matter

Direct and Indirect Effects

For the present condition regarding organic matter, please see the previous section under "Current Conditions: Organic Matter". Under the No-action Alternative, surface organic matter can be expected to increase as organic materials accumulate on the soil surface. The continued accumulation of organic matter on the forest floor would contribute to increased ground and surface fuel loads, which may lead to increased fire severity and intensity during a fire event.

Cumulative Effects

Under the No-action Alternative, surface organic matter can be expected to increase as organic materials accumulate on the soil surface. However, a future wildfire could consume organic horizons on the forest floor, creating a non-wettable layer, as described above. Immediately following a fire, the affected stand may not meet the PNF LRMP recommended threshold of

greater than 50% cover of organic matter. However, within several months a thin layer of needlecast from scorched trees would increase cover of organic matter (Pannkuk and Robichaud 2003). Fires short-circuit the decomposition pathway, rapidly oxidizing organic matter and releasing available nutrients to plants and soil organisms. When organic matter burns, essential nutrients can be transferred to the atmosphere through volatilization and ash convection (Raison et al. 1984). Nutrients may also be lost following fire due to leaching (Boerner 1982). Some nutrients are returned relatively quickly by terrestrial cycling pathways. Compared to the pre-burn condition, a large reduction in the organic matter covering the soil would reduce the insulating effect this layer has on soil temperature. Under a reduced organic layer, soils experience greater temperature extremes. In addition, a blackened surface, due to partially combusted organic materials, would absorb more light and become warmer than a soil without a dark surface (Ahlgren and Ahlgren 1960). 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 biological activity in the soil, resulting in altered nutrient cycling regimes.

3.5.5.2 Alternative 1 (Proposed Action)

By following the standards and guidelines contained in the PNF LRMP and the recommendations in the USDA Forest Service Region 5 Soil Quality Standards, there would be a lower risk that soil productivity would be impaired. Please see section “4.3. Soil Assessment Methods” for further discussion on standards and guidelines used. Alternative 1 would have 4,140 acres of mechanical treatment, which does not include exclusion areas (e.g. slope restrictions, sensitive areas, etc.), therefore there would be the potential for a moderate amount of ground disturbance from equipment, skid trails, and landings. Impacts on soil resources would be greater than alternative 2 and 4, but less than alternatives 3.

The R5 Soil Quality Standards recommend managing annual rate of soil loss through sufficient soil cover to prevent accelerated soil erosion from exceeding the rate of soil formation (The long-term average is approximately one ton of soil formation/acre/year). One ton per acre is equivalent to the thickness of two sheets of paper. Accelerated soil erosion applies to human caused disturbance and does not account for the other disturbances, such as wildfire.

Modeling erosion rates requires a substantial amount of time; therefore six erosion response units were selected within mechanical treatment areas where erosion rates were expected to be high because of geological type, length of slope, amount of soil cover and treatment. Overall, the WEPP model predicted that erosion rates would not increase over the existing erosion rate. However, within one of the three erosion response units on clay-loam soils the erosion rate approached 0.01 tons per acre over the existing erosion rate. As a result of implementing the management activities the WEPP model predicted that the other 5 units would not approach 1 ton per acre. It is not expected that hillside erosion over any given treatment area would exceed one

ton per acre, however, as discussed above, on a site specific basis this erosion rate may be exceeded on individual landings, roads or stream channels.

Soil Cover

Direct and Indirect Effects

It is difficult to accurately predict treatment effects on effective ground cover. Harvest operations may increase activity fuels and effective ground cover, while pile burning and underburning reduces the amount of ground cover. Westmoreland (2006) reported an average absolute decrease in soil cover of 10 percent after project implementation. Assuming the Grizz units undergo the same decrease; all units, except units 96, 197, 199, 223, and, 225, meet the threshold when their mean percent cover is considered. The 410 acres represented by these units equates to 15 percent of the sampled units (2,795 acres), 9 percent of all the proposed treatment units, which does not include the equipment exclusion zones (4,140 acres), and 2 percent of the project area (19,409). The sampled portion of the project area (55 sampled units) would experience a decrease in area meeting or exceeding the threshold from the mean average of 100 percent to 85 percent. Therefore, the total proposed treatment area (4,140 acres) that does not meet threshold is projected to equate to approximately 607 acres.

While differences in sampling method and intensities, as well as harvest and site preparation practices, complicate this type of comparison, it is reasonable to assume that effective ground cover would be decreased. Implementation of mitigation methods for those units that are above threshold such as mastication and leaving chips on site would ensure the threshold would still be met. As an additional mitigation measure, where available, organic matter will be pulled over skid trails, landings and roads at the time of decommissioning. There is a low risk that treated units would not meet the PNF LRMP threshold following treatment.

Under Alternative 1, mechanical treatment would occur within units where slopes are equal to or less than 35 percent and 25 percent or less in the RHCAs.

There is less potential for vegetation loss associated with grapple pile burning in Alternative 1, than all other action alternatives. Burn pile estimates range from 5 to 10 per acre and 10 to 20 feet in diameter, which would equate to a minimum of 22 acres and a maximum of a 180 acres disturbed. Ground cover lost is in the form of dispersed islands where sediment transport may be trapped by the surrounding vegetation and is not of the same concern as larger barren strips created from skid trails. Acres affected are presented in Table 3.22.

Table 3.22 Potential for erosion due to loss of ground cover comparison by alternatives

Type of Disturbance	Method of Disturbance	Acres* by Disturbance Alternative	Range of Percent Acres Impacted	Duration of impact in years	Rationale
Loss of Ground Cover, Vegetation	Mechanical	Alt 1 4,140 Alt 3 4,475 Alt 4 4,030 Alt 2 0	20 to 22 percent	1 to 5	Recolonization may be slower because the ground is compacted
Loss of Ground Cover, Vegetation	Hand Pile and Burn	Alt 1 180 Alt 3 204 Alt 4 184 Alt 2 0	0.5 to 2.3% at 5 piles per acre, 10 ft to 20 ft in diameter 1.1 to 4.6% at 10 piles per acre, 10 ft to 20 ft in diameter	0.5 to 5	Easily recolonizes from surrounding area
Loss of Ground Cover, Vegetation	Wild fire	Alt 1 Alt 3 Alt 4 Alt 2	0 to 100 percent of the project area. Risk would be reduced by acres treated. 0 to 100 of project area, analysis area or greater.	1 to 3	Recolonization dependant on fire intensity, some recolonization from surrounding area Large threat of invasive plant species. Stand structure permanently altered

* Acres include equipment exclusion zones in the RHCA for the DFPZ and Area Thin areas.

The potential for sediment transport to the stream channel would be greater in Alternative 1, because 357 acres proposed for mechanical treatment would occur within the RHCA buffers and within 25, 50 or 100 feet of the stream channels. The proximity of mechanical treatment to the stream channel increases the risk of sediment transport into the channel. In all alternatives sediment transport to the channels would decline due to the 7.25 miles of roads that would be decommissioned. The effects of all other road actions are presented under Alternative 1.

A reduction in effective ground cover would increase the risk of erosion in affected areas. The amount and type of erosion depends on the character of the area. For example, patches of ground cover across a large area would be more effective at intercepting surface water than large areas devoid of cover.

Cumulative Effects

A reduction in ground cover is likely to be short lived if nearby overstory trees remain intact. Over time, litter from trees and shrubs would contribute to the development of effective ground cover in bare areas. A wildfire entering a treated area may result in a greater reduction in ground cover than the proposed treatments alone. See the discussion under Alternative 2. It is unlikely that implementation of Alternative 1 would add any long-term negative effects.

Soil Porosity and Detrimental Compaction

Direct Effects

All treatment units meet or exceed the recommended soil porosity guideline of 10 percent for the existing condition.

In terms of skid trail and landing density, 10 of the 55 units surveyed are not expected to meet the less than 15 percent skid trail and landing density for the existing condition. The acres represented by the 10 units are 34 percent of the sampled area and 5 percent of the project area. Assuming the surveyed units undergo the same 13.5 percent average increase, as reported in the 2006 HFQLG monitoring report, and assuming 75 percent reuse and 66 percent subsoiling effectiveness, 17 additional units may not meet the 15 percent threshold. Therefore, the total proposed treatment area that is outside of the standard is approximately 222 acres or 5 percent of the proposed treatment area. Following treatment, these units would be reevaluated and additional subsoiling would occur in skid trails, landings, and/or group selection areas to reduce the extent of detrimental compaction to below the existing, pre-project condition.

The degree of soil compaction varies with soil texture and moisture content, while plant responses to compaction depend strongly on changes in the soil water regime (Gomez et al. 2002). In addition to subsoiling, Grizz Project SOPs include other soil protection measures, such as wet weather standards, to minimize soil compaction.

While it is assumed that there will be an increase in soil porosity due to mitigation effects from subsoiling of some existing skid trails and landings and the decommissioning of 7.25 miles of road, it is difficult to accurately predict proposed treatment effects on soil porosity at this time. This is due to the inability to collect post-treatment soil bulk density samples, which are needed to derive a direct correlation between the sampling results based on individual soil type and prescribed treatment and the existing pre-treatment results. Because of this lack of soil porosity information relating to the post-treatment effects that are available at the time of this report, there are no predicted treatment effects on soil porosity for any of the alternatives. However, the predicted percent increase of unit area in skid trails and landings were calculated for compaction and compared to the 2006 HFQLG soil monitoring report results.

Reused skidtrails would be subsoiled after implementation, as part of the Grizz Project. As a result the existing condition would be improved. However, HFQLFG (2006) monitoring on the Plumas, Lassen and Tahoe National Forests has shown that subsoiling is only 66 percent effective. Although treatment prescriptions vary among the action alternatives, it is assumed that all action alternatives would require the approximately same amount of skid trails and landings to service the treated acres. As an SOP, most all landings would be subsoiled after use to mitigate compaction effects, depending on soil type.

The potential for erosion is increased when equipment operates on slopes greater than 25 percent so higher erosion rates would be expected under Alternative 1 and the other action alternatives. Skid trail density and the steeper slopes contribute to the higher erosion rates on

these lands. When ground based harvesters operate on slopes greater than 25 percent, skid trails are installed perpendicular to the contour unless cut into the slope on a diagonal. Vertical skid trails require a much closer spacing. This results in an increase in bare soil and more disturbance of the soil between the skid trails. These skid trails are too steep to be subsoiled so soil porosity is decreased and the potential for erosion is increased.

Increases in compaction are not expected to be substantial due to the high percentage of existing skid trails and landings. However, within existing skid trails and landings that will not be reused, therefore not subsoiled, compaction is expected to continue to reduce the infiltration capacity, reduce available water in the soil, impede root growth and alter nutrient uptake and tree growth.

Cumulative Effects

Ten units do not meet the standard for skid trail and landing density in their existing condition. Following the proposed activities, these same units will still not meet the standard. Additional subsoiling of legacy skidtrails within these units will reduce compaction and leave them in an improved state, as discussed above under “Direct effects”. The remaining units are expected to meet the PNF LRMP standard.

Organic Matter

Direct and Indirect Effects

The 539 acres represented by the 9 units equate to 19 percent of the sampled units (2,795 acres), 13 percent of all the proposed treatment units (4,140 acres), and 3 percent of the project area (19,409 acres). Based on the 2006 HFQLG monitoring report that showed a decrease of 10 percent in soil ground cover (a composite of soil cover and organic matter) after project implementation and assuming that the Grizz units undergo the same decrease, 3 additional units will not meet the threshold of 50 percent. Therefore, the total proposed treatment area (4,140 acres) that does not meet threshold is projected to equate to approximately 798 acres.

Accurate prediction of treatment effects on surface fine organic matter is difficult. Mastication treatments are expected to increase cover of organic matter as masticated debris is broadcast away from the machine. Underburn treatments may reduce organic matter, but burning is expected to occur under prescribed conditions that would not result in complete combustion of the duff and litter layers. Under this alternative organic matter and soil nutrients may be affected by this project through soil displacement via road and landing construction, prescribed burns, burn piles and removal of vegetative material from the site.

Local reductions in surface fine organic matter may have local effects on soil temperature. Large reductions in organic matter may result in greater temperature extremes in the soil, as previously discussed. Removal of canopy cover may result in increased temperatures at the forest floor as well as reduced moisture content of surface fine organic matter (Erickson et al. 1985).

Cumulative Effects

Following the proposed treatments, organic matter on the soil surface would decrease in some areas, due to mechanical displacement or consumption by fire, while organic matter would increase in other areas due to additions of masticated material. This may result in greater heterogeneity of the forest floor. Patches of organic matter would provide habitat for soil invertebrates and microorganisms. Patches of bare areas would be susceptible to local erosion. Increases in woody materials on the forest floor due to mastication may cause short term changes in decomposition and carbon and nutrient dynamics in affected areas. Microorganisms that decompose wood would immobilize nitrogen and other nutrients while decaying the woody material. As the wood decomposes, those nutrients would be released and made available to plants and other organisms (Swift 1977). Microclimate changes at the forest floor due to reduced canopy cover can alter rates of decomposition and nutrient turnover in the surface fine organic matter of harvested stands (Edmonds 1985).

Table 3.23 Soil productivity comparison by alternatives.

Soil Productivity Indicator	Type of Disturbance	Acres[1] of treatment by Alternative	Impact	Duration of impact	Rationale
Microbes	Mechanical	Alt 1 4,140 Alt 3 4,475 Alt 4 4,030 Alt 2 0	Displacement or death	1to 5 years	Recolonization is slower because the ground is compacted
Microbes	Pile and Burn	Alt 1 180 Alt 3 204 Alt 4 184 Alt 2 0	No effect, displacement or death	.5 to 5 years	This effect is based on temperature intensity and duration of burn Recolonization occurs fairly quickly from the surrounding area
Nutrient Loss	Mechanical	Alt 1 4,140 Alt 3 4,475 Alt 4 4,030 Alt 2 0	Approximately a direct proportion to the weight of the timber harvested	Can be long term	Returns in proportion as vegetation returns and litter and duff layers establish
Nutrient Loss	Pile and Burn	Alt 1 180 Alt 3 204 Alt 4 184 Alt 2 0	100 to 900 lbs per acre	Short term	Effect is localized

1 Acres do not include equipment exclusion zones in the RHCA for the DFPZ and Area Thin areas.

3.5.5.3 Alternative 3

Alternative 3 has the most mechanical treatment proposed for all action alternatives, so there would be a greater increase of ground disturbance from equipment, skid trails, and landings. This alternative would increase the amount of mechanical treatments from Alternative 1 (4,140 acres) to 4,475 acres, which is an approximate increase of 335 acres. Approximately 18 percent of the subwatersheds analyzed would be treated mechanically. Within individual watersheds the percent

of mechanical treatments ranges from 0 to 52 acres and eighteen subwatersheds are between 10 and 40 percent.

Five watersheds would have a substantial amount of mechanical treatments (increase over existing of greater than one third of the watershed). Impacts on soil resources would be greater than all other alternatives.

Soil Cover

Direct and Indirect Effects

Direct and indirect effects to soil cover are expected to be the same under all action alternatives. See the discussion under Alternative 1. Assuming an average decrease in soil cover of 10 percent (Westmoreland 2006), the sampled portion (2,795 acres) of the proposed treatment area (4,475 acres) would experience a decrease in area meeting or exceeding the PNF LRMP standard similar to Alternative 1. Therefore, the total proposed treatment area that will not meet the threshold equates to 656 acres of the proposed treatment area. Implementation of mitigation methods for those units that are above threshold such as mastication and leaving chips on site would ensure the threshold would still be met.

There is the greatest potential for vegetation loss associated with pile burning in Alternative 3 because of the number acres of grapple burn piles. Burn pile estimates range from 5 to 10 per acre and 10 to 20 feet in diameter, which would equate to a minimum of 25 acres and a maximum of a 204 acres disturbed. Acres affected are presented in Table 3.22.

Under Alternative 3 mechanical treatment would occur within units where slopes are equal to or less than 35 percent and 25 percent or less in the RHCAs. The potential for sediment transport to the stream channel would be reduced in Alternative 3 because 332 acres of mechanical treatment would occur within 25, 50 or 100 feet of the stream channels.

In all action alternatives sediment transport to the channels would decline because of the decommissioning of 7.25 miles of roads.

Cumulative Effects

Cumulative effects to soil cover are expected to be the same under all action alternatives. See the discussion under Alternatives 1 and 2. It is unlikely that implementation of Alternative 3 would add any long-term negative effects. Treatment units above threshold or that do not have sufficient ground cover, will include mitigation methods, such as mastication and leaving chips on site, which will ensure sufficient ground cover. There is a low risk that treated units would not meet the PNF LRMP threshold following treatment under this alternative. See the discussion under Alternative 1.

Soil Porosity and Detrimental Compaction

Direct and Indirect Effects

The results from the soil porosity surveys that were collected on 55 treatment units estimate that 100 percent of the units currently meet or exceed the 10 percent threshold. In Alternative 3, impacts on soil porosity and detrimental compaction would be greater than all other alternatives due to 4,475 acres of mechanical treatment proposed. Assuming the surveyed units undergo the same 13.5 percent average increase, reported in the 2006 HFQLG monitoring report, and assuming 75 percent reuse and 66 percent subsoiling effectiveness, areas outside of standard would be similar to those discussed under Alternative 1. The remaining 38 percent of the proposed treatment area that was not surveyed is projected to be approximately 90 acres. Therefore, the total proposed treatment area that is outside of the standard is approximately 240 acres. Following treatment, these units would be reevaluated and additional subsoiling would occur in skid trails, landings, and/or group selection areas to reduce the extent of detrimental compaction to below the existing, pre-project condition.

Cumulative Effects

Cumulative effects to soil porosity and detrimental compaction are expected to be the same under all action alternatives. See the discussion under Alternative 1.

Organic Matter

Direct and Indirect Effects

Direct effects to organic matter are expected to be similar under all action alternatives for the sampled units. See the discussion under Alternative 1. In addition, based on the 2006 HFQLG monitoring report that showed a decrease of 10 percent in soil ground cover (a composite of soil cover and organic matter) and assuming that the Grizz units undergo the same decrease, the sampled portion of the proposed treatment area would experience a decrease in area meeting or exceeding the recommended threshold of the R5 Soil Quality Standards similar to those in Alternative 1. Therefore, the total proposed treatment area (4,475 acres) that does not meet threshold is projected to equate to approximately 863 acres.

Cumulative Effects

Cumulative effects to organic matter are expected to be similar under all action alternatives. However, under Alternative 3, 4,475 acres of mechanical treatment are proposed, which accounts for 23 percent of the project area. In addition, 204 acres of pile and burn is also proposed for this alternative. Table 3.23 displays a comparison of the effects to soil productivity by alternative.

3.5.5.4 Alternative 4

By following the standards and guidelines contained in the PNF LRMP and USDA Forest Service Region 5 Soil Quality Standards, there would be a lower risk that soil productivity would be

impaired. Impacts on soil resources from Alternative 4 would be greater than Alternative 2, but less than 1 and 3.

Soil Cover

Direct and Indirect Effects

Direct and indirect effects to soil cover are expected to be the same under all action alternatives. See the discussion under Alternative 1. Assuming an average decrease in soil cover of 10 percent (Westmoreland 2006), the sampled portion (2,795 acres) of the proposed treatment area (4,030 acres) would experience a decrease in area meeting or exceeding the PNF LRMP standard similar to Alternatives 1 and 3. Therefore, the total proposed treatment area that is outside of standard equates to 591 acres.

Burn piles are another way ground cover is reduced. There is less potential for vegetation loss associated with grapple pile burning than Alternative 3, but greater than Alternative 1. Burn pile estimates range from 5 to 10 per acre and 10 to 20 feet in diameter. This would equate to a total of 23 to 184 acres disturbed across the Grizz Project area. Acres affected are presented in Table 3.22.

Under Alternative 4 mechanical treatment would occur within units where slopes are equal to or less than 35 percent and 25 percent or less in the RHCAs. The potential for sediment transport to the stream channel would be reduced in Alternative 4 because 322 acres of mechanical treatment would occur within 25, 50 or 100 feet of the stream channels.

In all action alternatives sediment transport to the channels would decline because of the decommissioning of 7.25 miles of roads.

Cumulative Effects

Direct effects to soil cover are expected to be similar to alternatives 1 and 3. Treatment units that do not have sufficient ground cover will include mitigation methods such as mastication and leaving chips on site which will ensure sufficient ground cover. As an additional mitigation measure, where available, organic matter will be pulled over skid trails, landings and roads at the time of decommissioning. There is a low risk that treated units would not meet the PNF LRMP threshold following treatment under this alternative. See the discussion under Alternative 1.

Soil Porosity and Detrimental Compaction

Direct and Indirect Effects

Direct and indirect effects of soil porosity and detrimental compaction are expected to be the same under all action alternatives. See the discussion under Alternative 1. The results from the soil porosity surveys that were collected on 55 treatment units estimate that 100 percent of the units currently meet or exceed the 10 percent threshold. Assuming the surveyed units undergo the same 13.5 percent average increase, as reported in the 2006 HFQLG monitoring report, and assuming 75 percent reuse and 66 percent subsoiling effectiveness, areas outside of standard would be similar to those discussed under Alternative 1. Therefore, the total proposed treatment

area that is outside of the standard is approximately 216 acres. Following treatment, these units would be reevaluated and additional subsoiling would occur in skid trails, landings, and/or group selection areas to reduce the extent of detrimental compaction below the existing, pre-project condition.

Cumulative Effects

Cumulative effects to soil porosity are expected to be the same under all action alternatives. See the discussion under Alternative 1.

Organic Matter

Direct and Indirect Effects

Direct effects to organic matter are expected to be the same under all action alternatives. See the discussion under Alternative 1 and 3. Direct effects to organic matter are expected to be the same under all action alternatives. See the discussion under Alternatives 1 and 3. In addition, based on the 2006 HFQLG monitoring report that showed a decrease of 10 percent in soil ground cover (a composite of soil cover and organic matter) and assuming that the Grizz units undergo the same decrease, the sampled portion of the proposed treatment area would experience a decrease in area meeting or exceeding the recommended threshold of the R5 Soil Quality Standards similar to those in alternatives 1 and 3. Therefore, the total proposed treatment area (4,030 acres) that does not meet threshold is projected to equate to approximately 777 acres.

Cumulative Effects

Cumulative effects to organic matter are expected to be similar under all action alternatives. However, under Alternative 4, 4,030 acres of mechanical treatment is proposed, which accounts for 21 percent of the project area. In addition, 184 acres of pile and burn is also proposed for this alternative.

3.6 Wildlife Resources

3.6.1 Introduction

The following assessment is summarized from the biological assessment/biological evaluation (BA/BE) for threatened, endangered and sensitive (TES) wildlife species for the Grizz Project, which is incorporated here by reference (USFS PNF BRD 2007h). This assessment addresses how the Proposed Actions of the Grizz Project affect threatened, endangered and sensitive wildlife species. For discussion regarding Wildlife Management Indicator Species (MIS), please see the appropriate sections.

The purpose of the BA/BE is to determine whether the Proposed Action, as well as other action alternatives, would result in a trend toward listing or loss of viability for sensitive species, and to document effects on threatened, or endangered species and/or their critical habitat as part of determining whether formal or informal consultation is needed. The BA/BE 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 direction (FSM 2672.42), and is incorporated into this Grizz Project EA by reference (USFS PNF BRD 2007h).

Several threatened and endangered (T&E) species identified in the list of T&E species provided by the "Federal Endangered and Threatened Species that may be affected by projects in the Plumas National Forest", updated January 4, 2007, accessed via US Fish and Wildlife Service (USFWS) web page (http://www.fws.gov/sacramento/es/spp_lists/NFActionPage.cfm) (Appendix A), have been eliminated from further analysis, based on past analysis and concurrence from the USFWS (HFQLG BA/BE Rotta 1999, USFWS letter 1-1-99-I-1804 dated August 17, 1999) or due to lack of species distribution and/or lack of designated critical habitat. These species/habitat are listed below:

- Winter Run Chinook Salmon (Oncorhynchus tshawaytsha)
- Central Valley steelhead (*Oncorhynchus mykiss*)
- Delta smelt (*Hypomesus transpacificus*)
- Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*)
- Central Valley spring-run Chinook salmon (*Oncorhynchus tshawaytsha*)
- Carson wandering skipper (*Pseudocopaeodes eunus obscurus*)
- Critical habitat for vernal pool invertebrates (Butte County)
- Critical habitat for California red-legged frog

Table 3.24 summarizes the effects to the following species analyzed in the Grizz Project. Affects to the great gray owl, California spotted owl, Northern goshawk, the American marten and the Pacific fisher are presented here within this Wildlife Resources Section. For further discussion regarding the other species shown in Table 3.24, please refer to the Grizz Wildlife

BA/BE that is part of the project record and available upon request from the Beckwourth Ranger District (BKRD).

Table 3.24 List of TES and proposed wildlife species that potentially occur on the Plumas National Forest and a summary of effects/determinations of the No-action and action alternatives.

Species	Category	Alternatives 1, 3 & 4	Alternative 2	Analysis discussion
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)**	Threatened	N/A	N/A	N/A
Hardhead minnow (*Mylopharodon conocephalus*)**	Sensitive	N/A	N/A	N/A
California red-legged frog (*Rana aurora draytonii*)**	Threatened	N/A	N/A	N/A
Foothill yellow-legged frog (*Rana boylii*)	Sensitive	MAI	WNA	BA/BE
Mountain yellow-legged frog (*Rana muscosa*)*	Sensitive	MAI	WNA	BA/BE
Northern leopard frog (*Rana pipiens*)**	Sensitive	N/A	N/A	N/A
Northwestern pond turtle (*Clemmys marmorata marmorata*)	Sensitive	MAI	WNA	BA/BE
Bald eagle (*Haliaeetus leucocephalus*)	Sensitive***	WNA	WNA	BA/BE
California spotted owl (*Strix occidentalis occidentalis*)	Sensitive	MAI	WNA	EA and BA/BE
Greater sandhill crane (*Grus canadensis tabida*)	Sensitive	MAI	WNA	BA/BE
Great gray owl (*Strix nebulosa*)	Sensitive	MAI	WNA	EA and BA/BE
Northern goshawk (*Accipiter gentilis*)	Sensitive	MAI	WNA	EA and BA/BE
Peregrine falcon (*Falco peregrinus anatum*)	De-Listed	WNA	WNA	BA/BE
Swainson's hawk (*Buteo swainsoni*)**	Sensitive	N/A	N/A	N/A
Willow flycatcher (*Empidonax trailii brewsteri*)	Sensitive	MAI	WNA	BA/BE
American marten (*Martes americana*)	Sensitive	MAI	WNA	EA and BA/BE
California wolverine (*Gulo gulo luteus*)	Sensitive	WNA	WNA	BA/BE
Pacific fisher (*Martes pennanti pacifica*)	Sensitive	MAI	WNA	EA and BA/BE
Pallid bat (*Antrozous pallidus*)	Sensitive	MAI	WNA	BA/BE
Sierra Nevada red fox (*Vulpes vulpes necator*)	Sensitive	WNA	WNA	BA/BE
Townsend's big-eared bat (*Corynorhinus townsendii*)	Sensitive	MAI	WNA	BA/BE
Western red bat (*Lasiurus blossevillii*)	Sensitive	MAI	WNA	BA/BE

* The Sierra Nevada population of the mountain yellow-legged frog designated as a candidate species by USFWS (Federal Register January 16, 2003 Volume 68, #11), but listing under the Endangered Species Act is precluded by the need to take other listing actions of a higher priority.

**These wildlife species are not further analyzed either because their range is above the elevation or there is no suitable habitat within the Grizz Wildlife Analysis Area for them and there have been no observations. Please see the discussion in the next paragraph.

Note: N/A-Not applicable

***The bald eagle was delisted in the Federal Register on July 9, 2007 and became effective 30 days later

BA/BE-Grizz wildlife biological assessment/biological evaluation

EA-GrizzProject environmental assessment

MAI-May affect individuals, but not likely to result in a trend toward Federal listing or loss of viability

WNA-Will not affect

There have either been no known habitat, no observations and/or the Grizz Wildlife Analysis Area is above the elevational range for the following threatened or endangered species (Table 3.24): Valley elderberry longhorn beetle and California red-legged frog. There is also no suitable habitat and have been no observations for the following sensitive species (Table 3.24): hardhead minnow, Northern leopard frog and Swainson's hawk within the Grizz Wildlife Analysis Area. Therefore, these five species will not be discussed further in the Grizz EA or the Grizz Wildlife BA/BE (USFS 2007h).

3.6.2 Affected Environment

3.6.2.1 Scope of the Analysis

Geographic Analysis Area: The proposed treatment area is located in predominately Sierra mixed conifer forest habitat. The Treatment Area is defined as the units to be treated. This includes approximately 2,106 to 2,558 acres of DFPZ, 1,061 to 1,580 acres of Area Thinning, up to 143 acres of group selections and access roads to the groups. The Project Area is defined as the treatment area plus an additional larger land base which encompasses all of the treatment area which equals approximately 19,408 acres of which 19,012 acres are National Forest Lands. This project area is located at elevations ranging from approximately 5,000 feet at Little Grizzly Creek to about 8,000 feet around Mt. Ingalls. For the purpose of the BA/BE, the Wildlife Analysis Area is defined as the project area (which includes treatment areas) plus an additional larger land base (Figure 13). The additional larger land base was delineated based on the potential indirect and cumulative effects on California spotted owl Protected Activity Center (PAC) and Home Range Core Area (HRCA) distribution. So the Wildlife Analysis Area goes out to and encompasses the closest PACs/HRCAs to the project area. The Wildlife Analysis Area totals approximately 64,561 acres (Figure 13) of which 54,594 acres are National Forest Lands. This Wildlife Analysis Area is also being used for all other wildlife species analyzed in this BA/BE since the effects of the project to those species would not extend beyond the Wildlife Analysis Area boundary for the California spotted owl. All direct, indirect and cumulative effects discussed, occur within this 64,561 acre Wildlife Analysis Area. The direct and indirect effects of each alternative, together with the additive or cumulative effects of each alternative, have been considered in evaluating impacts to TES species and TES habitat.

Timeframe of Analysis: The timeframe used for determining cumulative effects depends on the length of time that lingering effects of the past actions would continue to impact the species in question. For the Grizz Project, general information based on the history of the area and sight specific information based on available data, going back approximately 25 years and forward approximately 5 years was incorporated.

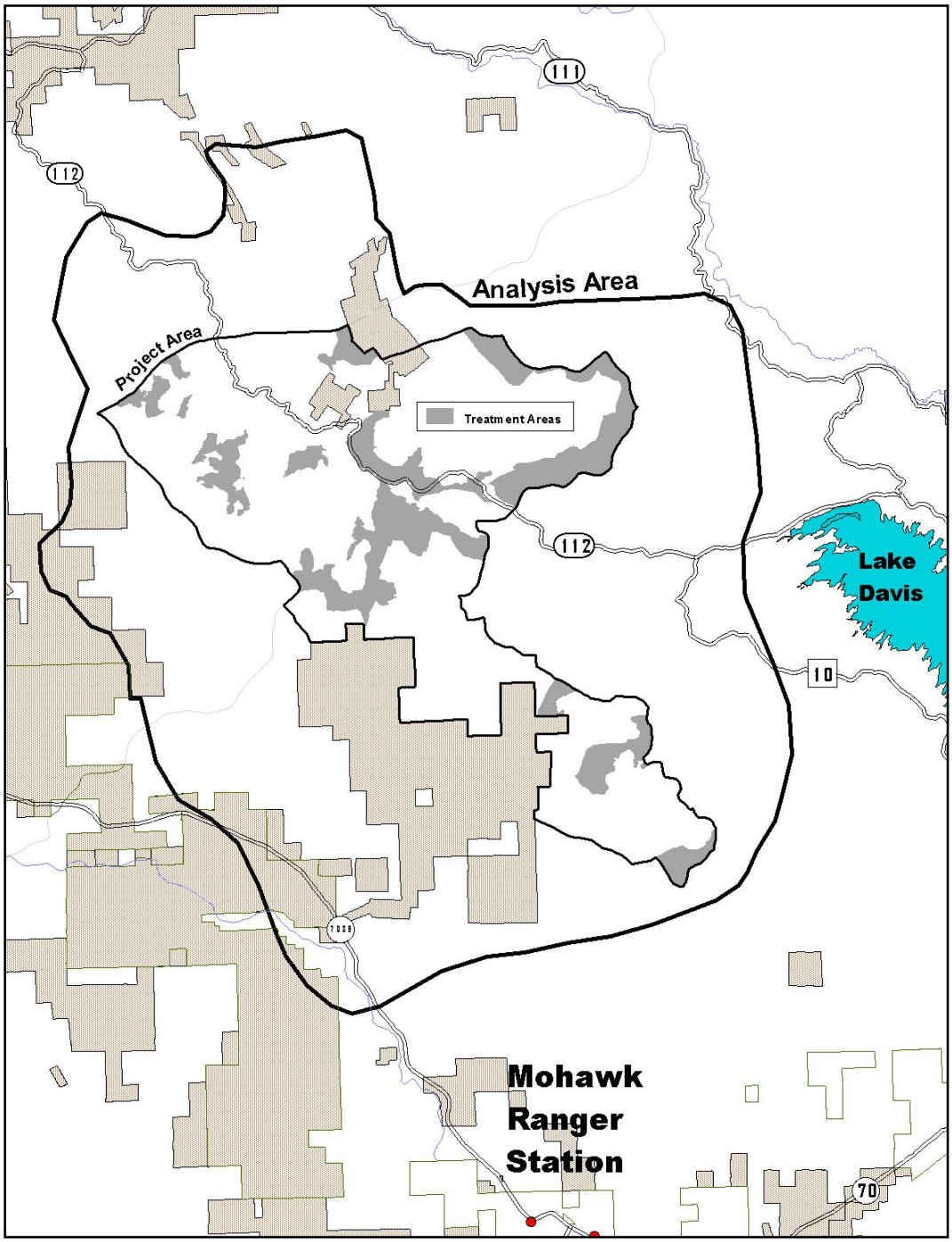

Figure 13 Grizz Wildlife Analysis Area, Project Area and Treatment Area

3.6.2.2 Analysis Methodology

The Grizz Project was reviewed using aerial photographs, digital orthophoto quadrangles (DOQs), vegetation layer spatial datasets, species specific spatial datasets and known information to help determine suitable habitat for TES species (i.e. California spotted owls, Northern

goshawks, etc). In the field, areas identified as suitable habitat are surveyed to the following R5 protocols and acceptable standards:

- "Standardized protocol for Surveying Aquatic Amphibians" (Fellers and Freel 1995)
- "Western Pond Turtle Survey Methods" (Reese 1993)
- "Protocol for Surveying for Spotted Owls in Proposed Management Activity Areas and Habitat Conservation Areas March 12, 1991 (Revised February 1993)"
- "Survey Methodology for Northern Goshawks in the Pacific Southwest Region, U.S. Forest Service" (USDA Forest Service 2000)
- "Survey Protocol for the Great Gray Owl in the Sierra Nevada of California, May 2000" (USDA Forest Service 2000)
- "A Willow Flycatcher Survey Protocol for California, May 29, 2003" (Bombay, et al. 2003)
- "American Marten, Fisher, Lynx and Wolverine: Survey Methods for Their Detection" (Zielinski and Kucera 1995)

Consultation also took place with various agencies in addition to the wildlife surveys. From February 10 to August 3, 1999 a series of informal meetings and written correspondence occurred between the USDA Forest Service and USFWS regarding the development of the HFQLG FEIS (See programmatic Biological Assessment and Evaluation of Herger-Feinstein Quincy Library Group Forest Recovery Act (Rotta 1999) pg 5, for specific topics discussed and timelines). As a result, the Forest Service incorporated the recommended measures provided by USFWS for the bald eagle and California red-legged frog (USDA Forest Service 1999).

The Draft Study Plan for the Plumas and Lassen National Forests Administrative Study, dated September 12, 2001, was reviewed by the USFWS, as was the Proposed Action for the Administrative Study dated December 10, 2002. A USFWS letter dated January 31, 2003 responded to the initial Proposed Action, expressing concern over road construction needed for access to group selection harvest units and its effect on fragmentation to old forest dependent species.

One of the measures mentioned above from the HFQLG FRA FEIS ROD directs the forests, in consultation with the USFWS, to complete a bald eagle management plan for any proposed management activities within an active bald eagle territory. Following this direction the BKRD consulted with Kathy Brown of the USFWS regarding the development of the Lake Davis Bald Eagle Habitat Management Plan (BEHMP) a series of informal emails during the month of April 2004. During the month of April the BKRD also solicited input from both Julie Cunningham and Ron Jurek of the California Department of Fish and Game (CDFG). All input gathered during this time was incorporated into the final BEHMP. The final BEHMP was sent to the USFWS on June 14, 2004. On July 12, 2004 the PNF received a letter from the USFWS stating, "We have reviewed this BEHMP and feel that it adequately addresses the needs of the Lake Davis bald eagles." As a result, the Forest Service incorporated the BEHMP into the Grizz Project design.

No consultation specific to the Grizz Project was done, since the project satisfied the BEHMP for Lake Davis and there were no effects to other listed or proposed species. A list of T&E species was provided by the "Federal Endangered and Threatened Species that may be affected by "Projects on the Plumas National Forest", updated January 4, 2007, accessed via USFWS County list web page (http://www.fws.gov/sacramento/es/spp_lists/NFActionPage.cfm) (Appendix A).

On February 9th, 2007 the Proposed Action and alternatives, to be analyzed with an EA, were sent via email to Jim Lidberg of the California Department of Fish & Game. No issues were raised and no correspondence has occurred since with regard to the Grizz Project.

3.6.2.3 Current Conditions

Terrestial Habitat

Existing conditions within the proposed project include areas of moderate to high fuel loading. On average, surface and ladder fuels exceed levels necessary to achieve the desired conditions for DFPZ. The existing height to live crown is estimated to be one to five feet. Given the current surface fuel condition, combined with existing height to live crown, a wildfire in the 90th percentile fire weather condition would transfer fire from the surface to the tree canopy. Table 3.25 summarizes the amount of 4M, 4D, 5M, and 5D CWHR types within the Wildlife Analysis Area.

Table 3.25 Summary of CWHR 4M, 4D, 5M, 5D acres within the Wildlife Analysis Area derived from vegetation layer (all acres are approximate and National Forest System Lands only)

CWHR Type*	Wildlife Analysis Area
DFR4D	286
DFR4M	424
DFR5D	127
EPN4D	124
EPN4M	269
EPN5D	26
EPN5M	3
JPN4D	190
JPN4M	163
LPN4D	52
LPN4M	282
LPN5D	111
MHC4D	66
MHC4M	55
MHC5D	38
MHC5M	11
MHW4D	6
MHW4M	49
RFR4D	248
RFR4M	1,598
RFR5D	409
RFR5M	277
SMC4D	3,982
SMC4M	12,184
SMC5D**	3,511
SMC5M	1,923
WFR4D	1,948
WFR4M	2,747
WFR5D	169
WFR5M	987
Total	**32,265**

*4=small 11-24"dbh, 5=medium/large >24"dbh. D= Dense Canopy Cover > 60%, M= Moderate Canopy 40-59%, DFR= Douglas-fir, EPN=Eastside Pine, JPN=Jeffrey Pine, LPN=Lodgepole Pine, MHC=Montane Hardwood-Conifer, MHW=Montane Hardwood, RFR=Red Fir, SMC=Sierran Mixed Conifer, WFR = White Fir.
** CWHR type 6 incorporated into 5D due to small amount of this type present in Wildlife Analysis Area.

Aquatic Habitat

The Grizz Project is located on the Beckwourth Ranger District within the 5th field Hydrologic Unit Code or HUC 5 of Lower Indian Creek and Lake Davis/Long Valley (a.k.a. Middle Fork Feather River) watersheds. Within the Wildlife Analysis Area there are 298 miles of perennial,

130 miles of intermittent and 90 miles of ephemeral streams for a total of 518 miles of streams. Of the 298 miles of perennial streams, approximately 53 miles are fish bearing streams. The main drainages within the Wildlife Analysis Area include Little Grizzly, Dolly, Lovejoy, Blakeless, and Long Valley Creeks. Many of the small tributaries flowing into Little Grizzly and Long Valley Creeks originate from springs situated in their headwaters.

Little Grizzly, Blakeless and Long Valley Creeks are relatively sensitive stream systems with high fishery values. The streams and tributary reaches along Little Grizzly, Long Valley, Blakeless, Lovejoy, Dolly and Emigrant Creeks are in poor to fair condition. Little Grizzly and Dolly Creeks are both identified by the State Water Resources Control Board (State Board) and Regional Water Quality Control Boards (Regional Boards) as impaired water bodies due to high levels of copper and zinc caused by mining activities that occurred at Walker Mine before 1940. This is in accordance with section 303(d) of the Federal Clean Water Act (33 USC § 1313 (d)). In addition the State and Regional Boards have established total maximum daily loads (TMDLs). These TMDLs were approved by the United States Environmental Protection Agency, for Little Grizzly and Dolly Creeks. TMDLs are used to develop a plan for implementation to ensure that the listed impaired water bodies will meet all applicable standards by a proposed completion date (California Regional Water Quality Control Board 2005). See the Grizz Watershed and Soils section or the Grizz Project CWE and Soils Assessment in the Grizz Project record and available upon request for further details on the watersheds and stream conditions.

3.6.3 Environmental Consequences-California Spotted Owl

3.6.3.1 Alternative 2 (No-action Alternative)

Direct and Indirect Effects

Spotted owl surveys have occurred within the Wildlife Analysis Area. There would be no direct effects on spotted owl or spotted owl protected activity centers (PACS), home range core areas (HRCAs) or spotted owl habitat areas (SOHAs). A total of thirteen PACs with associated HRCAs are in the Wildlife Analysis Area (Figure 14). There are two 1,000-acre base SOHAs located within the Wildlife Analysis Area (Figure 14). PACs and HRCAs have been delineated for these SOHAs and are included in the total of thirteen PACs and HRCAs in the Wildlife Analysis Area. Eleven percent or 6,083 acres of the 54,594 acre Wildlife Analysis Area on National Forest System lands are protected for spotted owls via designated PACs and SOHAs. No activities would occur that would cause disturbance to nesting or foraging birds, nor any impacts to the existing habitat conditions (Table 3.26).

Table 3.26 Acres of high capability suitable California spotted owl habitat on National Forest land within Wildlife Analysis Area.

CWHR Type*	Habitat Type	Acres in Wildlife Analysis Area
4M	Foraging	17,771
4D	Foraging	6,902
5M	Nesting	3,201
5D	Nesting	4,391
Total	**Suitable**	**32,265**

*4=small 11-24"dbh, 5=medium/large >24"dbh. D= Dense Canopy Cover > 60%, M= Moderate Canopy 40-59%. CWHR size class 6 was lumped into CWHR 5D due to small amount of this type present in Wildlife Analysis 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 owl nesting habitat and other important habitat attributes such as large trees, large snags and down woody material. If a large fire occurred suitable owl habitat could become patchy and could lead to reduced or lower abundance of owls within the Wildlife Analysis Area.

With the current PNF woodcutting program, the project area (excluding the lake side of 24N10 and surrounding Lake Davis) would be open to public woodcutting 12 months a year, limited only by available access. Uncontrolled public use within the areas used by spotted owls, especially during the nesting season, could cause disturbance that could disrupt and preclude successful nesting. No roads would be closed or decommissioned with this alternative.

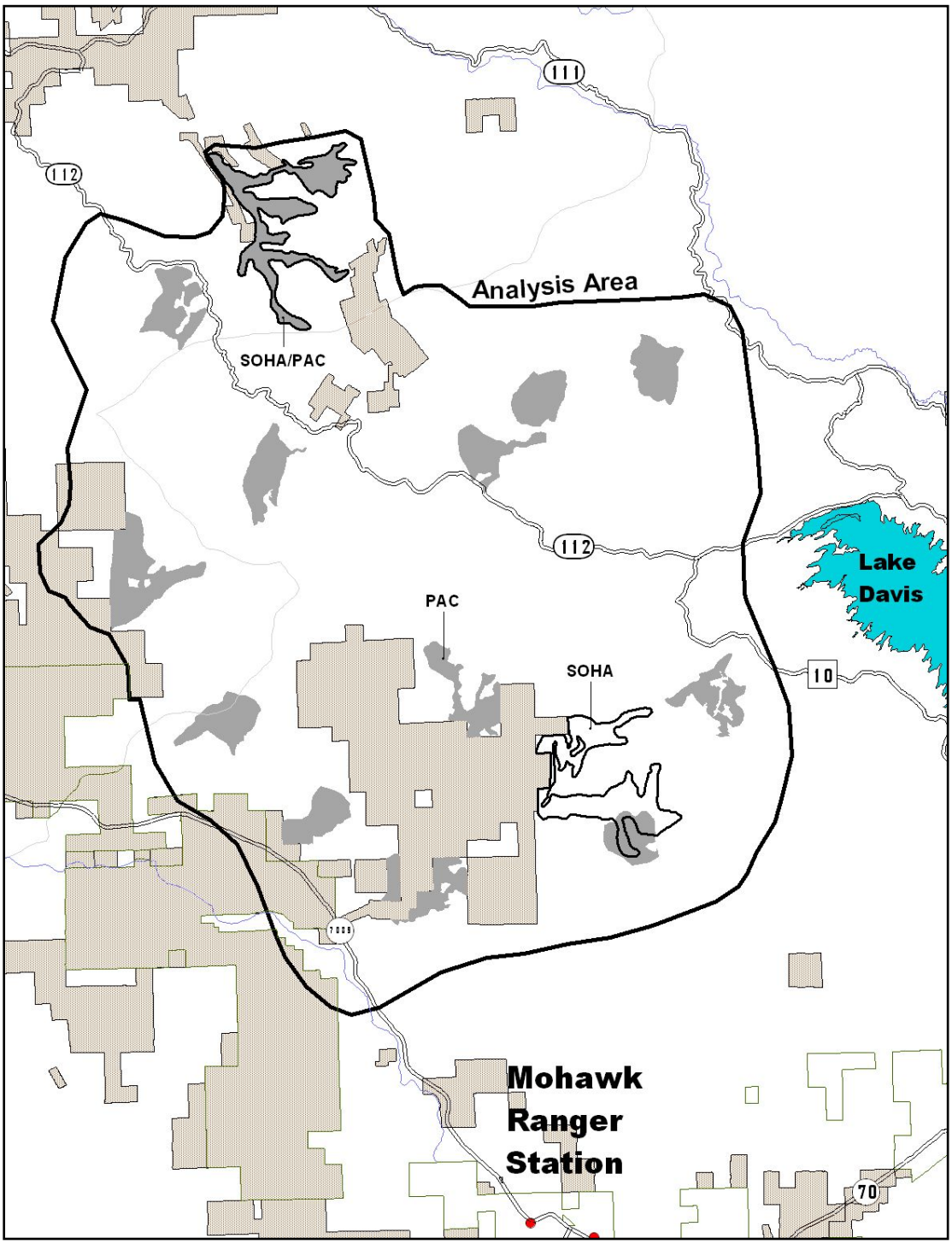

Figure 14 Grizz Wildlife Analysis Area with 300 acre California Spotted Owl Protected Activity Centers (PACs) (solid color) and 1,000 acre Spotted Owl Habitat Areas (SOHAs) (black outline).

Cumulative Effects

The No-action Alternative for the Grizz Project would not provide for the long-term protection of spotted owl habitat from catastrophic fire. 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 (2001)), which could lead to lower owl abundance from existing condition within the Wildlife Analysis Area. There would be no thinning that could enhance the growth of dominant and co-dominant (20”-30”) trees that may provide future habitat availability.

3.6.3.2 General Effects of the Action Alternatives

Direct and Indirect Effects

Potential direct effects on the spotted owl may result from the modification or loss of habitat or habitat components. Direct mortality could occur if nest trees are felled but this would be exceedingly rare. The Proposed Action and alternatives would not cut or remove nest trees. In addition, disturbances associated with logging, temporary road building, or other associated activities within or adjacent to occupied habitat may disrupt nesting, fledging, and foraging activities. Implementation of Limited Operating Period (LOP) around known spotted owl nests would remove the effects to existing owl pairs associated with direct disturbance on treatment units and access routes.

Based on the vegetation layer and the CWHR model, about 14% or 7,592 acres within the Wildlife Analysis Area (54,594 NF acres) may be considered suitable spotted owl nesting habitat (5M, 5D, and 6), and about 45% or 24,673 acres may be considered suitable foraging habitat (4M and 4D) (see Table 3.25).

Changes to suitable habitat as a result of implementing fuels treatments in all action alternatives would occur due to the removal of large structural components and reduction in canopy cover to 40 - 50%. The more open canopied forested stands still retain the minimum canopy cover for suitable habitat but become unsuitable due to the removal of the needed structural components (snags, vertical and horizontal layering, down woody debris, etc.). DFPZ treatments will bring canopy cover down to 40%, the minimum to be classified as “M”, therefore the minimum to be considered foraging habitat. However, the removal of other important habitat components such as snags and vertical layering further diminish habitat value and render it unsuitable for foraging. Stands treated as Area Thin also decrease in habitat value due to a reduction in canopy cover to 50% and the removal of other important habitat components. There may also be some additional risk associated with isolated torching events during prescribed fire that could kill additional trees thus further opening up the canopy, and reducing foraging and nesting opportunities. Table 3.27 show the above mentioned changes to California spotted owl nesting and foraging habitat by alternative.

Table 3.27 Comparison of Action Alternatives 1, 3 & 4 on Spotted Owl Nesting & Foraging Habitat (4M, 4D, 5M, 5D) within the Wildlife Analysis Area

Foraging Habitat	Alternative 1 (PA) Acres			% (Alt. 1) Remaining in Wildlife Analysis Area	Alternative 3 Acres			% (Alt. 3) Remaining in Wildlife Analysis Area
	DFPZ	GS	Area Thinning w/biomass		DFPZ	GS	Area Thinning w/biomass	
4M*	-913	-87	-815	89.8%	-1155	-100	-881	88.0%
4D	-246	0	-133	94.5%	-263	-20	-174	93.4%
Total Foraging Change	**-1159**	**-87**	**-948**	**91.1% retained (-8.9%)**	**-1418**	**-120**	**-1055**	**89.5% retained (-10.5%)**
Nesting Habitat								
5M*	-42	0	-114	95.1%	-91	0	-72	94.9%
5D	-34	0	-5	99.1%	-34	0	-5	99.1%
Total Nesting Change	**-76**	**0**	**-119**	**97.4% retained (-2.6%)**	**-125**	**0**	**-77**	**97.3% retained (-2.7%)**
Foraging Habitat	**Alternative 4 Acres**			**% (Alt. 4) Remaining in Wildlife Analysis Area**				
	DFPZ	**GS**	**Area Thinning w/biomass**					
4M*	-1155	-92	-621	89.5%				
4D	-263	-10	-119	94.3%				
Total Foraging Change	**-1418**	**-102**	**-740**	**90.8% retained (-9.2%)**				
Nesting Habitat								
5M*	-91	0	-56	95.4%				
5D	-34	0	-3	99.2%				
Total Nesting Change	**-125**	**0**	**-59**	**97.6% retained (-2.4%)**				

*Reductions shown here are due to the removal of understory structural components leading to unsuitable foraging and nesting habitat.

Irwin & Rock (2004) found that probability of stand use by spotted owl increased strongly as basal area rose from 80 to 320 square feet/acre (optimum range 160-320 square feet/acre) and was positively influenced by the number of trees/acre that were >26” dbh. With the implementation of Alternatives 1, 3 and 4 in treatment areas (DFPZ & Area Thinning), the residual basal area in 4M would be approximately 192 square feet/acre, approximately 236 square feet/acre in 4D, approximately 242 square feet/acre in 5M and 5D based on the Forest Vegetation Simulator (FVS) model (see Grizz Forest Vegetation Report for data tables). Current large tree (>24” dbh) densities range from 5 to 29 per acre; averaging 15 large trees per acre, similar to the 5-30 large trees per acre in the pre-European period (see Grizz Forest Vegetation Report). These figures represent what is projected to remain on site immediately after project implementation.

No fuels treatments, including DFPZ construction, group selection, Area Thin with biomass removal would occur within the designated 1,000 acre SOHA or 300 acre PACs. The two SOHAs and thirteen PACs equal approximately 4,686 acres owl habitat that would be retained and remain suitable within the Wildlife Analysis Area on National Forest System land.

Habitat alteration by the Proposed Action and action alternatives and the associated risks to known owl occupancy within individual HRCAs is displayed in Table 3.28. The acres of habitat change range from a high of 139 - 291 acres in HRCA associated with PAC PL096 (Alternative 1, 3 & 4) to a low of 0 - 94 acres in HRCA associated with PL274 (Alternative 1, 3 & 4); the average reduction in suitable acres for the 5 HRCAs would be 97 acres with Alternative 1, 140 acres with Alternative 3 and 52 acres with Alternative 4.

Within the Wildlife Analysis Area there are approximately 13,662 acres of PAC and HRCA combined; thus approximately 94-98% of all PAC/HRCA combined acres would not be treated under the action alternatives.

Table 3.28 Habitat Impacts and Risks for 3 Directly Affected HRCAs associated with owl occupancy.

PAC	Occupancy*	Most HRCA Acres Treated^	Acres in HRCA	% HRCA Treated	Acres PAC & HRCA	% HRCA/ PAC** Treated	Suitable Habitat Reduction (acres) by alternative					Potential Risk to PAC viability
							1		3		4	
PL078	M	123	723	17.0%	1,081	11.4%	55		95		0	Moderate
PL080	H	108	701	15.4%	1,001	10.8%	102		101		0	Moderate
PL096	M	342	731	46.8%	1,054	32.4%	208		291		139	High
PL242	M	165	797	20.7%	1,105	14.9%	120		120		119	Moderate
PL274	M	98	709	13.8%	1,058	9.3%	0		94		0	Moderate
		836	**3,661**	**22.8%**	**5,299**	**15.8%**	**485**		**701**		**258**	

*High Occupancy: Reproduction documented the last two years and/or pair occupancy during the last two years,
Medium Occupancy: Reproduction in 1992 and/or pair occupancy after 1992; single owl found at least one of the last 2 years,
Low Occupancy: Reproduction and/or pair occupancy not documented since 1992, no owls found the last two years.
**HRCA/PAC is the combination of the minimum 300 acre PAC and 700 acre Core as a 1000+ acre unit; NO PAC IS TREATED WITH THE PROPOSED ACTION ALERNATIVES, only HRCAs are subject to treatment.
^HRCA treated acres reflect Alternative 3 which treats the greatest number of acres.

Potential risk to owl PAC viability is a subjective rating based on the relationship of total acres of PAC/HRCA, the percentage of the PAC associated HRCA acres being treated and the amount of suitable habitat potentially affected. It is speculated that PAC/HRCA viability (ability to be occupied by owls) for those PAC/HRCAs that are at or below 1000 acres and incur more acres of treatment (>10% PAC/HRCA treated), especially within suitable habitat, is put at higher risk than those treatments on larger PACs/HRCAs with less acres treated. This speculation is based on the premise that removing suitable habitat within an owls home range tends to reduce the productivity and survivorship of resident owls (Bart 1995, Hunsaker 2002). As can be seen in Table 3.28, all PAC/HRCA habitats exceed 1000 acres and thus are buffered with additional acres over SNFPA standards & guidelines.

As part of a strategic system of DFPZs, this project would reduce the potential for high-severity wildfires, which could eliminate vast tracts of habitat for this species. There has been a

lack of large fires in recent history in the Grizz Project area. This raises a concern, since surface and ladder fuels have accumulated to the extent that stand replacing wildfires are increasingly likely (Grigg 2007).

Home ranges of neighboring spotted owls commonly overlap (Verner et al. 1992: 149). The action alternatives that eliminate or modify habitat, possibly could cause a shift in owl home range use, increasing the potential for intraspecific competition between neighbors. The increased competition associated with using the same restricted habitat parcels could impact owl behavior, possibly affecting nesting and reproduction. Because of this, directly affected HRCAs could have an indirect affect on adjacent PAC/Home Ranges not directly affected by the Proposed Action, especially if the directly affected HRCA overlaps with another HRCA. There are a total of 13 PACs/HRCAs within the Wildlife Analysis Area (including two SOHA); 5 directly affected and 8 indirectly affected.

Based on acres affected within individual HRCAs displayed in Tables 3.27 to 3.28, it is difficult to predict if there would be a shift in owl use due to habitat alteration. Two HRCAs directly affected by potential habitat reduction as a result of this project are located immediately adjacent to each other between Mt. Ingalls and Little Summit Lake (PL096 and PL242).

It is uncertain as to whether the same number of owl sites occupied in 2005 and 2006 (seven and four) would be occupied within the Wildlife Analysis Area post project. Because PACs and SOHAs are avoided by treatments and the majority of the habitat within the 700 acre plus HRCAs would not be affected by treatments, it is reasonable to assume that occupancy would be maintained. The remaining eight sites would have no change to habitat within PACs, and associated HRCAs would still be present that could support owl occupancy. Risks to owl occupancy are increased in PAC/HRCAs PL078, PL080, PL096, PL242 and PL274 due to changes in habitat in portions of HRCAs.

Fuel treatments including thinning and prescribed burning would result in a shift in stand microclimate that would have a negative impact to flying squirrels (Lehmkuhl et al 2006). These treated stands would have fewer trees, a less complex and more open canopy structure (<50% canopy cover), resulting in a higher variability stand microclimate, all of which create more xeric conditions that would likely lower availability and biomass of truffles. Retention of down woody material and the largest trees may retain some level of lichen and truffle diversity and biomass, providing flying squirrel forage resources within treated stands. With regular maintenance through prescribed burning every 10 or so years, downed wood would be hard to retain in the long term, resulting in lower density of truffles. These potential losses would be offset by the benefit that fuel treatment could have for reducing the large scale loss of habitat through wildfire. Less than 7% (3,619 to 4,057 of 54,594 acres) of the National Forest System land within the Wildlife Analysis Area would be treated with the Grizz Project, while 50,537 to 50,975 acres of National Forest terrestrial forested habitat would not be treated. Location of treatment acres are constrained across the landscape for various resource reasons (PACs & SOHAS for example)

such that this untreated habitat is spread across the Wildlife Analysis Area and thus would unlikely impact the distribution and viability of flying squirrel populations.

It is unknown as to how some of the important prey species preferred by spotted owls (woodrats and flying squirrels) would respond to group selection harvest units. With reforestation, as the brush/seedling habitat matures, woodrats may recolonize sooner as they are known to utilize earlier successional habitats (CWHR Version 8.0, and G.Rotta, personal communication). Downed logs created by the retention of snags would provide down woody structures that would provide habitat for prey species. Flying squirrels would likely be absent within the group selection openings but could possibly utilize the edges to their advantage, and would eventually inhabit these areas as the forest matures. It is unknown if these small openings within the forest would be used for foraging by spotted owls. Reforestation should shorten the timeframe to develop forested stands as well as accelerate the development of old forest conditions that owls prefer when compared to natural succession.

Habitat modeling conducted for the SNFPA FEIS and subsequent FSEIS to project trends in woodrat and flying squirrel habitat as a result of implementing fuels reduction activities and group selection harvest within the Sierra Nevada range, indicated that populations of both species would apparently increase slightly over current conditions, but the difference in populations in either the short or long-term would be very small.

In terms of acres treated, with the subsequent potential for snag removal, Alternative 3 treats approximately 371 more acres than Alternative 1; thus fewer snags could be removed (due to hazards, operability, etc) with Alternative 1. Alternatives 4 treats approximately 67 less acres than Alternative 1, thus this action alternative potentially retains the most snags of the three action alternatives.

Edges created by groups within suitable owl habitat may reduce the use of foraging habitat by spotted owls and may increase use by great horned owls, an effective competitor and predator of the spotted owl. Responses of prey species, as well as spotted owl use of group openings is one of the main objectives of the post implementation monitoring that would be conducted by the USFS Pacific South West (PSW) Research Station through the administrative study. Ongoing research by PSW would provide information as to the change in great horned owl use and occupancy and contribute knowledge as to the coexistence of these two species.

Cumulative Effects

The existing condition reflects the changes from all activities that have occurred in the past. The analysis of cumulative effects of the action alternatives evaluates the impact on TES wildlife from the existing condition within the Wildlife Analysis Area. The past actions in the Wildlife Analysis Area that contributed to the existing condition include grazing, mining, timber harvest, watershed restoration, and recreation use.

Grazing would be expected to continue on private and National Forest System lands at current levels. There are six livestock grazing allotments (Chase, Grizzly Valley Community,

Grizzly Valley, Long Valley, Mt. Ingalls and Willow Creek 2) that overlap with the Wildlife Analysis Area, three of which are active. All of the Grizzly Valley Community allotment is within the Wildlife Analysis Area. This activity would continue to degrade riparian habitats through the browsing of aspen, willow, etc. thus potentially affecting the diversity within spotted owl habitat.

The Dolly Creek Diversion Channel project, expected to begin in 2007, consists of construction of a new channel to convey all of Dolly Creek, except for large flood events, in a sealed, riprap channel to prevent the creek from being in contact with the Walker Mine tailings subsequently picking up copper pollution. This action should have negligible affects on spotted owls.

Future activities include on going work within the Humbug DFPZ, Freeman DFPZ and the planned Happy Jack DFPZ. Little to no change in overstory vegetation has occurred with the Humbug project which was implemented under the SNFPA FEIS 2001. The Freeman and Happy Jack DFPZs have similar design features as the Grizz Project. The timber harvest activities in these projects would reduce the availability of old forest (CWHR Habitat 4M, 4D, 5M and 5D) stand structure and characteristics by approximately 16% or 2,436 acres out of 14,990 acres in the Wildlife Analysis Area of the Happy Jack Project and approximately 1% or 147 acres out of 24,990 acres in the Wildlife Analysis Area of the Freeman Project.

Table 3.29 provides a cumulative total of the amount of suitable owl nesting habitat that has been reduced due to fuels treatments, group selection and Area Thinning projects implemented under HFQLG on the BKRD.

Based on Table 3.29, the three action alternatives in the Grizz Project could contribute to a cumulative reduction in spotted owl nesting habitat (a potential loss of 573-591 acres). It is uncertain as to what influence these various reductions in habitat would do to owl activity and occupancy within the Wildlife Analysis Area. As noted in the direct/indirect effects section, spotted owl PACs/SOHAs would not be entered for Grizz Project activities in order to conserve habitat for these species. Also additional PACs and HRCAs would be created in the future, if warranted by new site-specific owl information.

Table 3.29 Cumulative Reduction of California Spotted Owl Nesting Habitat (5M, 5D, 6) on Beckwourth RD

Project	Red Clover DFPZ/GS	Dotta DFPZ/GS	Last Chance DFPZ/GS	Poison DFPZ/GS	Crystal-Adams DFPZ/GS**	Humbug DFPZ	Mabie DFPZ
	Alt. 3*	**Alt. 2***	**Alt. 4***	**Alt. 4***	**Alt. 1***	**Alt. 3***	**Alt. 3***
Nesting Habitat	0 acres	0 acres	0 acres	1 acre	0 acres	0 acres	0 acres
Project	**Happy Jack DFPZ/GS**	**Freeman DFPZ/GS**	**Grizz DFPZ/GS**				
	Proposed Action	**Alt. 4***	**Alt. 1**	**Alt. 3**	**Alt. 4**	**Potential Cumulative Change**	
Nesting Habitat	9 acres	379 acres	195 acres	202 acres	184 acres	**573 – 591 acres**	

*Selected Alternative for the projects.
** Subsequent litigation dropped all group selections and applied a 12 inch upper diameter limit to the majority of the project area so the acres reflected in this table did not actually get reduced.

The Proposed Action for the Mt. Ingalls DFPZ, which is partly within the Wildlife Analysis Area, is currently under development with preliminary units identified. An additional potential project (Big Hill) involves fuel treatments and falls partly within the Wildlife Analysis Area near Grizzly Ridge. However, no site specific planning has occurred. Planning could potentially occur in 2008. The effects of these projects are expected to be similar to the Grizz Project effects. However, site-specific analysis of direct, indirect and cumulative effects of these projects would be documented in a separate analysis.

The cumulative effect of HFQLG pilot project actions, such as the Proposed Action, and other vegetation management actions in the Sierra Nevada was assessed in the SNFPA FSEIS, to which this assessment is tiered. The habitat modeling used for this assessment was intended to indicate the direction, magnitude and time frames (general trends) of change and was not intended to provide precise information. The SNFPA FSEIS (pages 260-280) acknowledged that suitable foraging habitat provided by CWHR size class 4 stands would diminish in early decades under SNFPA, but would be offset by increases in acreage of CWHR size class 5 and 6 stands. According to projections (FSEIS Chapter 4, table 4.3.2.3g, pg. 269), total spotted owl habitat in the HFQLG planning area would increase 11% twenty (20) years after SNFPA implementation. By year 50, the net gain would have dropped to 6%, and by year 130 there would be a net reduction of 7% in the pilot project area. In the Sierra Nevada bioregion as a whole, however, total habitat would increase 13% by year 20, 18% by year 50, and 20% for year 130. Within the HFQLG planning area, full implementation of HFQLG FRA under SNFPA 2004 ROD is projected to result in roughly 65,000 fewer acres of suitable habitat in year 20 than with SNFPA 2001 ROD (Alternative S1 in 2004 SNFPA FSEIS). This is primarily due to 1) implementation of

group selection harvest and 2) the fact that standards and guidelines for CWHR 4M and 4D do not have any minimum canopy cover requirements and have a 30% (DFPZ) - 40% (AT) basal area retention standard. Also, under the 2004 ROD, the canopy cover in CWHR class 5M, 5D and 6 stands are more likely to drop to 40% in DFPZs. (SNFPA FSEIS Chap 4, page 269). Because the spotted owl population is currently within the 95% confidence limits of a stable population (Franklin et al 2003 in SNFPA FSEIS 2004), the SNFPA FSEIS and BA/BE concluded that these cumulative habitat changes (within the range of the California spotted owl within both the Sierra Nevada and the HFQLG planning area) would not result in a trend toward listing or loss of viability of the California spotted owl.

Forest Vegetation Simulator (FVS) modeling of stand exam data indicates tree growth and subsequent habitat recovery follows the trends projected in the SNFPA FSEIS. All action alternatives that implement fuel treatments and Area Thinning with biomass removal in the Grizz Project result in providing suitable owl habitat over time (year 20) (see Forest Resources report in Project Record). Individual groups are also expected to be CWHR 3 by 20 years with structurally suitable habitat occurring beyond year 40.

Large scale changes in owl habitat as a result of recent wildfires and anticipated future fires in spotted owl habitat have been identified as a potential threat affecting spotted owl distribution (70 Federal Register, 35613, June 21, 2005). An annual average of 4.5 PACs have been lost or severely modified by wildfire since 1998 in the range of the California spotted owl (SNFPA FSEIS Chapter 3, page 145). Table 3.2.2.3b within the SNFPA FSEIS indicates that approximately 7 PACs on the PNF are considered lost due to fire effects. None of these PACs have been removed from the Plumas designated PAC network. At least three have been re-designated around the periphery of the Stream Fire and owls have been found in all three sites. Approximately 2,300 acres of suitable owl habitat (CWHR 4M, 4D, 5M, 5D, & 6) was lost with the Stream Fire. Spotted owls may have re-located in habitat outside of the fire perimeter, which could have resulted in increased crowding and competition with established owls. This resulted in lower owl numbers and occupancy in the general area. None of these large scale fires have occurred within the Grizz Project area.

The Personal Use Firewood program on the PNF is an ongoing program that has been in existence for years and is expected to continue. This program allows the public to purchase a woodcutting permit to remove firewood from National Forest System lands. The Grizz Project area, as well as the Wildlife Analysis Area (excluding the lake side of 24N10 and surrounding Lake Davis) is open to woodcutting. Snags and logs would continue to be removed, resulting in the cumulative loss of these habitat components across the landscape. Snags are recruited annually from live trees through natural processes at a rate that may sustain this loss within the Wildlife Analysis Area; snag and log removal is most common along, or within a short distance from, open roads. Closure of roads under the action alternatives would reduce the area accessible for woodcutting. The effect of this action would be to shift forest successional stages to somewhat

earlier stages, while generally retaining continuous forest cover which would have a nominal affect on the California spotted owl.

The documented range expansion of the barred owl has been hypothesized as a contributing factor in the decline of the Northern spotted owls, through both hybridization as well as replacing the Northern spotted owl in some areas. It is thought that this range expansion and subsequent Northern spotted owl displacement is related to forest fragmentation and the barred owls ability to adapt better to a mosaic of habitats. The latest information regarding barred owls versus Northern spotted owls can be found in Pearson and Livezey (2003). Some of the key points that this paper identifies are summarized here: 1) Northern spotted owls are more likely to abandon a site if barred owls take up residence close to that site, 2) that a combination of habitat lost due to timber harvest and the presence of barred owls may work together to put Northern spotted owl pairs at risk of losing their territories; 3) there is an increasing amount of evidence that barred owls occasionally kill Northern spotted owls, and 4) barred owls can cause a reduction in the Northern spotted owl populations by physically excluding them from historic sites and making those sites unavailable for recolonization.

Since 2001 approximately 111,843 acres have been surveyed using the two year protocol on the BKRD. No barred owls were found. No barred owls were discovered in either the spotted owl or great gray owl surveys conducted within the Grizz Project area in 2004 and 2005. Based on the studies that have been conducted in the Northern spotted owl range, barred owls seem to be more adaptable to habitat perturbations within suitable spotted owl habitat than spotted owls themselves. The potential exists for the barred owl to establish and compete with spotted owls within the Grizz Project area.

The Grizz Project is not located within any CASPO identified Areas of Concern (AOC). This project would not improve or exacerbate any of the habitat conditions within these two AOC.

3.6.3.3 Differences Between the Action Alternatives

There is no change in prescription of treatments among the different action alternatives. The action alternatives differ by the “footprint” of the activity and unit locations. The three Proposed Action alternatives avoid habitat modification within PACs/SOHAs. No changes in spotted owl PAC/HRCA/SOHA occupancy, distribution or the spotted owl population on the PNF is expected to occur. For further discussion regarding how the different alternatives affect the California spotted owl, please see the Grizz Wildlife BA/BE, available upon request from the Beckwourth Ranger District.

Alternative 1 (Proposed Action)

Direct and Indirect Effects

There is a potential decrease in spotted owl foraging habitat by about 2,194 acres out of 24,673 acres, and a decrease in nesting habitat by about 195 acres of 7,592 acres. This would leave

91.1% of the existing suitable foraging habitat and 97.4% of the existing suitable nesting habitat within the Wildlife Analysis Area.

Within 4 HRCAs, a total of approximately 485 acres of suitable habitat would become unsuitable, with the average reduction of 121 acres/HRCA.

Placement of groups in proposed densities could result in up to 87 acres of fragmented forest supporting more edge habitat than forest interior habitat, creating less risk and uncertainty associated with habitat suitability than all other action alternatives.

Cumulative Effects

Based on the direct/indirect effects, implementation of this alternative would contribute to cumulative effects on individual spotted owls and/or spotted owl habitat. There would be a cumulative reduction in habitat for the next 50 years in the fuel treatments and 50+ years in group selection areas. Because of the decrease to spotted owl foraging habitat, treatment within HRCAs and group selection, implementation of Alternative 1 involves a level of risk to owl habitat in the short term and uncertainty about future owl activity; this level of risk is less than Alternative 3.

Implementation of fuels treatments could decrease the likelihood of active crown fires and increase the ability of fire management to suppress, control, and contain fires. This could reduce the potential risk of increased large-scale habitat fragmentation, and loss of owl habitat as a result of high intensity wildfire. This alternative would decrease the risk of PAC loss due to wildfire for a minimum of seven PACs immediately adjacent to, and upslope, of fuels treatments. However, this alternative would be less effective in reducing fire risk due to its lack of connectivity to the future Mt. Ingalls DFPZ project.

Alternative 3

Direct and Indirect Effects

There is a potential decrease in spotted owl foraging habitat by about 2,593 acres of 24,673 acres, and a decrease in nesting habitat by about 202 acres of 7,592 acres, leaving 89.5% of the existing suitable foraging habitat and 97.3% of the existing suitable nesting habitat within the Wildlife Analysis Area.

Within 5 HRCAs, approximately 701 acres of suitable habitat would become unsuitable, with the average reduction of 140 acres/HRCA.

Placement of groups in proposed densities could result in up to 120 acres of matrix forest supporting more edge habitat than forest interior habitat, creating more risk and uncertainty associated with habitat suitability than all other action alternatives.

Cumulative Effects

Based on the direct/indirect effects, implementation of this alternative would contribute to cumulative effects on individual spotted owl and spotted owl habitat. There would be a cumulative reduction in habitat for the next 50 years in the fuel treatments and 50+ years in group

selection areas. Because of the decrease to spotted owl foraging habitat, treatment within HRCAs and group selection, implementation of Alternative 3 involves the highest risk of all alternatives to owl habitat in the short term and greatest uncertainty about future owl activity.

Implementation of fuels treatments could decrease the likelihood of active crown fires and increase the ability of fire management to suppress, control, and contain fires. This could reduce the potential risk of increased large-scale habitat fragmentation, and loss of owl habitat as a result of high intensity wildfire. This alternative would decrease the risk of PAC loss due to wildfire for a minimum of seven PACs immediately adjacent to, and upslope, of fuels treatments. However, this alternative would be more effective than Alternative 1 in reducing fire risk due to its connectivity to the future Mt. Ingalls DFPZ project.

Alternative 4

Direct and Indirect Effects

There is a potential decrease in spotted owl foraging habitat by about 2,260 acres of 24,673 acres, and a decrease in nesting habitat by about 184 acres of 7,592 acres, leaving 90.8% of the existing suitable foraging habitat and 97.6% of the existing suitable nesting habitat within the Wildlife Analysis Area.

Within 2 HRCAs, approximately 258 acres of suitable habitat would become unsuitable, with the average reduction of 129 acres/HRCA.

No groups in HRCAs with this alternative. Placement of groups in proposed densities could result in up to 102 acres of matrix forest supporting more edge habitat than forest interior habitat, creating additional risk and uncertainty associated with habitat suitability, but this risk is less than Alternative 3.

Cumulative Effects

Based on the direct/indirect effects, implementation of this alternative would contribute to cumulative effects on individual spotted owls and spotted owl habitat. There would be a cumulative reduction in habitat for the next 50 years in the fuel treatments and 50+ years in group selection areas. Because of the decrease to spotted owl foraging habitat, treatment within HRCAs and group selection, implementation of Alternative 4 involves a level of risk to owl habitat in the short term and uncertainty about future owl activity; this level of risk is less than either Alternatives 1 and 3.

Implementation of fuels treatments could decrease the likelihood of active crown fires and increase the ability of fire management to suppress, control, and contain fires. This could reduce the potential risk of increased large-scale habitat fragmentation, and loss of owl habitat as a result of high intensity wildfire. This alternative would decrease the risk of PAC loss due to wildfire for a minimum of seven PACs immediately adjacent to, and upslope, of fuels treatments. This alternative would also be more effective in reducing fire risk due to its connectivity to the future Mt. Ingalls DFPZ project.

3.6.3.4 Determinations

Alternative 2 (No-action Alternative)

It is the determination that the Grizz Project will not affect the California Spotted Owl.

Alternatives 1, 3 and 4

It is the determination that the Grizz Project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl. This determination is based on the following:

1. PAC avoidance;
2. retention of 89.5% to 91.1% of existing foraging habitat and 97.3% to 97.6% of existing nesting habitat on 54,594 acre of National Forest lands within the Wildlife Analysis Area (Alternatives 1, 3 & 4) of which 32,265 acres (7,592 acres nesting and 24,673 acres foraging) are considered suitable habitat. This retention of nesting and foraging habitat outside existing PACs would provide opportunities for future occupancy and population expansion;
3. at least 84% of all PAC and HRCA combined acres would not be treated with action alternatives;
4. with an average suitable habitat reduction within HRCAs ranging from 258 to 701 acres on 54,594 acre of National Forest lands within the Wildlife Analysis Area (Alternatives 1, 3 & 4), owl occupancy of each established PAC within the Wildlife Analysis Area should remain the same as pre-treatment;
5. the greatest risk to owl occupancy occurs within two PAC/HRCAs that have been occupied by owls within the last one to four years but have no documented reproductivity;
6. creation of a network of fuel reduction areas (DFPZs) designed to reduce the loss of habitat due to wildfire.

It is acknowledged that implementation of alternatives involve some risk to habitat and subsequent uncertainty with regards to owl activity. Alternative 3 poses the greatest risk and uncertainty, with Alternatives 1 and 4 having less risk respectively. Alternative 2 is not without risk to spotted owl habitat, as no action is taken to reduce existing fuel levels, create areas that could allow for better and more efficient fire suppression efforts, and leaves existing owl habitat vulnerable to large scale fragmentation as a result of wildfire.

3.6.4 Environmental Consequences-Great Gray Owl

3.6.4.1 Alternative 2 (No-action Alternative)

Direct and Indirect Effects

There would be no direct effects on great gray owls or great gray owl habitat, as no activities would occur that would cause disturbance to nesting or foraging birds, nor any impacts to the existing habitat conditions. Within the Wildlife Analysis Area on National Forest System lands

there are approximately 6,786 acres of habitat providing suitable nesting habitat capability and approximately 4,432 acres of habitat providing suitable foraging habitat capability (Table 3.30).

Table 3.30 Acres of Suitable Great Gray Owl Nesting and Foraging Habitat within the Wildlife Analysis Area on National Forest System Lands.

CWHR Type*	Habitat Type	Acres in Wildlife Analysis Area
Other (SGB and S/P forested stands)	Foraging	2,426
Meadows (AGS, PGS & WTM)	Foraging (optimal)	2,006
Total	**Foraging**	**4,432**
4M	Nesting	4,615
4D	Nesting	1,437
5M	Nesting (optimal)	414
5D	Nesting (optimal)	320
Total	**Nesting**	**6,786**

*4=small 11-24"dbh, 5=medium/large >24"dbh. D= Dense Canopy Cover > 60%, M= Moderate Canopy 40-59%, P= Open Canopy 25-39%, S= Sparse Canopy 10-24%, AGS= Annual Grasslands, PGS= Perennial Grasslands, SGB= Sagebrush, WTM= Wet Meadow. CWHR size class 6 was lumped into CWHR 5D due to small amount of this type present in Wildlife Analysis Area.

Based on detections and confirmations, three large preliminary PACs have been established with one of the three preliminary PACs being in the Grizz Wildlife Analysis Area (Figure 15).

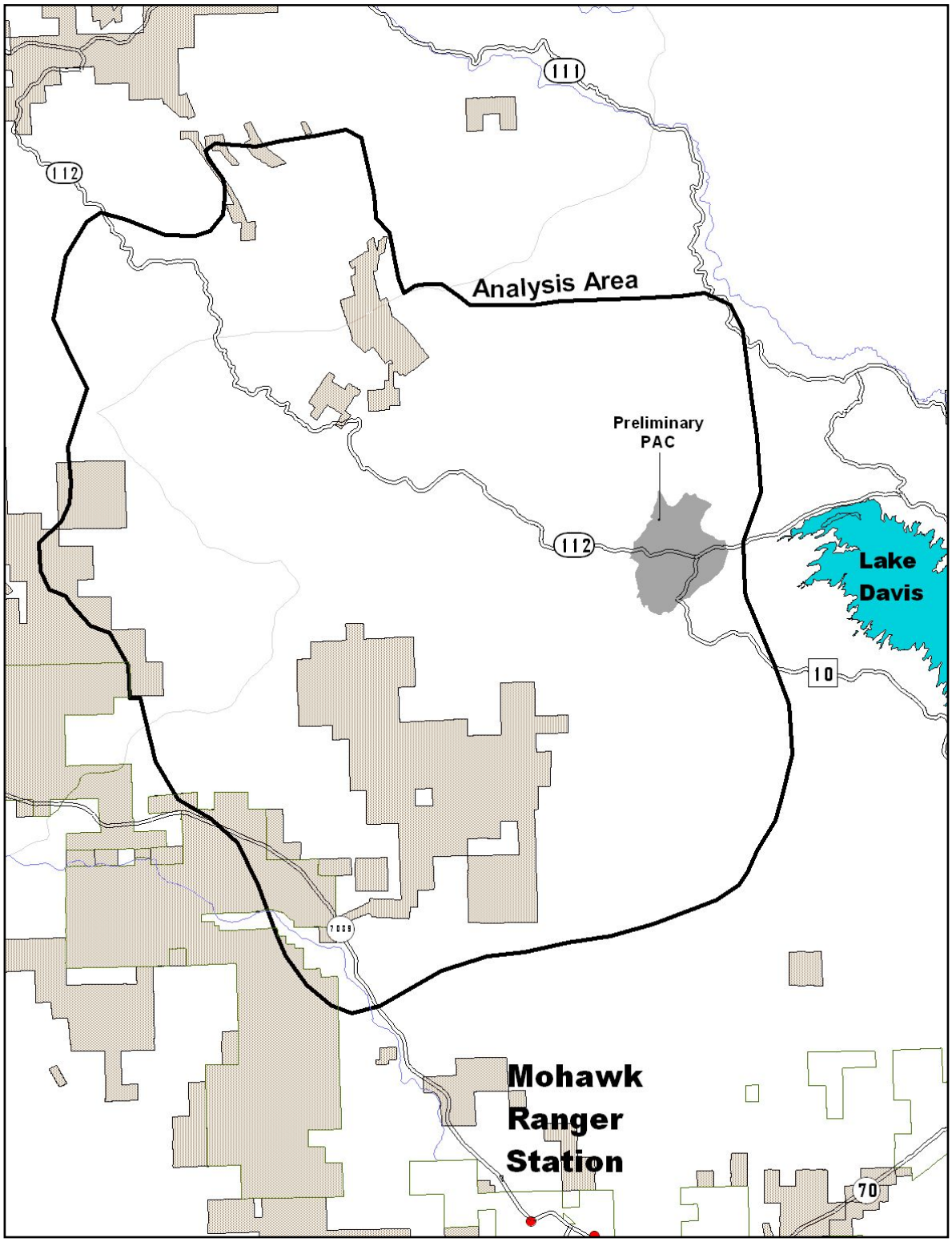

Figure 15 Grizz Wildlife Analysis Area with Preliminary Great Gray Owl Protected Activity Centers (PACs) (solid color)

These preliminary PACs encompass the majority of the detection made in 2004 through 2006. Further surveys will be necessary in order to better define these preliminary PACs which range

from 338 acres to 1,053 acres in size. For the Grizz Project, the one preliminary PAC boundary will be used for the analysis of effects (direct, indirect and cumulative).

Indirect effects of No-action Alternative 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 great gray owl nesting habitat and other important prey habitat attributes such as large trees, large snags and down woody material.

With the current PNF woodcutting program, the project area (excluding the lake side of 24N10 and surrounding Lake Davis) would be open to public woodcutting 12 months a year, limited only by available access. Uncontrolled public use within the areas used by great gray owls, especially during the nesting season, could cause disturbance that could disrupt and preclude successful nesting.

Cumulative Effects

The No-action Alternative for the Grizz Project would not provide for the long-term protection of great gray owl habitat from stand-replacing fire. There would be no actions designed to reduce the risk of high intensity wildfire. The total acres of wildfire and acres of high intensity wildfire are anticipated to increase from current levels under this alternative (based on analysis conducted in SNFPA (2001). There would be no thinning that could enhance the growth of dominant and co-dominant (20”-30”) trees that may provide future habitat availability.

3.6.4.2 General Effects of the Action Alternatives

Direct and Indirect Effects

Potential direct effects on the great gray owl may result from the modification or loss of habitat or habitat components through thinning (reduced canopy cover and availability of future nest trees), and through underburning (snag/log and tree removal, safety hazards, etc.). Disturbances associated with logging, temporary road building, or other associated activities within or adjacent to occupied habitat may disrupt nesting, fledging, and foraging activities. Implementing limited operating periods within 600 feet of occupied meadow habitats and restricting harvest activity within ½ mile of nest sites (if discovered) would reduce or completely eliminate potential disturbance impacts to this species from the Proposed Action.

Based on the vegetation layer and the CWHR model, about 12% or 6,786 acres within the Wildlife Analysis Area (54,594 NF acres) may be considered suitable great gray owl nesting habitat (4M, 4D, 5M, 5D, and 6 within 300 yards of a meadow) (USDA Forest Service 2004), and about 8% or 4,432 acres may be considered suitable foraging habitat such as meadows and open forested stands (CWHR S and P). In the Grizz Wildlife Analysis Area, 1% or 320 acres of the above nesting habitat is composed of 5D (optimal), 1% or 414 acres is composed of 5M (optimal), 3% or 1,437 acres is composed of 4D, and 8% or 4,615 acres is composed of 4M.

Additionally in the Grizz Wildlife Analysis Area, 4% or 2,006 acres of the above foraging habitat is composed of meadow (optimal) and 4% or 2,426 acres is composed of other (sagebrush and CWHR S/P stands) (See Table 3.30).

Changes to suitable habitat as a result of implementing fuels treatments in all action alternatives would occur due to the removal of large structural components and reduction in canopy cover to 40 - 50%. The more open canopied forested stands still retain the minimum canopy cover for suitable habitat but become unsuitable due to the removal of the needed structural components (snags, vertical and horizontal layering, down woody debris, etc.). DFPZ treatments will bring canopy cover down to 40%, the minimum to be classified as "M", therefore the minimum to be considered foraging habitat. However, the removal of other important habitat components such as snags and vertical layering further diminish habitat value and render it unsuitable for foraging. Stands treated as Area Thin also decrease in habitat value due to a reduction in canopy cover to 50% and the removal of other important habitat components. There may also be some additional risk associated with isolated torching events during prescribed fire that could kill additional trees thus further opening up the canopy, and reducing foraging and nesting opportunities. Table 3.31 shows the above mentioned changes to great gray owl nesting habitat by alternative.

Table 3.31 Comparison of Action Alternatives 1, 3 & 4 on Great Gray Owl Nesting Habitat (4M, 4D, 5M, 5D) within the Wildlife Analysis Area.

Nesting Habitat	Alternative 1 (PA) Acres			% (Alt. 1) Remaining in Wildlife Analysis Area	Alternative 3 Acres			% (Alt. 3) Remaining in Wildlife Analysis Area
	DFPZ	GS	Area Thinning w/biomass		DFPZ	GS	Area Thinning w/biomass	
4M*	-215	-23	-136	91.9%	-360	-38	-227	86.5%
4D	-35	0	-19	96.2%	-41	-3	-28	95.0%
5M*	-8	0	-15	94.4%	-12	0	-15	93.5%
5D	-17	0	-1	94.4%	-17	0	-1	94.4%
Total Nesting Change	**-275**	**-23**	**-171**	**93.1% retained (-6.9%)**	**-430**	**-41**	**-271**	**89.1% retained (-10.9%)**
Nesting Habitat	**Alternative 4 Acres**			**% (Alt. 4) Remaining in Wildlife Analysis Area**				
	DFPZ	**GS**	**Area Thinning w/biomass**					
4M*	-360	-30	-126	88.8%				
4D	-41	-1	-17	95.9%				
5M*	-12	0	0	97.1%				
5D	-17	0	-1	94.4%				
Total Nesting Change	**-430**	**-31**	**-144**	**91.1% retained (-8.9%)**				

* Reductions shown here are due to the removal of understory structural components leading to unsuitable nesting habitat.

No preliminary PACs would be entered with the action alternatives. Implementation of the action alternatives during the nesting season around known nest sites could cause disturbance that could disrupt nesting behaviors and potentially lead to nest failure. The risk of this occurring is tempered by the delineation of a preliminary PAC and/or implementation of a LOP prohibiting disturbing activities from occurring within ¼ mile from nest sites.

Group selection openings created within the same watersheds as the existing suitable habitat could provide additional foraging habitat. Project activities are not expected to result in indirect effects, nor are they expected to create conditions that would not allow for occupancy and establishment of a great gray owl territory around the suitable meadow habitat within the project area.

Cumulative Effects

The existing condition reflects the changes of all activities that have occurred in the past. The analysis of cumulative effects of the action alternatives evaluates the impact on TES wildlife from the existing condition within the Wildlife Analysis Area. The past actions in the Wildlife Analysis Area that contributed to the existing condition include grazing, mining, timber harvest watershed restoration, and recreation use. Cumulative effects on the great gray owl are similar to those described for the California spotted owl.

Cumulative effects on the great gray owl could occur with the incremental loss of the quantity and/or quality of habitat for this species. Overall, increases in urbanization, increases in recreational use of Forest Service system lands, and the utilization of natural resources on private and federal lands may contribute to habitat loss for this species. High intensity crown fires have contributed and would continue to contribute to loss of habitat for this species.

Grazing would be expected to continue on private and National Forest lands at current levels. There are six livestock grazing allotments (Chase, Grizzly Valley Community, Grizzly Valley, Long Valley, Mt. Ingalls and Willow Creek 2) that overlap into the Wildlife Analysis Area, three of which are active. All of the Grizzly Valley Community allotment is within the Wildlife Analysis Area. This activity would continue to impact meadow vegetation thus potentially affecting prey species (voles and pocket gophers) abundance and availability due to the lack of suitable breeding, foraging and hiding cover.

The Dolly Creek Diversion Channel project, expected to begin in 2007, consists of construction of a new channel to convey all of Dolly Creek, except for large flood events, in a sealed, riprap channel to prevent the creek from being in contact with the tailings and picking up copper pollution. Approximately 1,500 feet of this new channel will be constructed on the hillside along the northern edge of the tailings and the remaining 1,800 feet will be constructed across the tailings. The new channel will be lined with High-density Polyethylene (HDPE) for the entire length so the stream flow will not come in contact with the tailings. This action should improve the meadow hydrology thus potentially improving great gray owl foraging habitat.

Table 3.32 provides a cumulative total on the amount of suitable great gray owl nesting habitat that has been impacted by the fuels treatments, group selection and Area Thinning projects implemented under HFQLG on the BKRD.

Table 3.32 Cumulative Changes (Reduction) in Great Gray Owl Nesting Habitat on the Beckwourth RD

Project	**Red Clover DFPZ/GS**	**Dotta DFPZ/GS**	**Last Chance DFPZ/GS**	**Poison DFPZ/GS**	**Crystal-Adams DFPZ/GS****	**Humbug DFPZ**	**Mabie DFPZ**
	Alt. 3*	**Alt. 2***	**Alt. 4***	**Alt. 4***	**Alt. 1***	**Alt. 3***	**Alt. 3***
Nesting Habitat	0 acres	0 acres	0 acres	0 acre	0 acres	0 acres	0 acres
Project	**Happy Jack DFPZ/GS**	**Freeman DFPZ/GS**	**Grizz DFPZ/GS**				
	Alt. 1	**Alt. 4***	**Alt. 1**	**Alt. 3**	**Alt. 4**	**Potential Cumulative Change**	
Nesting Habitat	0 acres	1,882 acres	469 acres	742 acres	605 acres	**2,351 – 2,624 acres**	

*Selected Alternative for the projects.
** Subsequent litigation dropped all group selections and applied a 12 inch upper diameter limit to the majority of the project area so the acres reflected in this table did not actually get reduced.

Based on Tables 3.31 and 3.32, the Grizz Project potentially contributes to a cumulative reduction in great gray owl nesting habitat. It is uncertain as to what influence these various reductions in habitat would have on great gray owl activity and occupancy within the Wildlife Analysis Area. However, it is not anticipated that this cumulative habitat reduction would result in loss of occupancy or productivity of the preliminary great gray owl PACs, based on no entry into preliminary PACs, the location of project activities to preliminary PACs, distribution of preliminary PACs across the Wildlife Analysis Area, and retention of at least 89% of available suitable nesting habitat distributed across the Wildlife Analysis Area on National Forest System lands post project implementation.

3.6.4.3 Differences Between the Action Alternatives

There is no change in prescription of treatments among the different action alternatives. The action alternatives differ by the “footprint” of the activity and unit locations. There are slight difference in the effects to great gray owl habitat between Alternatives 1, 3, and 4 in regards to implementation of actions designed to create DFPZs, implementing group selection, and Area Thinning with biomass removal.

Alternative 1 (Proposed Action)

Direct and Indirect Effects

There is a potential decrease in great gray owl nesting habitat by about 469 out of 6,786 acres, leaving 93.1% of the existing suitable nesting habitat within the Wildlife Analysis Area.

Cumulative Effects

Based on the direct/indirect effects, implementation of this alternative would contribute to cumulative effects to individual great gray owls and great gray owl habitat. There would be a cumulative reduction in nesting habitat for the next 50 years in the fuel treatments and 50+ years in group selection areas. Implementation of Alternative 1 involves a level of risk to great gray owl nesting habitat in the short term and uncertainty about future great gray owl activity; this level of risk is less than either Alternatives 3 and 4.

Implementation of fuels treatments could decrease the likelihood of active crown fires and increase the ability of fire management to suppress, control, and contain fires. This could reduce the potential risk of increased large-scale habitat fragmentation, and loss of great gray owl habitat as a result of high intensity wildfire. This alternative would decrease the risk of preliminary PAC loss due to wildfire for a minimum of one PAC immediately adjacent to, and upslope, of fuels treatments. However, this alternative would be less effective than Alternative 3 and 4 in reducing fire risk due to its lack of connectivity to the future Mt. Ingalls DFPZ project.

Alternative 3

Direct and Indirect Effects

There is a potential decrease in great gray owl nesting habitat by about 742 out of 6,786 acres, leaving 89.1% of the existing suitable nesting habitat within the Wildlife Analysis Area.

Cumulative Effects

Based on the direct/indirect effects, implementation of this alternative would contribute to cumulative effects to individual great gray owls and great gray owl habitat. There would be a cumulative reduction in nesting habitat for the next 50 years in the fuel treatments and 50+ years in group selection areas. Implementation of Alternative 3 involves the highest risk of all alternatives to great gray owl nesting habitat in the short term and greatest uncertainty about future great gray owl activity.

Implementation of fuels treatments could decrease the likelihood of active crown fires and increase the ability of fire management to suppress, control, and contain fires. This could reduce the potential risk of increased large-scale habitat fragmentation, and loss of great gray owl habitat as a result of high intensity wildfire. This alternative would decrease the risk of preliminary PAC loss due to wildfire for a minimum of one PAC immediately adjacent to, and upslope, of fuels treatments. However, this alternative would be more effective than Alternative 1 at reducing fire risk due to its connectivity to the future Mt. Ingalls DFPZ project.

Alternative 4

Direct and Indirect Effects

There is a potential decrease in great gray owl nesting habitat by about 605 out of 6,786 acres, leaving 91.1% of the existing suitable nesting habitat within the Wildlife Analysis Area.

Cumulative Effects

Based on the direct/indirect effects, implementation of this alternative would contribute to cumulative effects to individual great gray owls and great gray owl habitat. There would be a cumulative reduction in nesting habitat for the next 50 years in the fuel treatments and 50+ years in group selection areas. Implementation of Alternative 4 involves a level of risk to great gray owl nesting habitat in the short term and uncertainty about future great gray owl activity; this level of risk is less than Alternative 3.

Implementation of fuels treatments could decrease the likelihood of active crown fires and increase the ability of fire management to suppress, control, and contain fires. This could reduce the potential risk of increased large-scale habitat fragmentation, and loss of great gray owl habitat as a result of high intensity wildfire. This alternative would decrease the risk of preliminary PAC loss due to wildfire for a minimum of one PAC immediately adjacent to, and upslope, of fuels treatments. However, this alternative would be more effective in reducing fire risk than Alternative 1 due to its connectivity to the future Mt. Ingalls DFPZ project.

3.6.4.4 Determinations

Alternative 2 (No-action Alternative)

It is the determination that the Grizz Project will not affect the great gray owl.

Alternatives 1, 3 and 4

It is the determination that the Grizz Project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl. This determination is based on the following:

1. Preliminary PAC avoidance;
2. retention of 89.1% to 93.1% of existing suitable nesting habitat on 54,594 acre of National Forest lands within the Wildlife Analysis Area (Alternatives 1, 3 & 4);
3. creation of a network of fuel reduction areas designed to reduce the loss of habitat due to wildfire.

3.6.5 Environmental Consequences-Northern Goshawk

3.6.5.1 Alternative 2 (No-action Alternative)

Direct and Indirect Effects

There would be no direct effects on individual northern goshawks or northern goshawk habitat, as no activities would occur that would cause disturbance to nesting or foraging birds, nor any impacts to the existing habitat conditions. Northern goshawk surveys have occurred within the Wildlife Analysis Area. In 2002 and 2003, the Humbug Project, including the southeastern portion of the Grizz Wildlife Analysis Area, was surveyed to the two-year protocol standards ("Survey Methodology for Northern Goshawks in the Pacific Southwest Region" (USDA Forest Service 2000)), by contractor North State Resources, Inc. In 2004 and 2005, the Happy Jack and Freeman Projects, including the southern and the eastern portion of the Grizz Wildlife Analysis Area, were surveyed to the two-year protocol standards (USDA Forest Service 2000), by contractor Williams Wildland Consulting, Inc. The remainder of the Grizz Wildlife Analysis Area was surveyed to protocol in 2005 and 2006 by contractor Silva Environmental. One new goshawk nest site was located resulting in one new protected activity center (PAC) (SE 2006). A total of thirteen PACs are in the Wildlife Analysis Area (Figure 16).

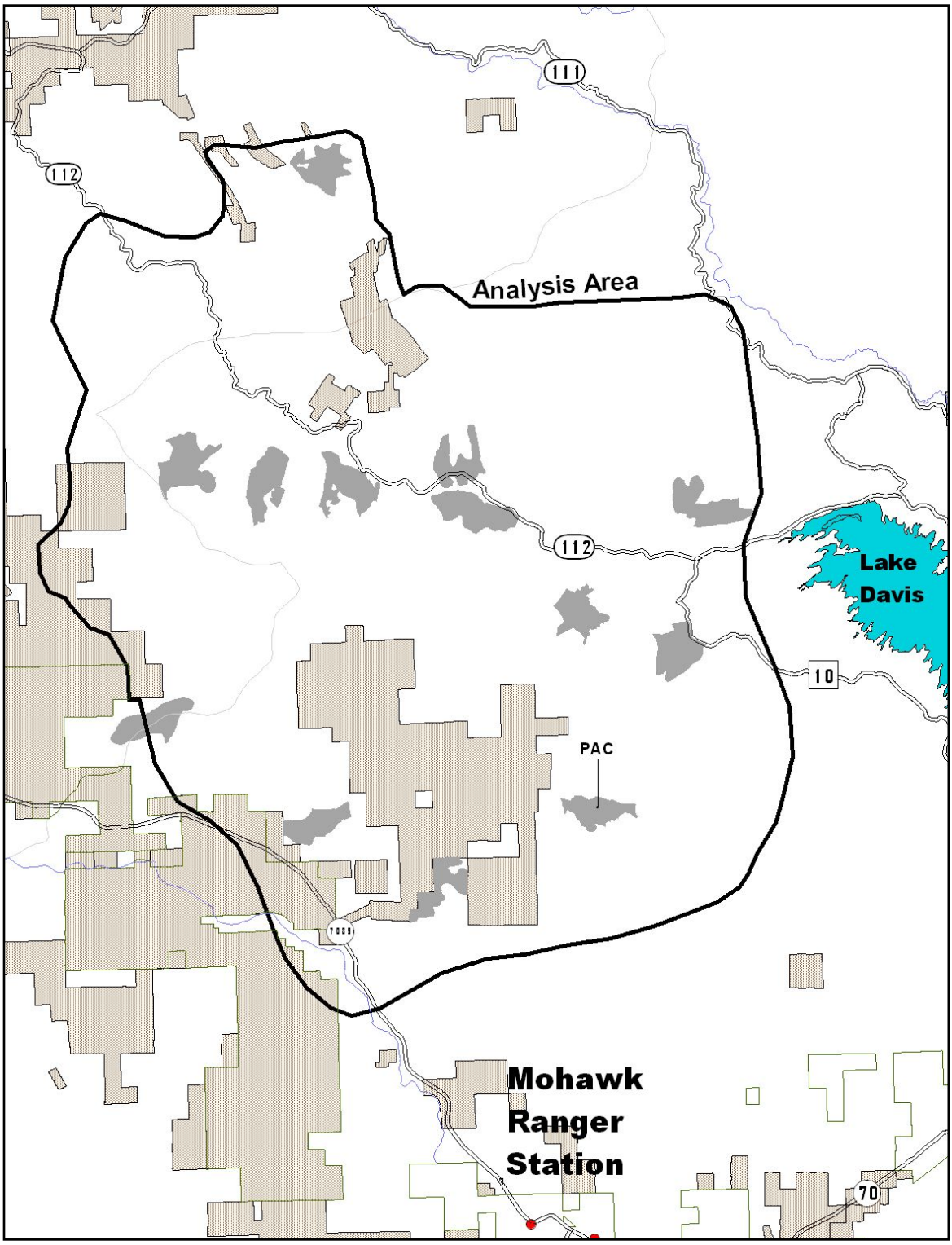

Figure 16 Grizz Wildlife Analysis Area with 200 acre Northern Goshawk Protected Activity Centers (PACs) (solid color)

Within the Wildlife Analysis Area there are approximately 29,160 acres of habitat providing high nesting habitat capability (Table 3.33).

Table 3.33 Acres of High & Moderate Capability Northern Goshawk Nesting Habitat on National Forest Land within Wildlife Analysis Area.

CWHR Type*	Habitat capability	Acres in Wildlife Analysis Area
4M	High nesting	15,480
4D	High nesting	6,244
5M	High nesting	3,198
5D	High nesting	4,238
Total	**High nesting**	**29,160**
3M	Moderate nesting	21
3D	Moderate nesting	0
4M	Moderate nesting	2,291
4D	Moderate nesting	658
5M	Moderate nesting	3
5D	Moderate nesting	153
Total	**Moderate nesting**	**3,126**
Total All	**All nesting**	**32,286**

*3=pole 6-11”dbh, 4=small 11-24"dbh, 5=medium/large >24"dbh. D= Dense Canopy Cover > 60%, M= Moderate Canopy 40-59%. CWHR size class 6 was lumped into CWHR 5D due to small amount of this type present in Wildlife Analysis 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 goshawk nesting habitat and other important prey habitat attributes such as large trees, large snags and down woody material.

With the current PNF woodcutting program, the project area (excluding the lake side of 24N10 and surrounding Lake Davis) would be open to public woodcutting 12 months a year, limited only by available access. Uncontrolled public use within the areas used by goshawks, especially during the nesting season, could cause disturbance that could disrupt and preclude successful nesting.

Cumulative Effects

The No-action Alternative for the Grizz Project would not provide for the long-term protection of goshawk habitat from crown and stand-replacing fires. There would be no actions designed to reduce the risk of high intensity wildfire. The total acres of wildfire and acres of high intensity wildfire are anticipated to increase from current levels under this alternative (based on analysis conducted in SNFPA (2001). There would be no thinning that could enhance the growth of dominant and co-dominant (20-30” dbh) trees that may provide future habitat availability.

3.6.5.2 General Effects of the Action Alternatives

Direct and Indirect Effects

Potential direct effects on the Northern goshawk may result from the modification or loss of habitat or habitat components, and rarely from direct mortality if nest trees are felled. The Proposed Action and alternatives would not cut or remove nest trees. In addition, disturbances associated with logging, temporary road building, or other associated activities, within or adjacent

to occupied habitat may disrupt nesting, fledging, and foraging activities (Richardson and Miller 1997). Implementation of Limited Operating Periods (LOPs) around known goshawk nests would remove the effects associated with direct disturbance on treatment units and access routes.

Project activities would not occur within ¼ mile of known nest sites, within all designated PACs within the Wildlife Analysis Area. Proposed activities could cause short-term displacement and disruption during the time equipment is present and underburning activities are taking place if there are unknown nest sites unprotected by PACs and LOPs.

In a recently published monograph on northern goshawks in the interior Pacific Northwest (McGrath et al, 2003), it was reported that goshawk nests occurred in the lower 1/3 of slopes and in drainage bottoms more than expected based on availability and less than expected on the upper 1/3 slopes and ridgetops. Although the upper 1/3 was not completely avoided it was used half as often as would be expected based on the availability of such areas. The goshawk habitat for the Grizz Wildlife Analysis Area was not stratified or analyzed using McGrath method because it is uncertain as to its application to goshawks in the Sierra Nevada, nor is the data available for the goshawk nest sites on the Plumas that would indicate whether nest sites fall into the McGrath parameters. This is pointed out to identify that the availability of goshawk habitat within the Wildlife Analysis Area may potentially be overestimated.

Changes to suitable habitat as a result of implementing fuels treatments in all action alternatives would occur due to the removal of large structural components and reduction in canopy cover to between 40 - 50%. The more open canopied forested stands still retain the minimum canopy cover for suitable habitat but become unsuitable due to the removal of the needed structural components (snags, vertical and horizontal layering, down woody debris, etc.). DFPZ treatments will bring canopy cover down to 40%, the minimum to be classified as “M”, therefore the minimum to be considered foraging habitat. However, the removal of other important habitat components such as snags and vertical layering further diminish habitat value and render it unsuitable for foraging. Stands treated as Area Thin also decrease in habitat value due to a reduction in canopy cover to 50% and the removal of other important habitat components. There may also be some additional risk associated with isolated torching events during prescribed fire that could kill additional trees thus further opening up the canopy, and reducing foraging and nesting opportunities. Table 3.34 shows the above mentioned changes to Northern goshawk nesting and foraging habitat by alternative.

Table 3.34 Comparison of action alternatives 1, 3 & 4 on northern goshawk nesting (4M, 4D, 5M, 5D) and foraging habitat within the Wildlife Analysis Area.

Forage Habitat	Alternative 1 (PA) Acres			% (Alt. 1) Remaining in Wildlife Analysis Area	Alternative 3 Acres			% (Alt. 3) Remaining in Wildlife Analysis Area
	DFPZ	GS	AT w/biomass removal		DFPZ	GS	AT w/biomass removal	
3M	+2	0	-5	99.8%	+1	0	-1	100.0%
3D	-47	0	0	93.0%	-46	0	-4	92.6%
4P	0	-23	0	99.7%	0	-23	0	99.7%
5P	0	0	0	100.0%	0	0	0	100.0%
Total Foraging Change (acres)	**-45**	**-23**	**-5**	**99.3% retained (-0.7%)**	**-45**	**-23**	**-5**	**99.3% retained (-0.7%)**
Nesting Habitat								
4M*	-913	-87	-815	89.8%	-1155	-100	-881	88.0%
4D	-246	0	-133	94.5%	-263	-20	-174	93.4%
5M*	-42	0	-114	95.1%	-91	0	-72	94.9%
5D	-34	0	-5	99.1%	-34	0	-5	99.1%
Total Nesting Change (acres)	**-1235**	**-87**	**-1067**	**92.6% retained (-7.4%)**	**-1543**	**-120**	**-1132**	**91.3% retained (-8.7%)**
Forage Habitat	**Alternative 4 Acres**			**% (Alt. 4) Remaining in Wildlife Analysis Area**				
	DFPZ	**GS**	**AT w/biomass removal**					
3M	1	0	-5	99.7%				
3D	-46	0	0	93.2%				
4P	0	-24	0	99.7%				
5P	0	0	0	100.0%				
Total Foraging Change (acres)	**-45**	**-24**	**-5**	**99.3% retained (-0.7%)**				
Nesting Habitat								
4M*	-1155	-92	-621	89.5%				
4D	-263	-10	-119	94.3%				
5M*	-91	0	-56	95.4%				
5D	-34	0	-3	99.2%				
Total Nesting Change (acres)	**-1543**	**-102**	**-799**	**92.4% retained (-7.6%)**				

Reductions shown in Table 3.34 are due to the removal of understory structural components leading to unsuitable nesting habitat. No goshawk PACs would be entered with the action

alternatives. Implementation of the action alternatives during the nesting season around known nest sites could cause disturbance that could disrupt nesting behaviors and potentially lead to nest failure. The risk of this occurring is tempered by the delineation of a PAC around known nest sites and/or implementation of a LOP prohibiting disturbing activities from occurring within ¼ mile from nest sites.

No new road construction would occur within PACs. As part of a strategic system of DFPZs, this project would reduce the potential for high-severity wildfires, which could eliminate vast amounts of habitat.

It is unknown as to how some of the important prey species preferred by goshawks (small mammals, birds) would respond to opening up forested stands with DFPZ and group selection harvest units. Based on CWHR modeling, it is known that several bird species respond favorably to either less dense forested stands and/or openings within forested stands, while some do not (HFQLGFRA FEIS, Appendix I). The increased diversity and edges created by groups within forested stands may provide foraging habitat that would increase use of the landscape by goshawks. Responses of prey species, including small mammals and passerine bird use of group openings is one of the main objectives of the post implementation monitoring that would be conducted by PSW research through the administrative study. Ongoing research by PSW would provide information as to the response by these prey species to DFPZ and group selection harvesting.

Cumulative Effects

The existing condition reflects the changes of all activities that have occurred in the past. The analysis of cumulative effects of the action alternatives evaluates the impact on TES wildlife from the existing condition within the Wildlife Analysis Area. The past actions in the Wildlife Analysis Area that contributed to the existing condition include grazing, mining, timber harvest watershed restoration, and recreation use. Cumulative effects on the Northern goshawk are similar to those described for the California spotted owl.

Cumulative effects on the goshawk could occur with the incremental loss of the quantity and/or quality of habitat for this species. 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 crown fires have contributed and would continue to contribute to loss of habitat for this species.

Table 3.35 provides a cumulative total on the amount of suitable goshawk nesting habitat that has been impacted by the fuels treatments, group selection and Area Thinning projects implemented under HFQLG on the BKRD.

Table 3.35 Cumulative Changes (Reduction) in Northern Goshawk Nesting Habitat on Beckwourth RD.

Project	Red Clover DFPZ/GS	Dotta DFPZ/GS	Last Chance DFPZ/GS	Poison DFPZ/GS	Crystal-Adams DFPZ/GS**	Humbug DFPZ	Mabie DFPZ
	Alt. 3*	**Alt. 2***	**Alt. 4***	**Alt. 4***	**Alt. 1***	**Alt. 3***	**Alt. 3***
Nesting Habitat	1,574 acres	0 acres	25 acres	35 acre	0 acres	0 acres	0 acres
Project	**Happy Jack DFPZ/GS**	**Freeman DFPZ/GS**	**Grizz DFPZ/GS**				
	Alt. 1	**Alt. 4***	**Alt. 1**	**Alt. 3**	**Alt. 4**	**Potential Cumulative Change**	
Nesting Habitat	2,436 acres	3,416 acres	2,389 acres	2,795 acres	2,444 acres	**9,875 – 10,281 acres**	

*Selected Alternative for the projects.
** Subsequent litigation dropped all group selections and applied a 12 inch upper diameter limit to the majority of the project area so the acres reflected in this table did not actually get reduced.

Based on Tables 3.34 and 3.35, the Grizz Project potentially contributes to a cumulative reduction in goshawk nesting habitat. It is uncertain as to what influence these various reductions in habitat would have on goshawk activity and occupancy within the Wildlife Analysis Area. However, it is not anticipated that this cumulative habitat reduction would result in loss of occupancy or productivity to known goshawk PACs; based on no entry into PACs, the proximity of project activities to known PACs, distribution of known PACs across the Wildlife Analysis Area, and retention of at least 91% of available suitable nesting habitat distributed across the Wildlife Analysis Area on National Forest System lands post project implementation.

3.6.5.3 Differences Between the Action Alternatives

There is no change in prescription of treatments among the different action alternatives. The action alternatives differ by the “footprint” of the activity and unit locations. There are slight difference in the effects to goshawk habitat between Alternatives 1, 3, and 4 in regards to implementation of actions designed to create DFPZs, implementing group selection, and Area Thinning with biomass removal.

Alternative 1 (Proposed Action)

Direct and Indirect Effects

There is a potential decrease in goshawk nesting habitat by about 2,389 acres out of 32,265 acres, leaving 92.6% of the existing suitable nesting habitat within the Wildlife Analysis Area.

Cumulative Effects

Based on the direct/indirect effects, implementation of this alternative would contribute to cumulative effects to individual goshawks and goshawk habitat. There would be a cumulative reduction in habitat for the next 50 years in the fuel treatments and 50+ years in group selection areas. Implementation of Alternative 1 involves a level of risk to goshawk habitat in the short term and uncertainty about future goshawk activity; this level of risk is less than either Alternatives 3 and 4.

Implementation of fuels treatments could decrease the likelihood of active crown fires and increase the ability of fire management to suppress, control, and contain fires. This could reduce the potential risk of increased large-scale habitat fragmentation, and loss of goshawk habitat as a result of high intensity wildfire. This alternative would decrease the risk of PAC loss due to wildfire for a minimum of nine PACs immediately adjacent to, and upslope, of fuels treatments. However, this alternative would be less effective at reducing fire risk than Alternatives 3 and 4 due to its lack of connectivity to the future Mt. Ingalls DFPZ project.

Alternative 3

Direct and Indirect Effects

There is a potential decrease in goshawk nesting habitat by about 2,795 acres out of 32,265 acres, leaving 91.3% of the existing suitable nesting habitat within the Wildlife Analysis Area.

Cumulative Effects

Based on the direct/indirect effects, implementation of this alternative would contribute to cumulative effects on goshawk and goshawk habitat. There would be a cumulative reduction in habitat for the next 50 years in the fuel treatments and 50+ years in group selection areas. Implementation of Alternative 3 involves the highest risk of all alternatives to goshawk habitat in the short term and greatest uncertainty about future goshawk activity.

Implementation of fuels treatments could decrease the likelihood of active crown fires and increase the ability of fire management to suppress, control, and contain fires. This could reduce the potential risk of increased large-scale habitat fragmentation, and loss of goshawk habitat as a result of high intensity wildfire. This alternative would decrease the risk of PAC loss due to wildfire for a minimum of nine PACs immediately adjacent to, and upslope, of fuels treatments. However, this alternative would be more effective at reducing fire risk than Alternative 1due to its connectivity to the future Mt. Ingalls DFPZ project.

Alternative 4

Direct and Indirect Effects

There is a potential decrease in goshawk nesting habitat by about 2,444 acres out of 32,265 acres, leaving 62.4% of the existing suitable nesting habitat within the Wildlife Analysis Area.

Cumulative Effects

Based on the direct/indirect effects, implementation of this alternative would contribute to cumulative effects on goshawk and goshawk habitat. There would be a cumulative reduction in habitat for the next 50 years in the fuel treatments and 50+ years in group selection areas. Implementation of Alternative 4 involves a level of risk to goshawk habitat in the short term and uncertainty about future goshawk activity; this level of risk is less than Alternative 3.

Implementation of fuels treatments could decrease the likelihood of active crown fires and increase ability of fire management to suppress, control, and contain fires. This could reduce the potential risk of increased large-scale habitat fragmentation, and loss of goshawk habitat as a result of high intensity wildfire. This alternative would decrease the risk of PAC loss due to wildfire for a minimum of nine PACs immediately adjacent to, and upslope, of fuels treatments. However, this alternative would be more effective in reducing fire risk due to its connectivity to the future Mt. Ingalls DFPZ project.

3.6.5.4 Determinations

Alternative 2 (No-action Alternative)

It is the determination that the Grizz Project will not affect the Northern Goshawk.

Alternatives 1, 3 and 4

It is the determination that the Grizz Project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk. This determination is based on the following:

1. PAC avoidance;
2. Retention of 91.3% to 92.6% of existing nesting habitat on 54,594 acre of National Forest lands within the Wildlife Analysis Area (Alternatives 1, 3 & 4). This retention of nesting habitat outside existing PACs would provide opportunities for future occupancy and population expansion;
3. Creation of a network of fuel reduction areas designed to reduce the loss of habitat due to wildfire.

3.6.6 Environmental Consequences-American Marten and Pacific Fisher

Effects of the action alternatives and the No-action Alternative to the American marten and the Pacific fisher are discussed here. For further discussion regarding these two wildlife species or other mesocarnivors, please see the Grizz Wildlife BA/BE in in the project file.

3.6.6.1 Alternative 2 (No-action Alternative)

Direct and Indirect Effects

There would be no direct effects on forest carnivore habitat, as no activities would occur that would cause disturbance to denning, resting, dispersing or foraging animals, nor any impacts to the existing habitat conditions.

The PNF has mapped a draft forest carnivore network. The intent of the network is to provide a continuously connected system of habitats focused on the needs of marten and fisher. This corridor is designed to provide a habitat connectivity corridor linking the Tahoe NF with the Lassen NF. The Plumas draft forest carnivore network is comprised of four components:

1. the riparian zone;
2. old-forest habitat, including California spotted owl PACs and SOHAs, Northern goshawk PACs;
3. connectors, such as Special Interest Areas, Bucks Lake Wilderness, Wild & Scenic River;
4. and known marten sightings.

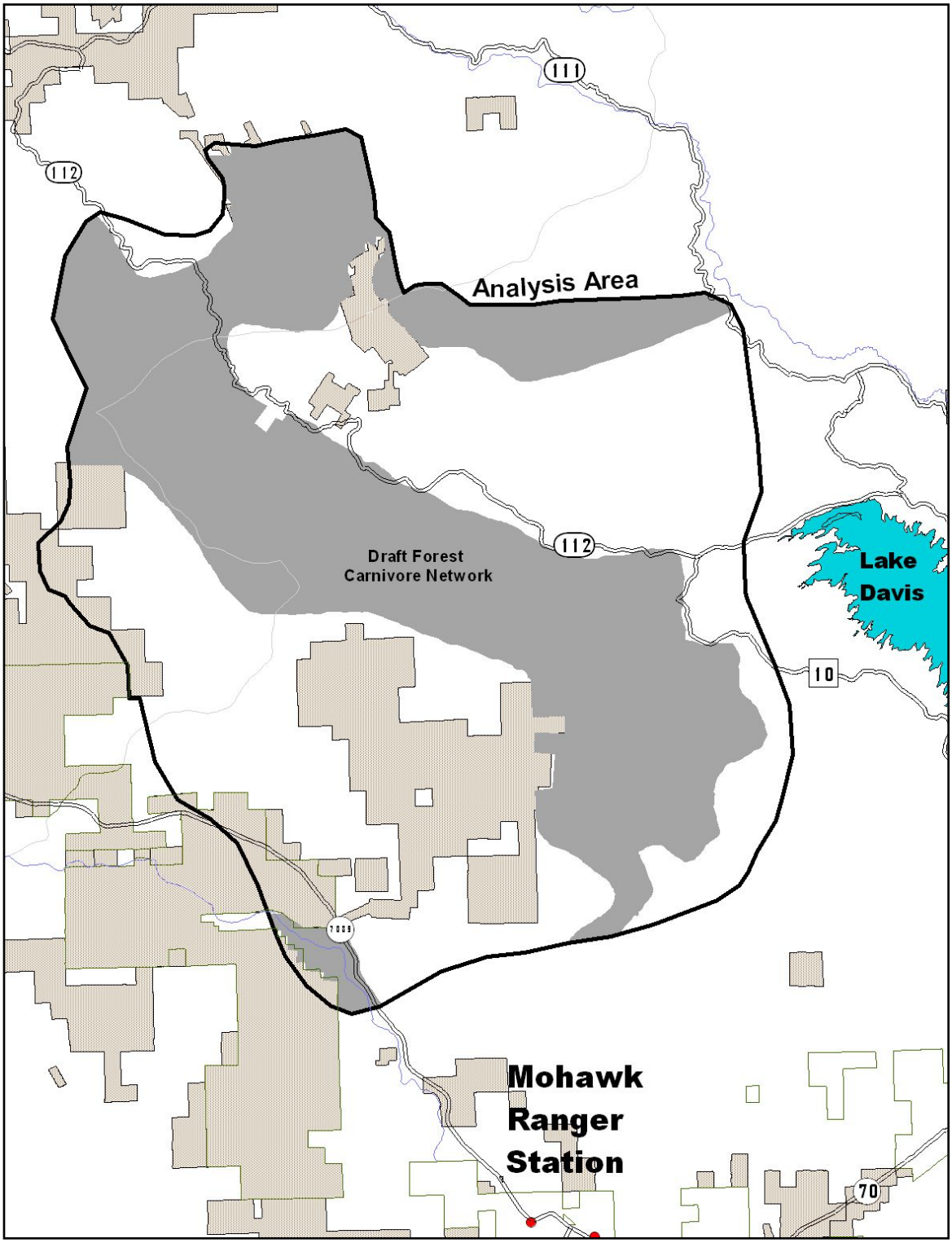

Figure 17 Grizz Wildlife Analysis Area with Draft Forest Carnivore Network (solid color)

Much of the draft forest carnivore network is in areas reserved from harvest for other reasons (e.g., Lakes Basin, Bucks Lake Wilderness). However, there is a need for corridors between these reserves that allow immigration and emigration to maintain healthy populations. Approximately

28,025 acres of the draft forest carnivore network (10.2%) are within the Wildlife Analysis Area (Figure 17).

The Grizz Wildlife Analysis Area has been surveyed several times over the years for mesocarnivores using both camera stations and track plates as detailed in Zielinski and Kucera (1995). To date no target mesocarnivores have been detected in the Wildlife Analysis Area using these methods.

American Marten

Important forest types to the American marten include mature mesic forests of red fir, mixed conifer-fir, lodgepole pine, Jeffrey pine and eastside pine (USDA Forest Service 2001). CWHR types 4M, 4D, 5M, 5D and 6 are identified as moderately to highly important for the marten. The red fir zone forms the core of marten occurrence in the Sierra Nevada. The American marten uses habitat comparable to that of the Pacific fisher and their current acres of suitable habitat will be similar. Table 3.36 displays the acres of habitat present in the Wildlife Analysis Area.

Table 3.36 Acres of Suitable Marten Habitat on National Forest System land within Wildlife Analysis Area.

Species	CWHR Types*	Wildlife Analysis Area (Acres)
Marten	4D, 5D, 6	11,183
	4M, 5M	20,857
Total		**32,040**

*4=small 11-24"dbh, 5=medium/large >24"dbh. D= Dense Canopy Cover > 60%, M= Moderate Canopy 40-59%, DFR =Douglas-fir, EPN=Eastside Pine, JPN=Jeffrey Pine, LPN=Lodgepole Pine, RFR=Red Fir, SMC=Sierran Mixed Conifer, WFR = White Fir. CWHR size class 6 was lumped into CWHR 5D due to small amount of this type present in Wildlife Analysis Area.

Pacific Fisher

CWHR types 4M, 4D, 5M, 5D and 6 are identified as being important to fisher. Preferred fisher forest types include montane hardwood conifer, mixed conifer, Douglas fir, redwood, montane riparian, Jeffrey pine, ponderosa pine, lodgepole pine, subalpine conifer, aspen, eastside pine and possibly red fir. The Pacific fisher uses habitat comparable to that of the American marten and their current acres of suitable habitat will be similar. Table 3.37 displays the acres of suitable fisher habitat present in the Wildlife Analysis Area.

Table 3.37 Acres of Suitable Fisher Habitat on National Forest System land within Wildlife Analysis Area.

SPECIES	CWHR Type*	Wildlife Analysis Area (Acres)
Fisher	4D, 5D, 6	11,293
	4M, 5M	20,972
Total		**32,265**

4=small 11-24"dbh, 5=medium/large >24"dbh. D= Dense Canopy Cover > 60%, M= Moderate Canopy 40-59%, DFR = Douglas-fir, EPN=Eastside Pine, JPN=Jeffrey Pine, LPN=Lodgepole Pine, MHC=Montane Hardwood-Conifer, MHW= Montane Hardwood, PPN=Ponderosa Pine, RFR=Red Fir, SMC=Sierran Mixed Conifer, WFR = White Fir. CWHR size class 6 was lumped into CWHR 5D due to small amount of this type present in Wildlife Analysis Area.

Cumulative Effects

The No-action Alternative for the Grizz Project would not provide for the long-term protection of forest carnivore habitat from stand-replacing fire. There would be no actions designed to reduce the risk of high intensity crown 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 (2001)). Large scale habitat fragmentation created as a result of wildfire could preclude the Grizz Wildlife Analysis Areas potential to contribute to fisher recovery.

3.6.6.2 General Effects of the Action Alternatives

Direct and Indirect Effects

Based on the vegetation layer, about 21% or 11,293 acres within the Wildlife Analysis Area (54,594 NF acres) may be considered suitable denning habitat for fisher (4D, 5D and 6), and about 38% or 20,972 acres may be considered suitable foraging habitat (4M and 5M) (Table 3.37). About 20% or 11,183 acres within Wildlife Analysis Area (54,594 NF acres) may be considered suitable denning and resting habitat for marten (4D, 5D and 6), and about 38% or 20,857 acres may be considered suitable foraging habitat (4M and 5M) (Table 3.36). Table 3.38 shows the above mentioned changes to Pacific fisher and American marten denning and foraging habitat by alternative.

Table 3.38 Comparison of Action Alternatives 1, 3 & 4 on Pacific Fisher and American Marten Denning & Foraging Habitat (4M, 4D, 5M, 5D) within the Wildlife Analysis Area.

Foraging Habitat	Alternative 1 (PA) Acres			% (Alt. 1) Remaining in Wildlife Analysis Area	Alternative 3 Acres			% (Alt. 3) Remaining in Wildlife Analysis Area
	DFPZ	GS	Area Thinning w/biomass		DFPZ	GS	Area Thinning w/biomass	
4M*	-913	-87	-815	89.80%	-1,155	-100	-881	88.0 %
5M*	-42	0	-114	95.10%	-91	0	-72	94.9 %
Total Foraging Change	**-955**	**-87**	**-929**	**90.6 % retained (- 9.4 %)**	**-1,246**	**-100**	**-953**	**89.0 % retained (- 11.0 %)**
Denning Habitat								
4D	-246	0	-133	94.5 %	-263	-20	-174	93.4 %
5D	-34	0	-5	99.1 %	-34	0	-5	99.1 %
Total Denning Change	**-280**	**0**	**-138**	**96.3 % retained (-3.7 %)**	**-297**	**-20**	**-179**	**95.6 % retained (- 4.4 %)**

Foraging Habitat	Alternative 4 Acres			% (Alt. 4) Remaining in Wildlife Analysis Area
	DFPZ	GS	Area Thinning w/biomass	
4M*	-1,155	-92	-621	89.5 %
5M*	-91	0	-56	95.4 %
Total Foraging Change	**-1,246**	**-92**	**-677**	**90.4 % retained (- 9.6 %)**
Denning Habitat				
4D	-263	-10	-119	94.3 %
5D	-34	0	-3	99.2 %
Total Denning Change	**-297**	**-10**	**-122**	**96.2 % retained (- 3.8 %)**

* Reductions shown here are due to the removal of understory structural components leading to unsuitable nesting habitat.

Projected activities within red fir habitat (habitats proposed for entries are Red Fir 4D, 4M, 4P, 4S, 5D, 5M, 5P and 5S) indicate the following:

- Alternative 1: up to 11 acres in group selection, 187 acres of DFPZ and 222 acres of Area Thinning (AT) with biomass removal
- Alternative 3: up to 37 acres in group selection, 506 acres of DFPZ and 234 acres AT with biomass removal
- Alternative 4: up to 27 acres group selection, 504 acres of DFPZ and 112 acres AT with biomass removal

Table 3.39 displays projected changes to CWHR types within draft forest carnivore network in the Wildlife Analysis Area.

Table 3.39 Comparison of Action Alternatives 1, 3 & 4 on Pacific isher and American marten suitable habitat (4M, 4D, 5M, 5D) within the draft forest carnivore network in the Wildlife Analysis Area.

Suitable Habitat	Alternative 1 (PA)			% (Alt. 1) Remaining within the Draft Forest Carnivore Network in the Wildlife Analysis Area	Alternative 3			% (Alt. 3) Remaining within the Draft Forest Carnivore Network in the Wildlife Analysis Area
	Acres				Acres			
	DFPZ	GS	AT with Biomass		DFPZ	GS	AT with Biomass	
4M	-353	-62	-596	87.5 %	-438	-68	-728	84.8 %
4D	-161	0	-127	93.3 %	-171	-12	-167	91.9 %
5M	-35	0	-104	92.8 %	-72	0	-71	92.6 %
5D	-10	0	-5	99.5 %	-10	0	-5	99.5 %
Total Change	**-559**	**-62**	**-832**	**91.8 % retained (-8.2 %)**	**-691**	**-80**	**-971**	**90.1 % retained (-9.9 %)**
Suitable Habitat	**Alternative 4**			**% (Alt. 4) Remaining within the Draft Forest Carnivore Network in the Wildlife Analysis Area**				
	Acres							
	DFPZ	**GS**	**AT with Biomass**					
4M	-438	-59	-566	86.9 %				
4D	-171	-6	-119	93.1 %				
5M	-72	0	-56	93.4 %				
5D	-10	0	-3	99.6 %				
Total Change	**-691**	**-65**	**-744**	**91.5 % retained (-8.5 %)**				

All alternatives propose to construct approximately 5 miles of temporary road, all of which would be closed post harvest and 0.4 miles of new system road construction. Thus there would be a very slight increase in habitat fragmentation with new road construction. In addition, 7.25 miles of existing road would be decommissioned and another 1.5 mile would be closed. All new temporary roads, as well as 7.5 miles of existing road, would be decommissioned to create conditions that allow for vegetation recovery and to reduce gaps created by road openings. This should also reduce human activities that often lead to decreased habitat capability for carnivores (snag and log removal through woodcutting, and disturbance). Open road density within the Wildlife Analysis Area would decline under all action alternatives from the existing approximately 3.0 miles/square mile to about 2.9 miles/square mile, which is still providing for low habitat capability for forest carnivores. As part of a strategic system of DFPZs, this project would reduce the potential for high-severity wildfires, which could eliminate vast tracts of habitat for this species. Overall this would decrease habitat fragmentation.

It is an unknown as to how some of the important prey species preferred by marten and fisher (small mammals, birds) would respond to group selection harvest units. The increased diversity and edges created by groups within forested stands may provide increased foraging opportunities for marten and fisher. Studying responses of prey species, including small mammals and passerine bird use to group openings and DFPZs is one of the main objectives of the administrative study conducted by PSW.

Cumulative Effects

The existing condition reflects the changes of all activities that have occurred in the past. The analysis of cumulative effects of the action alternatives evaluates the impact on TES wildlife from the existing condition within the Wildlife Analysis Area. The past actions in the Wildlife Analysis Area that contributed to the existing condition include grazing, mining, timber harvest watershed restoration, and recreation use. Cumulative effects to the mesocarnivores are similar to those described for the California spotted owl.

Cumulative effects on forest carnivores could occur with the incremental reduction of the quantity and/or quality of habitat for this species. 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 crown wildfires have contributed and would continue to contribute to loss of habitat for these species.

Table 3.40 provides a cumulative total on the amount of denning fisher and marten habitat that has been impacted by the fuels treatments, group selection and Area Thinning projects implemented under HFQLG on the BKRD.

Table 3.40 Cumulative Change (Reduction) of Pacific Fisher and American Marten Denning Habitat (4M, 4D, 5M, 5D, 6) on Beckwourth RD.

Project	**Red Clover DFPZ/GS**	**Dotta DFPZ/GS**	**Last Chance DFPZ/GS**	**Poison DFPZ/GS**	**Crystal-Adams DFPZ/GS****	**Humbug DFPZ**	**Mabie DFPZ**
	Alt. 3*	**Alt. 2***	**Alt. 4***	**Alt. 4***	**Alt. 1***	**Alt. 3***	**Alt. 3***
Denning Habitat	1,255 acres	0 acres	25 acres	26 acres	0 acres	127 acres	375 acres
Project	**Happy Jack DFPZ/GS**	**Freeman DFPZ/GS**	**Grizz DFPZ/GS**				
	Alt. 1	**Alt. 4***	**Alt. 1**	**Alt. 3**	**Alt. 4**	**Potential Cumulative Change**	
Denning Habitat	1,420 acres	1,549 acres	418 acres	496 acres	429 acres	**5,195 – 5,273 acres**	

*Selected Alternative for the projects.
** Subsequent litigation dropped all group selections and applied a 12 inch upper diameter limit to the majority of the project area so the acres reflected in this table did not actually get reduced.

Based on Tables 3.40, the Grizz Project potentially contributes to a cumulative reduction in suitable fisher and marten habitat. It is uncertain as to what influence these various reductions in habitat would have on potential future fisher and marten activity and occupancy within the Wildlife Analysis Area. These cumulative reductions are not expected to increase any large scale, high contrast fragmentation above existing levels. Thus habitat connectivity is maintained across the Forest north to south from Middle Fork Feather River to Grizzly Ridge and on to Mt. Jura.

The greatest concern for pacific fishers in the Sierra Nevada range is the risk of further fragmentation due to large stand-replacing wildfires (SNFPA FSEIS 2004, page 244). The design features of DFPZs retain habitat elements within the range of those used by fisher for foraging and dispersal such that they are not likely to create large barriers to further expansion and connectivity for fisher (Ibid, page 243). DFPZs are created to reduce the potential for crown replacing fires.

The fisher does not appear to inhabit the HFQLG area and even if fisher were reintroduced into northern California, it would probably be several years after reintroduction before available habitats would become fully occupied (SNFPA FSEIS 2004, page 243). Based on the home range and stand size reported in the April 8, 2004 Federal Register, it appears as if the Grizz Wildlife Analysis Area supports large blocks of contiguous suitable habitat.

3.6.6.3 Differences Between the Action Alternatives

There is no change in prescription of treatments among the different action alternatives. The action alternatives differ by the “footprint” of the activity and unit locations. There are slight

difference in the effects to fisher and marten habitat between Alternatives 1, 3, and 4 in regards to implementation of actions designed to create DFPZs, implementing group selection, and Area Thinning with biomass removal.

Alternative 1 (Proposed Action)

Direct and Indirect Effects

There is a potential decrease in fisher and marten denning habitat by about 418 acres out of 11,183 to 11,293 acres, retaining 96.3% of the existing suitable denning habitat within the Wildlife Analysis Area.

Approximately 28,025 acres of the 275,000 acre draft forest carnivore network is present within the Wildlife Analysis Area. Of the 28,025 acres approximately 17,657 acres may be considered suitable habitat. Based on the 17,657 acres of suitable habitat there is a potential decrease of approximately 1,453 acres or 8.2%.

Cumulative Effects

Based on the direct/indirect effects, implementation of this alternative would contribute to cumulative effects on fisher habitat and marten habitat. There would be a cumulative reduction in habitat for the next 50 years in the fuel treatments and 50+ years in group selection areas. Implementation of Alternative 1 involves a level of risk to fisher and marten habitat in the short term and uncertainty about possible future fisher and marten activity; this level of risk is less than Alternatives 3 and 4.

Implementation of fuels treatments could decrease the likelihood of active crown fires and increase the ability of fire management to suppress, control, and contain fires. This could reduce the potential risk of increased large-scale habitat fragmentation and loss of fisher and marten habitat as a result of high intensity wildfire. However, this alternative would be less effective than Alternative 3 and 4 at reducing fire risk due to its lack of connectivity to the future Mt. Ingalls DFPZ project.

Alternative 3

Direct and Indirect Effects

There is a potential decrease in fisher and marten denning habitat by about 496 acres out of 11,183 to 11,293 acres, retaining 95.6% of the existing suitable denning habitat within the Wildlife Analysis Area.

Approximately 28,025 acres of the 275,000 acre draft forest carnivore network is present within the Wildlife Analysis Area. Of the 28,025 acres approximately 17,657 acres may be considered suitable habitat. Based on the 17,657 acres of suitable habitat there is a potential decrease of approximately 1,742 acres or 9.9%.

Cumulative Effects

Based on the direct/indirect effects, implementation of this alternative would contribute to cumulative effects on fisher habitat and marten habitat. There would be a cumulative reduction in habitat for the next 50 years in the fuel treatments and 50+ years in group selection areas. Implementation of Alternative 3 involves a level of risk to fisher and marten habitat in the short term and the greatest uncertainty about possible future fisher and marten activity.

Implementation of fuels treatments could decrease the likelihood of active crown fires and increase the ability of fire management to suppress, control, and contain fires. This could reduce the potential risk of increased large-scale habitat fragmentation and loss of fisher and marten habitat as a result of high intensity wildfire. However, this alternative would be more effective in reducing fire risk than Alternative 1 due to its connectivity to the future Mt. Ingalls DFPZ project.

Alternative 4

Direct and Indirect Effects

There is a potential decrease in fisher and marten denning habitat by about 429 acres out of 11,183 to 11,293 acres, retaining 96.2% of the existing suitable denning habitat within the Wildlife Analysis Area.

Approximately 28,025 acres of the 275,000 acre draft forest carnivore network is present within the Wildlife Analysis Area. Of the 28,025 acres approximately 17,657 acres may be considered suitable habitat. Based on the 17,657 acres of suitable habitat there is a potential decrease of approximately 1,500 acres or 8.5%.

Cumulative Effects

Based on the direct/indirect effects, implementation of this alternative would contribute to cumulative effects on fisher habitat and marten habitat. There would be a cumulative reduction in habitat for the next 50 years in the fuel treatments and 50+ years in group selection areas. Implementation of Alternative 4 involves a level of risk to fisher and marten habitat in the short term and uncertainty about possible future fisher and marten activity; this level of risk is less than Alternative 3.

Implementation of fuels treatments could decrease the likelihood of active crown fires and increase the ability of fire management to suppress, control, and contain fires. This could reduce the potential risk of increased large-scale habitat fragmentation and loss of fisher and marten habitat as a result of high intensity wildfire. However, this alternative would be more effective in reducing fire risk than Alternative 1 due to its connectivity to the future Mt. Ingalls DFPZ project.

3.6.6.4 Determinations

Alternative 2 (No-action Alternative)

It is the determination that the Grizz Project will not affect the mesocarnivores (American marten, and Pacific fisher).

Alternatives 1, 3 and 4

It is the determination that the Grizz Project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for any of the Pacific fisher or American marten. This determination is based on the following:

1. retention of 95.6% to 96.3% of existing suitable denning habitat on 54,594 acre of National Forest lands within the Wildlife Analysis Area (Alternatives 1, 3 and 4);
2. retention of 90.1% to 91.8% of existing suitable habitat within the draft forest carnivore network on 54,594 acre of National Forest lands within the Wildlife Analysis Area (Alternatives 1, 3 and 4);
3. creation of a network of fuel reduction areas designed to reduce the loss of habitat due to wildfire.

3.7 Wildlife Management Indicator Species

3.7.1 Introduction

The following assessment is summarized from the Grizz Project Management Indicator Species (MIS) report, which is incorporated here by reference (USFS PNF BRD 2007i). The purpose of the MIS report is to evaluate and disclose the impacts of the Grizz Project on the terrestrial and aquatic wildlife Management Indicator Species (MIS) identified in the PNF LRMP (USDA 1988). For discussion regarding the affects of the Grizz Project to TES wildlife species, please see the appropriate section or the Grizz BA/BE, available in the Grizz Project file.

3.7.2 Summary

The appropriate approach for relating project-level impacts to broader scale trends depends on the terms in the LRMP. PNF LRMP requirements for MIS anlayszed for the Grizz Project are summarized on pages 11-16 of the Grizz Project MIS report that is part of the project record and available upon request from the Beckwourth Ranger District.

Hence, where the Plumas NF LRMP requires population monitoring or population surveys for an MIS, the project-level effects analysis for that MIS may be informed by population monitoring data, which are gathered at the forest or bioregional scale. Population monitoring and survey data are not generally gathered for site-specific projects, consistent with the 2005 planning rule, which states, “Site-specific monitoring or surveying of a proposed project or activity area is not required, but may be conducted at the discretion of the Responsible Official” (36 CFR 219.14(f)). For certain MIS, the Plumas NF LRMP does not require population monitoring or surveys; for these MIS, project-level MIS effects analysis can be informed by forest-scale habitat monitoring and analysis alone.

Therefore, adequately analyzing project effects to MIS, including Threatened, Endangered, and Sensitive (TES) species that are also MIS, involves the following steps:

- Identifying which MIS have habitat that would be either directly or indirectly affected by the project alternatives; these MIS are potentially affected by the project.
- Identifying the LRMP forest-level or bioregional-level monitoring requirements for this subset of forest MIS.
- Analyzing project-level effects on MIS habitats or habitat components for this subset of Forest MIS.
- Discussing forest or bioregional scale habitat and/or population trends for this subset of Forest MIS.
- Relating project-level impacts on MIS habitat to habitat and/or population trends for the affected MIS at the Forest or bioregional scale.

These steps are described in detail in the Pacific Southwest Region's draft document "MIS Analysis and Documentation in Project-Level NEPA, R5 Environmental Coordination" (USDA 2006). This MIS Report documents application of the above steps to select and analyze MIS for the Grizz Project.

MIS for the PNF are identified in the LRMP (USDA 1988). The MIS analyzed for the Grizz Project were selected from this list of MIS identified in the LRMP, as indicated below in Table 3.41. In addition, Table 3.41 identifies the status of the MIS (2nd column) and discloses whether or not the MIS is potentially affected by the Grizz Project (3rd column).

Bald eagle, largemouth bass, and peregrine falcon, identified as Category 1 in Table 3.41, will not be further discussed because the habitat factors for these species are not in or adjacent to the project area; therefore, the project will not directly or indirectly affect the habitat for these species and will, therefore, have no impact on bald eagle, largemouth bass, and peregrine falcon, forest-level habitat or population trends.

Canada goose identified as Category 2 (Table 3.41), have habitat in or adjacent to the project area but will not be further discussed because the habitat factors for these species would not be either directly or indirectly affected by the project; therefore, the project will not affect habitat for these species and will, therefore have no impact on Canada goose, Forest-level habitat or population trends.

Table 3.41 Management Indicator Species, Plumas NF, and Selection of MIS for Project-Level Analysis for the Grizz Project.

Management Indicator Species	Species Status	Category for Project Analysis	Existing Habitat	Project Habitat Trend	Existing Population/Distribution Trend	Project Population/Distribution Trend
American marten (*Martes americana*)	Forest Service Sensitive	3	Stable	Slight Decrease	Stable Population	Stable
bald eagle (*Haliaeetus leucocephalus*)	Federally Threatened	1	N/A	N/A	N/A	N/A
California spotted owl (*Strix occidentalis occidentalis*)	Forest Service Sensitive	3	Stable	Slight Decrease	Stable to Slight Upward Distribution	Stable
Canada goose (*Branta canadensis*)	Harvest	2	N/A	N/A	N/A	N/A
golden eagle* (*Aquila chrysaetos*)	Special Interest	3	Stable	Stable	Downward Population	Downward
largemouth bass (*Micropterus salmoides*)	Harvest	1	N/A	N/A	N/A	N/A
mule deer* (*Odocoileus hemionus*)	Harvest	3	Stable	Slight Increase	Stable Population	Stable
northern goshawk (*Accipiter gentilis*)	Forest Service Sensitive	3	Stable	Slight Decrease	Stable Distribution	Stable
peregrine falcon (*Falco peregrinus anatum*)	Forest Service Sensitive	1	N/A	N/A	N/A	N/A
prairie falcon* (*Falco mexicanus*)	Special Interest	3	Stable	Slight Increase	Downward Population	Downward
trout group* (Family *Salmonidae*)	Harvest	3	Stable	Slight Increase	Upward Population	Upward

*Will not be discussed in the Grizz Project EA. For further discussion, please see the Grizz Project MIS Report.
Category 1: MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.
Category 2: MIS whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.
Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

The MIS whose habitat would be either directly or indirectly affected by the Grizz Project, identified as Category 3 in Table 3.41, are carried forward in analysis. The MIS report will evaluate the direct, indirect, and cumulative effects of the Proposed Action and alternatives on the

habitat of the Category 3 non-TES MIS and summarize effects to those TES MIS discussed in the BA/BE. The MIS selected for Project-Level MIS analysis for the Grizz Project are: American marten, California spotted owl, golden eagle, deer, northern goshawk, prairie falcon and trout group. In this Grizz Project EA, only the three following species of interest to the responsible official will be summarized and discussed:

- American marten
- California spotted owl
- northern goshawk

For discussion regarding the other Wildlife MIS, please see the Grizz MIS report in the Grizz Project file (USFS PNF BRD 2007i).

3.7.3 Affected Environment

3.7.3.1 Scope of the Analysis

Geographic Analysis Area: The geographic analysis area for the Wildlife MIS is the same as the geographic analysis area for the Wildlife Resources Section for TES species. For further discussion, please see the discussion in the Wildlife Resources Section or the Wildlife BA/BE.
Timeframe of Analysis: The timeframe of analysis for the Wildlife MIS are the same as the timeframe of analysis for the Wildlife Resources Section for TES species. For further discussion, please see the discussion in the Wildlife Resources Section or the Wildlife BA/BE.

3.7.3.2 Analysis Methodology

The PNF LRMP (USDA 1988) requires forest-scale monitoring of habitat status and trend for select MIS on the Plumas NF and for MIS with habitat potentially affected by the Grizz Project. Habitats are the vegetation types (for example, mixed conifer forest) and/or ecosystem components (for example, cliffs or lakes) and any special habitat elements (for example, snags) required by an MIS for breeding, cover, and/or feeding. Required habitat is identified using habitat relationships data, GIS vegetation layers or models. For each terrestrial wildlife MIS on the PNF, the habitat relationship models are from the CWHR System (CWHR 2005).

In the case of MIS that are also federally TES species that have been studied in detail, additional habitat relationships information may be used to augment the CWHR system. Habitat relationships for fish are identified individually. Detailed information on the habitat relationships for MIS on the PNF and on the CWHR System can be found in the PNF MIS Report (USDA 2006).

MIS habitat trend is monitored using ecological and vegetation data for the PNF. These data include spatial ecological and vegetation layers created from remote-sensing imagery obtained at various points in time, which are verified using photo-imagery, on-the-ground measurements, and tracking of vegetation-changing actions or events (for example, wildland fires).

3.7.3.3 Current Conditions

The current conditions for the MIS discussed within this Grizz EA (American marten, California spotted owl and northern goshawk) were previously discussed in the Wildlife Resources Section. For further discussion regarding the affected environment, direct, indirect and cumulative effects to these three species, please see the appropriate section and/or the Grizz Wildlife BA/BE. For further discussion regarding wildlife MIS not discussed in this EA, please see the Grizz Wildlife MIS report in the Grizz Project file (.USFS PNF BRD 2007i).

3.7.4 Environmental Consequences-American Marten

Based on the small acre percentage of marten habitat affected by projects across the HFQLG Pilot Project and that the percentage on the PNF of affected denning and resting habitat is less than the 1.5% currently documented, habitat trends for the marten are considered stable on the PNF.

3.7.4.1 Population Status and Trend

The Global conservation status of marten is “G5-Secure” (“demonstrably widespread, abundant, and secure”) and the United States National conservation status is “N5” (“secure – common, widespread, and abundant in the nation) (NatureServe 2005). The Global Short-Term Trend is Stable (unchanged or within plus or minus 10% fluctuation in population, range, area occupied, and/or number or condition of occurrences) (Ibid).

3.7.4.2 Current Population Status and Trend–California and Sierra Nevada

The California Natural Diversity Database (CNDDB) rank is “G5S3S4”: Global 5 indicates marten is globally “demonstrably secure; commonly found throughout its historic range”; State 3/State 4 indicates that, in California, marten is between being ‘apparently secure’(G4) and ‘restricted range/rare’(G3); G4 indicates that there are some factors to cause some concern, such as narrow habitat or continuing threats; G3 indicates the species has about 21-80 viable occurrences or 1,000-3,000 individuals or 10,000 to 50,000 acres of occupied habitat within the State (CNDDB 2006).

Based on the monitoring data collected on the PNF, as required by Appendix E and the Plumas LRMP, it appears marten are locally distributed in and around the Lakes Basin area of the forest. This distribution of martens has remained stable since development of the LRMP in 1988.

3.7.4.3 Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the Species

Habitat reduction as a result of implementing alternatives mirrors that described for spotted owls and goshawks. Effects to the habitat trend on the draft forest carnivore network from the Grizz Project are expected to be minimal (<1%). Marten habitat could be better protected from stand replacement fires (from the existing condition) for the next 10-20 years with implementation of the PA. The project-level habitat impacts will contribute to the current forest-wide trends of short term habitat reductions for longer term protection of old forest habitat. Based on known

detections of marten on the PNF, no changes in marten occupancy or distribution on the PNF would occur.

3.7.5 Environmental Consequences-California Spotted Owl

Most of the projects affecting the spotted owl on the PNF have been HFQLG projects, so the amount of 5M, 5D, and 6 affected by HFQLG appears to be a good indicator of habitat trend. The 1.8% of 5M, 5D and 6 habitat affected to date is relatively low compared to the overall amount of suitable habitat available across the pilot area. The PNF share of this total would be less than the 1.8%. Thus across the HFQLG area there has been a slight decrease in nesting/roosting habitat since 2000.

3.7.5.1 Population Status and Trend

The viability threshold defined by the PNF LRMP of maintaining 54 Spotted Owl Habitat Areas (SOHAs) has been accomplished since 1991. In addition, the 296 California spotted owl PACs currently delineated on the Plumas are widely distributed across the forest where suitable habitat is present and available.

Bio-regional monitoring (including the Plumas Lassen Administrative Study (PLAS) spotted owl module, and the latest U.S. Fish & Wildlife Service listing determination indicates a stable to slightly upward population trend for the California spotted PNF data indicates that spotted owls are widely distributed across the forest where suitable habitat is currently present (PNF MIS Report, 2006).

3.7.5.2 Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the Species

The Grizz Project analysis concludes that there would be a reduction in 5M, 5D and 6 strata types of approximately 195 acres with Alternative 1, 202 acres with Alternative 3, and 184 acres with Alternative 4. Therefore, there would be a cumulative contribution to the loss of suitable habitat for old forest-dependent species within the HFQLG Planning Area as a result of implementing one of the three action alternatives. These figures have already been incorporated into the total acre figure reduced across the pilot project discussed on pages 33–35 of the MIS report.

The three action alternatives avoid habitat modification within PACs/SOHAs. No changes in California spotted owl PAC/HRCA/SOHA occupancy, distribution or the spotted owl population on the PNF is expected to occur. With implementation of an action alternative, California spotted owl habitat could be better protected from crown fires (from the existing condition) for the next 10-20 years. The project-level habitat impacts will contribute to the current forest-wide trends of short term reductions for longer term protection of PACs, SOHAs and HRCAs.

3.7.6 Environmental Consequences-Northern Goshawk

Most of the projects affecting the goshawk on the PNF have been HFQLG projects, so the amount of 5M, 5D, and 6 affected by HFQLG appears to be a good indicator of habitat trend. The

1.8% of 5M, 5D and 6 habitat affected to date is relatively low compared to the overall amount of suitable habitat available across the pilot area. The PNF share of this total would be less than the 1.8%. Thus across the HFQLG area there has been a slight decrease in habitat since 2000.

3.7.6.1 Population Status and Trend

From 2000 to 2005, PAC monitoring has occurred on approximately 30 percent of all PACs across the northern province of the Sierras (Region 5 statistics). The combination of historic information and more recent inventory and monitoring data, indicate that the northern goshawk populations in the Sierra Nevada including the P NF are relatively secure with the increase in occupancy of previously unoccupied sites indicating potentially increasing populations at the forest scale.

3.7.6.2 Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the Species

The three action alternatives avoid habitat modification within goshawk PACs. It is not anticipated that the expected habitat reduction would result in loss of occupancy, productivity or distribution of known goshawk PACs, and therefore no changes to the goshawk population on the PNF and within the Sierra Nevada is expected to occur.

3.8 Sensitive Plant Species and Botanical Resources

3.8.1 Introduction

The following assessment is summarized from the biological assessment/biological evaluation (BA/BE) for threatened, endangered and sensitive plant for the Grizz Project, which is incorporated here by reference (USFS PNF BRD 2007g). This assessment addresses how the Proposed Actions of the Grizz Project affect sensitive plant species. For discussion regarding noxious weeds and botanical Management Indicator Species, please see the appropriate sections.

The purpose of this BA/BE is to determine whether the Proposed Action, as well as other action alternatives, would result in a trend toward listing or loss of viability for sensitive species, and to document effects on threatened, or endangered species and/or their critical habitat as part of determining whether formal or informal consultation is needed. This BA/BE 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 direction (FSM 2672.42), and is incorporated into this Grizz EA by reference (USFS PNF BRD 2007g).

Much of the species information and effects discussion was taken directly from the Biological Evaluation for Plants for the Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLGFRA) Final Environmental Impact Statement (FEIS). The 2004 Sierra Nevada Forest Plan Amendment (SNFPA) Final Environmental Impact Statement (FEIS) and ROD further amended the sensitive plant and noxious weed standards and guidelines.

3.8.2 Affected Environment

3.8.2.1 Scope of the Snalysis

Geographic Analysis Area: The geographic boundary for analyzing effects to special interest plants and special habitats is the project boundary. Sensitive plants and other botanical resources are managed at the project level according to the Plumas National Forest (PNF) Interim Management Prescriptions (USDA Forest Service 2007). All known ecology, habitat, range and distribution information is considered in creating these prescriptions and they are periodically reviewed and updated by Forest Service botanists. The Grizz Project will not cause effects to sensitive plants or special habitats outside of the project area. Therefore, an analysis area equal to the project area insures adequate conservation.

Timeframe of Analysis: Past and current activities listed in Appendix E have altered special interest plants and special habitats. The effects of past activities are built into this analysis in that they are largely responsible for the existing landscape.

3.8.2.2 Analysis Methodology

The project area was surveyed for vascular plants by botanists from Siskiyou BioSurvey of Eagle Point, OR and Ecosystems West Consulting Group of Santa Cruz, CA. Non-vascular plant surveys were done in 2005 by Vegetation Management Solutions, a Forest Service Enterprise Team. Additional botanical surveys were performed by Plumas National Forest botanists in 2004 and 2005. Parts of the project area have been surveyed for specific sensitive plant species in previous projects. Surveys for the following projects were done in or near the Grizz Project area: Freeman Project, Mabie DFPZ, Happy Jack DFPZ and GS, Humbug DFPZ, Grizz DFPZ, Lake Davis Chip Seal and Beckwourth Ranger District general noxious weed survey program by contractors.

The Grizz Project area was reviewed using aerial photographs, soils maps and known occurrences to help determine potential habitat for rare species. In the field, areas identified as potential habitat were surveyed at a high level of intensity (complete survey). Areas identified as potential habitat include openings in the forest, meadows, riparian areas, seeps and springs. Other areas with little to no potential habitat were surveyed at a less intense level (cursory survey). Plant location data was recorded using Global Positioning Systems and the data was then entered into a Geographic Information System (GIS). Treatment units were added to the GIS data to analyze proximity to rare species and identify potential detrimental treatments and designate "Controlled Areas." Areas of concern were brought forward at planning meetings and appropriate mitigations will be enacted (see page 47, Management Mitigations in the Biological Evaluation).

3.8.2.3 Current Conditions

Special Habitats and Biodiversity Areas

Springs and Seeps

Groundwater seeps, springs, wet meadows and other wetlands were documented at numerous sites within the project area (EcoSystems West Consulting Group 2005 and Siskiyou BioSurvey LLC 2005). These habitats are considered sensitive resources because they provide valuable habitat for a diversity of plants and wildlife and perform essential ecological and hydrological functions. Wetlands also support numerous PNF sensitive and special interest plants species (Hanson 1999, 2003). In the project area, there are:

- Thirty-one seeps,
- nineteen springs,
- one fen,
- and one pond.

Each of these sites has been surveyed for sensitive and special interest plants. Of these various wetland types, 35 occur in or near (within 100 feet) treatment units. Control areas will be established to protect all 35 of these. Some control areas will have more than one seep or spring

and may also contain occurrences of sensitive plants. These control areas will be flagged and avoided. Buffer zones will be established and maintained around seeps, springs and associated meadows according to the Standard Operating Procedures (SOPs) for Riparian Habitat Conservation Areas (Appendix D).

Willow/Alder Plant Community

Groundwater seeps and spring wetlands in the project area support a rich array of hydrophytic species including shrubs. The most notable common shrub community within riparian areas and seeps/springs in and adjacent to the Grizz Project is riparian willow and alder shrub stands. These areas will be protected by enacting current SOPs (Appendix D) regarding Riparian Habitat Conservation Areas (RHCA).

Threatened, Endangered and Sensitive-Status Plants

No other Threatened, Endangered, Proposed or Sensitive (TEPS) plant species have known occurrences or potential habitat on the PNF. Species which do not have potential habitat in the project area, based on the reasons given in Table 3.42, are not further analyzed in this document.

Although adequate botanical surveys have been performed in the project area, it is possible that isolated individuals may be present. Therefore, undiscovered individuals may be impacted inadvertently. For this reason (potential impact to undiscovered individuals) a determination of "may impact individuals but not likely to cause a trend toward federal listing or loss of viability" has been made for these species. However, if any of these species with potential habitat but no known occurrences in the project area are found during project implementation they will be protected by applying the SOPs, such as flagging and avoidance or a limited operating period (LOP). Without known populations it is not possible to present a more detailed discussion of effects. Table 3.42 lists all sensitive-status plant species from the PNF and their current status.

Table 3.42 Habitat potential of the proposed project area for sensitive plants

SPECIES	Known occ.	Potential habitat	No habitat	Habitat unsuitable based on the following:
Allium jepsonii			X	No serpentine outcrops in the project area.
Arabis constancei			X	No serpentine outcrops in the project area.
Astragalus lemmonii		X		
Astragalus lentiformis		X		
Astragalus pulsiferae var.coronensis		X		
Astragalus pulsiferae var. pulsiferae		X		
Astragalus pulsiferae var. suksdorfii		X		
Astragalus webberi		X		
Balsamorhiza macorlepis var. macorlepis			X	No serpentine soils or foothill woodlands habitat in project area.
Botrychium ascendens		X		
Botrychium crenulatum		X		
Botrychium lunaria		X		
Botrychium minganense		X		
Botrychium montanum		X		
Botrychium pinnatum		X		
Bruchia bolanderi		X		
Buxbaumia viridis		X		
Calystegia atriplicifolia ssp. buttensis			X	Proposed project is too high in elevation.
Calycadenia oppositifolia			X	Proposed project is too high in elevation.
Clarkia biloba ssp. brandegeae			X	Proposed project is too high in elevation.
Clarkia gracilis ssp. albicaulis			X	Proposed project is too high in elevation.
Clarkia mildrediae ssp. mildrediae			X	Proposed project is too high in elevation.
Clarkia mosquinii			X	Proposed project is too high in elevation.
Cypripedium fasciculatum		X		
Cypripedium montanum		X		
Dendrocollybia racemosa			X	No habitat predicted by habitat model.
Eleocharus torticulumis		X		
Eriogonum umbellatum var. ahartii			X	No serpentine outcrops in the project area.
Fissedens aphelotaxifolius		X		
Fissedens pauperculus		X		
Frittilaria eastwoodiae			X	Proposed project is too high in elevation.
Helodium blandowii		X		
Hydrothyria venosa		X		
Ivesia aperta var. aperta		X		
Ivesia sericoleuca		X		
Ivesia webberi		X		
Lewisia cantelovii		X		
Lewisia kellogii ssp. hutchinsonii		X		
Lewisia kellogii ssp. kelloggii		X		

SPECIES	Known occ.	Potential habitat	No habitat	Habitat unsuitable based on the following:
Lomatium roseanum	X			
Lupinus dalesiae	X			
Meesia longiseta		X		
Meesia triquetra		X		
Meesia uliginosa		X		
Mielichhoferia elongata		X		
Monardella follettii			X	No serpentine outcrops in the project area.
Monardella stebbinsii			X	No serpentine outcrops in the project area.
Oreostemma elatum		X		
Packer eurycephalus var. lewisrosei (Senecio eurycephalus var. lewisrosei)			X	No serpentine outcrops in the project area.
Packera layneae (Senecio layneae)			X	No serpentine in the project area. Project area is too high in elevation.
Penstemon personatus		X		
Penstemon sudans		X		
Phaeocollybia olivacea			X	No habitat predicted by habitat model.
Pyrrocoma lucida		X		
Sedum albomarginatum			X	No serpentine outcrops in the project area.

No threatened or endangered plant species are found within the project area. Only four sensitive species of plants are found within the project area.

Botrychium ascendens, B. crenulatum, B. lunaria, B. montanum, B. minangense, B. pinnatum (Moonworts)

Four occurrences of moonworts were found in the project area. The moonworts are small inconspicuous, perennial ferns. They are distributed across North America (*B. ascendens* to British Columbia and Nevada, *B. crenulatum* to Washington and Utah and *B. montanum* to British Columbia and Montana) but nowhere are they abundant. According to some experts (Wagner and Devine, 1989) they should be regarded everywhere as threatened species. Overall plant numbers in California are low (i.e. occurrences often consist of only a few plants). It is difficult to tell the various *Botrychium* species apart. *B. crenulatum* and *B. ascendens* are known from two adjacent drainages, *B. montanum* from a single drainage on the Lassen National Forest near the PNF. *B. lineare* is known in California from Fresno County. B. ascendens and *B. crenulatum* grow in moist meadows, while *B. montanum* is found in shaded coniferous forest areas near streams. They grow in moss, grasses, sedges and rushes and other vegetation. The Moonwort plants can be hidden by the taller grasses and other vegetation growing with them. They are sensitive to drought and may not appear in dry years. *Botrychium* plants are closely associated with mycorrhizal fungi at all life stages, so the most important habitat requirements are probably maintaining shade, soil moisture and organic matter and avoiding disturbance such as defoliation or root/ mycorrhizal disruption. Surveys for these species have been conducted on the PNF since 1994. Species determinations of the four known occurrences in the project area have not been verified. As such, they will be treated as one of the above eight species and protected according to

the Interim Management Prescriptions for *Botrychiums*. When enough plant material is found to justify collecting a specimen species, determinations will be verified using molecular methods.

Bruchia bolanderi (Bolander's Candle Moss)

One occurrence of this species was found in the project area. This moss is endemic to California and Oregon. In the Sierra Nevada, it is known from fewer than 10 occurrences from Yosemite National Park south to Sequoia National Forest in Tulare County. It has also been found in Plumas County with 1 confirmed occurrence on private land and 2 occurrences (1 confirmed and 1 unconfirmed) on the PNF. It grows in meadow habitats in mixed conifer and subalpine plant communities. It is assigned to the meadow and seep and nonforested lakeshore guild. This moss grows in ephemeral habitats such as the sides of erosional ditches or streams in wet meadows. In Oregon, it grows as individual plants among grasses or in large colonies in openings on disturbed soil with organic content (Christy and Wagner, 1996). The trend is unknown. Threats include trampling of stream banks and any other activity that would increase erosion or alter hydrology.

Lomatium roseanum (Adobe Lomatium)

One occurrence of this species was found in the project area. This plant is known from the PNF from 4 occurrences, totaling about 550 plants. It is suspected to occur on the Modoc Plateau in Modoc and Lassen Counties and known from Plumas County in California east to Washoe County, Nevada. There are nine occurrences (0.1 km apart) known in Nevada, totaling 160,000 individuals. Malheur County, Oregon populations (including type locality) are believed to be extirpated. This plant has been found in rocky, shallow soil on wind swept ridge tops on the PNF. Habitat has little or no canopy and sites are dry. Elevation ranges between 5,880 to 7,280 feet.

Lupinus dalesiae (Quincy Lupine)

Two occurrences of this species were found in the project area. This plant is known to occur in Butte, Plumas, Sierra, Yuba and Nevada Counties in California. It is known from the Plumas (115 occurrences), Lassen (18 occurrences) and Tahoe (2 occurrences) National Forests. It occupies metasedimentary and metavolcanic open canopy sites in mixed conifer forest plant communities. It is assigned to the gap-phase and general opening guilds. The trend for this plant is stable. Threats include road construction and maintenance, mining, off-road vehicle use, timber harvest, release and site preparation activities. Development is a threat on private lands.

Special Interest Plant Species

According to Weingardt (2006), watch list species (PNF special interest species) should be considered during project planning and documentation retained in the planning file. These species make an important contribution to the forest biodiversity and should be maintained under the provisions of the National Forest Management Act (NFMA).

Didymodon norrisii (Norris' Beard-Moss)

There are two known occurrences of *Didymodon norrisii* in the project area and each has several suboccurrences. *Didymodon norrisii* is a moss that occurs on intermittently mesic rock slabs in cismontane woodland, lower montane, coniferous forest. It is best developed in drainage channels on rock outcrops that completely dry out in the summer. Less frequently it occurs in small, intermittent streams. It can occur on rather flat, shallow rocky soil where sheet drainage occurs in open grasslands. These occurrences are more vulnerable to disturbance. It ranges in elevation from 850 to 6,000 ft.

Pseudostellaria sierrae (Sierra Starwort)

There are three known occurrences in the project area. Each of these occurrences is over 8 acres in size. It has also been found to be abundant on the Mt Hough Ranger District of the PNF. *Pseudostellaria sierrae* is a species that was newly described in 2002. It was added to the PNF Special Interest Species list in 2005 due to a lack of information. On the PNF it is known form the vicinity of Mt Hough, Grizzly Ridge, Quincy and Thompson Creek. The California Native Plant Society (CNPS) gives it a ranking of 3.2, indicating a need for more information about this species and that it is "fairly endangered in California" (California Native Plant Society 2001).

Silene invisa (Cryptic Catchfly)

There are 26 known occurrences in the PNF and 3 in the project area. *Silene invisa* is a disturbance tolerant species found at higher elevations in true forests. It does not have a CNPS ranking. *Silene invisa* is also on the PNF list of Management Indicator Species and is analyzed in further detail within that section.

Trichodon cylindricus (Trichodon Moss)

There are four known occurrences in the PNF and all four are in the project area. *Trichodon cylindricus* is a small moss. It grows in broadleaved upland forest and upper montane coniferous forest on sandy, exposed soil and road banks at elevations of 100 to 5000 feet above sea level. CNPS gives it a ranking of 2.2 indicating that it is fairly endangered in California but more common elsewhere.

Rare Fungi Species

Sensitive species of fungi were analyzed using a habitat model (USDA Forest Service, 2005). The model was constructed to identify areas of potential habitat for these fungi species. These areas were ranked according to the quality of the potential habitat (high, medium and low) and the likelihood of the sensitive fungi species occurring there. According to the model no potential habitat exists in the project area.

3.8.3 Environmental Consequences

3.8.3.1 Alternative 2 (No-action Alternative)

Direct and Indirect Effects

There would be no direct effects from the No-action Alternative to sensitive plants and botanical resources other than those associated with current ongoing actions such as grazing, recreation and woodcutting.

The No-action Alternative would not prescribe any fire; the risk of wildfire would remain. The No-action Alternative can indirectly cause a loss of habitat for these plant species. With the No-action Alternative, habitat succession could adversely affect some sensitive plant species in the analysis area. *Lupinus dalesiae* prefers earlier successional stages and would have to rely on natural disturbance factors under the No-action Alternative.

Wildfire is unpredictable, but given the fire history of the analysis area it is likely that wildfires will occur. The effects of wildfire to sensitive plants in the analysis area are not fully known and uncertain. From past experience the effects of fire suppression can have a larger effect than the wildfire itself. The overall effect depends on fire timing and intensity, which sensitive species are located in the analysis area and how those sensitive species are distributed. Thus, the response to wildfire would be species-dependant. Fire exclusion allows conifers seedlings to establish in forest openings and at the edges of meadows. Several sensitive plant species of the PNF grow in meadows and forest openings.

Indirect effects from the No-action Alternative would be those associated with continued habitat succession, ongoing activities (woodcutting and recreation), the current and future threats of noxious weed infestation and the current and future threat of wildfire. The effects of successional progression on the sensitive plants identified for this analysis area is not clear. There is a mix of seral stages within the analysis area. Those species residing in habitat currently meeting their ecological needs may maintain their current populations or experience a decline as forest canopies continue to close and more shade tolerant species out-compete these sensitive plant species for light and other resources.

Noxious weeds are known to occur in the project area in isolated locations and along roadsides. Ongoing use of forest roads and terrain by woodcutters and recreationists is expected to continue contributing to the risk of noxious weed introduction. See the “Noxious Weeds” section for additional information on noxious weeds.

Woodcutting and recreation are anticipated to continue in the area and likely will continue to impact occasional individual sensitive plants. The degree of this future impact is currently not predictable but is assumed to be similar to the present use. In calendar year 2006, there were 3,119 cords of firewood removed from the Beckwourth Ranger District.

Cumulative Effects

Probably the most important factors contributing to potential cumulative effects of the No-action Alternative would include those associated with the potential for wildfire to act in excess of its historical intensity and the degree of successional progression to later seral stages. The project area has stands exhibiting signs of past timber management intermingled with stands exhibiting signs of fire exclusion. Quantifying the threat of wildfire to sensitive plant species is difficult but a wildfire threat exists to some extent in the project area. There is some potential for the lack of prescribed fire under the No-action Alternative to contribute toward declining habitat suitability for *Lupinus dalesiae* because this species has historically relied on some level of disturbance to maintain its place in the plant community.

3.8.3.2 Alternative 1

Direct and Indirect Effects

There will be no direct effects to known populations of *Bruchia bolanderi* and *Lomatium roseanum* because there is no treatment being proposed within 300 feet of these occurrences. It is unlikely that there will be indirect effects to known populations of *Bruchia bolanderi* and *Lomatium roseanum* because there is no treatment being proposed within 300 feet of these occurrences. *Bruchia bolanderi* is found on soil of stream banks and *Lomatium roseanum* is found on dry rocky ridges where there is no canopy. The habitats of these two sensitive plant species will not be disturbed by project activities.

Control areas will be established to flag and avoid the known populations of *Botrychium* species and *Lupinus dalesiae*. It is unlikely that there will be any direct effects to these populations. It is possible that potential habitat for several sensitive species of moonworts (*Botrychium* species) may be indirectly affected by thinning treatment in riparian areas. These riparian areas may include moonwort habitat. *Botrychium* species are usually associated with riparian areas, small streams, or fens within coniferous forests. The area has been adequately surveyed by qualified botanists. Any known moonwort populations will be protected from disturbance. Standard Operating Procedures (SOP) common to all action alternatives will minimize or eliminate potential adverse impacts.

Lupinus dalesiae may be indirectly affected by the project activities. Although the known occurrences will be protected within control areas, the surrounding habitat will be thinned mechanically. The reduced canopy cover, soil disturbance and burning will most likely enhance habitat for this species. Personal observations by PNF botanists have determined that this plant responds favorably to various types of disturbance. It is likely that project activities will enhance adjacent potential habitat.

Norris' beard moss (*Didymodon norrisii*) and Trichodon moss (*Trichodon cylindricus*)are not likely to be effected because the known occurrences will not be disturbed.

Cryptic catchfly (*Silene invisa*) is likely to respond favorably. Observations by forest service botanists have shown that this species will colonize areas of disturbed soil where some canopy has been removed. Only small portions of the known populations will be directly affected.

Sierra starwort (*Pseudostellaria sierrae*) is abundant in the project area. The three known occurrences are over 10 acres each. Only small portions of these occurrences are within treatment units and would be disturbed. The undisturbed portions of these occurrences include sufficient number of individuals to ensure that population numbers can be maintained to avoid the species addition to the sensitive list.

Cumulative Effects

Bruchia bolanderi and *Lomatium roseanum* are unlikely to have cumulative effects because they will not be directly or indirectly affected.

One *Botrychium* occurrence (BOSP 11-004) is known within the DFPZ. Future maintenance of DFPZs can potentially impact these occurrences. Any future DFPZ maintenance will include an environmental analysis to consider impacts. The site will most likely be flagged and avoided at the time of any future maintenance. Therefore DFPZ maintenance is unlikely to cause cumulative effects to this species. It is unlikely that the Grizz Project will have any adverse cumulative effects on this species because adequate surveys have been done and known populations will not be disturbed. The project area has also been surveyed for special habitats (including seeps, springs and fens) which are suitable habitats for *Botrychium* species. These known special habitats will be protected according to the SOPs. Those seeps, springs and fens that are in or near a treatment unit will also be protected as Control Areas. (See Appendix C, The Botany Protection Plan for specific Control Areas in the Grizz Project record).

There are two known occurrences of *Lupinus dalesiae* in the project area. This disturbance tolerant species will most likely respond favorably to project activities. Past management activities may have impacted these occurrences. Fire suppression may have allowed other brushy plant species to encroach upon and out-compete the *Lupinus dalesiae* individuals. Fire suppression has also allowed young conifers to fill in openings and shade the plants. Past timber harvesting may have enhanced *Lupinus dalesiae* habitat by creating openings. Management activities may have negatively impacted *Lupinus dalesiae* plants directly by operating equipment or falling trees on the plants. A decision memo has been signed for a project to enhance 28 acres of habitat by underburning within a known occurrence of *Lupinus dalesiae* that lies within the Grizz Project area. The Grizz Project is likely to have a favorable effect on *Lupinus dalesiae* and its habitat. The known occurrences will be flagged and avoided. Treatment will be allowed adjacent to these occurrences. The proposed thinning and pile burning around these *Lupinus dalesiae* populations will enhance habitat and promote expansion of these populations.

SOPs common to all action alternatives will minimize potential adverse direct effects to sensitive plant species. Minimizing direct effects is the largest individual factor in diminishing cumulative effects to sensitive plant species. The Proposed Action may improve the quality and

amount of suitable habitat for sensitive plants species that tolerate or prefer moderate disturbance conditions.

3.8.3.3 Alternative 3

Direct and Indirect Effects

This alternative treats a greater number of acres than Alternative 1. However, these additional acres are not within or adjacent to any known sensitive or special plant occurrences. The direct and indirect effects of Alternative 1, discussed above, also pertain to Alternative 3.

Cumulative Effects

The cumulative effects of this alternative on sensitive and special interest plants will be the same as those of Alternative 1, the Proposed Action. If this alternative is implemented the protections for sensitive and special interest plants will be implemented as described in the Management Mitigations in Appendix C, the Botany Protection Plan of the Grizz Project record.

3.8.3.4 Alternative 4

Direct and Indirect Effects

This alternative treats less number of acres than Alternative 1. There are no know sensitive plant occurrences in or adjacent to the areas that are affected by the changes that this alternative would make to the Proposed Action. The direct and indirect effects of Alternative 1, discussed above, also pertain to Alternative 4.

Cumulative Effects

The cumulative effects of this alternative on sensitive and special interest plants will be the same as those of Alternative 1, the Proposed Action. If this alternative is implemented the protections for sensitive and special interest plants will be implemented as described in the Management Mitigations in Appendix C, the Botany Protection Plan of the Grizz Project record.

3.8.3.5 Determinations

Alternative 2 (No-action Alternative)

__X___ May impact individuals but not likely to cause a trend toward federal listing or loss of viability to*: Botrychium species, Bruchia bolanderi, Lomatium roseanum and Lupinus dalesiae.*

Will not affect: *Astragalus lemmonii, A. lentiformis, A. pulsiferae var. coronensis, A. pulsiferae var. pulsiferae, A. pulsiferae var. suksdorfii, A. webberi, Buxbaumia viridis, Cypripedium fasciculatum, Cypripedium montanum, Eleocharus torticulmis, Fissendens aphelotaxifolius, F. pauperculus, Helodium blandowii, Hydrothyria venosa, Ivesia aperta var. aperta, I. webberi, I. sericoleuca, Lewisia cantelovii, L. kellogii ssp. hutchinsonii, L. kellogii ssp. kelloggii, Meesia longiseta, M. triquetra, M. uliginosa, Mielichhoferia elongate, Oreostemma elatum, Penstemon personatus, P. sudans and Pyrrocoma lucida.*

Alternatives 1, 3 and 4

__X___ May impact individuals but not likely to cause a trend toward federal listing or loss of viability to: *Astragalus lemmonii, A. lentiformis, A. pulsiferae var. coronensis, A. pulsiferae var. pulsiferae, A. pulsiferae var. suksdorfii, A. webberi, Botrychium ascendens, B. crenulatum, B .lunaria, B .minganense, B. montanum, B. pinnatum, Bruchia bolanderi, Buxbaumia viridis, Cypripedium fasciculatum, Cypripedium montanum, Eleocharus torticulmis, Fissendens aphelotaxifolius, F. pauperculus, Helodium blandowii, Hydrothyria venosa, Ivesia aperta var. aperta, I. webberi, I. sericoleuca, Lewisia cantelovii, L. kellogii ssp. hutchinsonii, L. kellogii ssp. kelloggii, Lomatium roseanum, Lupinus daleseiae, Meesia longiseta, M. triquetra, M. uliginosa, Mielichhoferia elongate, Oreostemma elatum, Penstemon personatus, P. sudans and Pyrrocoma lucida.*

Although known occurrences will be protected, undiscovered occurrences of sensitive plants may exist in the project area. For this reason the aforementioned plant species may be impacted. The project area has been adequately surveyed for sensitive species and such impacts are expected to minimal.

3.9 Noxious Weed Risk Assessment

3.9.1 Introduction

The following assessment is summarized from the biological evaluation for threatened, endangered and sensitive plant for the Grizz Project, which is incorporated here by reference (USFS PNF BRD 2007g). This assessment addresses how the Proposed Actions of the Grizz Project would affect the risk of noxious weed infestation in areas affected by the Grizz Project.

This noxious weed risk assessment has been prepared to evaluate the effect of the Grizz Project on California Department of Food and Agriculture (CDFA) listed noxious weeds and other invasive non-native plant species. This assessment is in compliance with the PNF LRMP (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 (USFS 2004), Executive Order on Invasive Species (Executive Order 13112) and the direction in the Forest Service Manual section 2080, Noxious Weed Management (amendment effective since 11/29/95) (USFS 1991), which includes a policy statement calling for a risk assessment for noxious weeds to be completed for every project.

The overriding principle stated in these documents is that "…it is much cheaper to prevent an infestation from becoming established than to try to eliminate it once it has begun to spread, or deal with the effects of a degraded plant community." Specifically, the manual states: 2081.03 – Policy: When any ground disturbing action or activity is proposed, determine the risk of introducing or spreading noxious weeds associated with the Proposed Action.

3.9.2 Affected Environment

3.9.2.1 Scope of the Analysis

Geographic Analysis Area: The Grizz Project area is approximately 19,400 acres. The area of analysis for noxious weed risk assessment includes the surrounding land up to 1 mile from the project boundary. Access routes to the project area were also considered in analyzing the risk of noxious weed infestation.

Timeframe of Analysis: The earliest noxious weed records for this analysis area are from the year 2000. These records and any subsequent records of noxious weeds in the area were considered in this analysis.

3.9.2.2 Analysis Methodology

Noxious weed surveys were conducted in the project analysis area by Siskiyou Bio Survey of Central Point, Oregon; Eco Systems West of Santa Cruz, CA; and PNF botanists. Adequate noxious weed surveys have been completed within and adjacent to the project area.

Noxious weed surveys targeting roadsides, landings and camping areas within the project area were conducted in the summer of 2005. The noxious weed surveys were conducted in conjunction with rare plant surveys. Although surveys focused on areas within the project boundaries, adjacent roads and landings were surveyed as well. Access routes into the project area were also considered in this noxious weed risk analysis.

The risk of noxious weed establishment takes into account a variety of factors including an anticipated weed response to project activities and mitigation measures (Table 3.43):

- Mapping of noxious weed species
- Size of existing known populations
- Treatment of known populations
- Standard Operating Procedures
- Intensity of underburns

Table 3.43 Anticipated weed response

Factors	Variation	Risk
NON-PROPOSED ACTION DEPENDENT FACTORS		
1. Inventory	Adequate	Low
2. Known Noxious Weeds	Small populations of high priority species present	Moderate
3. Habitat vulnerability	Moderate cover, low disturbance	Moderate current vulnerability
4. Non-project dependent vectors	Moderate current vectors	Moderate current vulnerability
PROPOSED ACTION DEPENDENT FACTORS		
5. Habitat alteration expected as a result of project.	Moderate to high ground disturbance.	Moderate to high
6. Increased vectors as a result of project implementation	Temporary roads, road reconstruction, road closures and decommissioning, short-term traffic increase	Moderate to high
7. Mitigation measures	No SOPs measures implemented	High
	Some SOPs measures implemented	Moderately reduced
	All SOPs measures implemented	Greatly reduced
8. Anticipated weed response to Proposed Action	Some or no SOPs measures implemented	Moderate to high potential for significant increase in weed spread as a result of project implementation
	All SOPs measures implemented	Moderate potential for weed spread as a result of project implementation
9. Cost estimates	2007 Mapping, monitoring and control 5 days GS 11 = $1448.00 2008 Mapping, monitoring and control 5 days GS 11 = $1448.00	Generally, it is more economical and efficient to treat small infestations than to wait until they are too large.

3.9.2.3 Current Conditions

The California Department of Food and Agriculture's noxious weed list (http://www.cdfa.ca.gov) divides noxious weeds into 3 categories:

- A-listed weeds are those for which eradication or containment is required at the state or county level.
- B-listed weeds, eradication or containment is at the discretion of the County Agricultural Commissioner.
- C-listed weeds require eradication or containment only when found in a nursery or at the discretion of the County Agricultural Commissioner.

There are two known occurrences of the A-listed weed species spotted knapweed (*Centaurea maculosa*) in the analysis area. There are 9 known occurrences of the following B-listed weed species in the analysis area: tall whitetop (*Lepidium latifolium*) occurs in 3 sites and Canada thistle (*Cirsium arvense*) in 5 sites. There are 2 occurrences of the C-listed species, field bindweed (*Convulvulus arvensis*). These occurrences are summarized in table 3.44.

Table 3.44 Noxious weed occurrences within 1 mile of project boundaries.

Unit number	Species	Occurrence Number	Mitigation
None	*Cirsium arvense*	11-075	Control Area
103	*Cirsium arvense*	11-076	Control Area
89	*Cirsium arvense*	11-077	Control Area
None	*Cirsium arvense*	11-079	Control Area
264	*Cirsium arvense*	11-080	Control Area
None	*Lepidium latifolium*	11-014-1	Control Area
None	*Lepidium latifolium*	11-005	Control Area
None	*Centaurea maculosa*	11-003	Control Area
None	*Centaurea maculosa*	11-010	Control Area

A-listed Weeds

The two spotted knapweed sites are located outside of the project area but both are along roads that may be used to access the project. One site, CEMA4_003, is along county road 112 (forest road 175). It was visited by Forest Service botanists in September 2005 and August 2006. Very few plants were found and all were pulled. The second spotted knapweed site is along county road 126. It was visited by forest service botanists in July 2005 and August 2006; no knapweed plants were found. Plumas County employees treated the site by hand pulling the weeds in 2004 (Tim Gibson personal communication). There is likely to be a seed bank in the soil and the area will continue to be considered a noxious weed site. Both of these spotted knapweed sites will be revisited in summer of 2007 and mechanically treated as necessary.

B-listed Weeds

Three tall white top sites are located along county road 112 (forest road 175) at the north end of Lake Davis. They are not in the project area but are along an access route. They will not be disturbed by the Grizz Project. They have been treated by hand pulling in 2004, 2005 and 2006. PNF botanists visit these sites annually and treat the weeds by hand pulling.

Five sites of Canada thistle are known within the analysis area. Four of these sites are located in treatment units. These four, CIAR 11-075, CIAR 11-076, CIAR 11-077 and CIAR 11-080 will be flagged and avoided. The fifth site, CIAR 11-079 is approximately ¼ mile from any treatment unit. It is not along any haul route and will not be affected by project activities.

C-listed Weeds

Two sites of field bindweed are located along forest road 24N10 which provides access to the project area. This weed is common throughout California. It does not pose a serious threat to wild

land habitats (CDFA 2006). The County Agricultural Commissioner does not require treatment of this weed species.

Klamath weed can be found along most Forest Service roads on the PNF that are not shaded by overstory canopy. Plants are usually scattered within the road prism, rarely forming dense stands or invading the adjacent forest. Plant distribution appears to be most heavily concentrated at the lower elevations (1,000-4,000 ft) with plants becoming less common at the higher elevations. The Grizz Project area is generally above five thousand feet; therefore Klamath weed is far less common in the project area. The biological control agents *Chrysolina quadrigemina* and *C. hyperici*, leaf-feeding flea beetles and *Agrilus hyperici* a root-boring beetle largely control Klamath weed. These biological control agents have reduced infestations by 97% to 99% since 1940 (California Department of Food and Agriculture 2004). No other action is prescribed for controlling Klamath weed.

Bull thistle is common along most Forest Service roads on the PNF. Like Klamath weed, bull thistle is found along roads that are not shaded. Bull thistle is most common in disturbed areas with little to no canopy cover. Two biocontrol insects (*Urophora stylata* and *Rhinocyllus conicus*) have been released and help reduce population levels. Bull thistle is widely distributed along PNF roads and other disturbed areas.

3.9.3 Environmental Consequences

3.9.3.1 Alternative 2 (No-action Alternative)

Direct and Indirect Effects

Noxious weeds are known to occur in the project area in isolated locations and along roadsides. Ongoing use of forest roads and terrain by woodcutters and recreationists is expected to continue contributing to the risk of noxious weed introduction.

Cumulative Effects

Probably the most important factors contributing to potential cumulative effects of the No-action Alternative would include those associated with the potential for wildfire to act in excess of its historical intensity and the degree of successional progression to later seral stages.

A high-intensity wildfire would remove much more of the canopy and duff layer and increase the risk of noxious weed invasion. Data suggest the degree of fire-induced disturbance is an important factor in post-fire noxious weed invasion. According to Crawford (cited in Keeley 2001), studies of high and low intensity burns showed that noxious weed invasion is favored when fire intensity is sufficient to open the canopy and destroy the litter layer. Keeley also explains how recent studies throughout the southern Sierra Nevada have shown cheatgrass (*Bromus tectorum*) invasions to be the most predictable in forest patches that were burned with high intensity. He explains that such impacts could be potentially more profound now due to unnaturally high fuel loads.

3.9.3.2 Alternative 1

Direct and Indirect Effects

The implementation of the Grizz Project is predicted to result in a moderate potential for weed introduction and spread if all SOPs are adopted and all road decommissioning and closure is implemented. If the SOPs such as inventory, avoiding noxious weed areas with timber and fuels management activities, cleaning equipment, using weed free material and mulch and avoiding spread are followed the threat from noxious weeds will be minimized to less than a significant level.

The potential to introduce noxious weeds with machinery traveling through the project area presents a threat. Noxious weeds can also be brought into the area in road materials and mulch. Once established, noxious weeds can be difficult to control and eliminate from an area. Noxious weeds displace native plant habitat and degrade watershed functions.

In riparian areas or wet meadows, Canada thistle (*Cirsium arvense)* and perennial pepperweed (*Lepidium latifolium*) may invade with potentially catastrophic results. Upland areas may be invaded by a host of noxious weeds such as yellow star thistle (*Centaurea solstitialis*), the knapweeds (*Centaurea* spp.), or annual grasses such as medusahead (*Taeniatherum caput-medusae*). These noxious weeds can lead to habitat changes that are detrimental to sensitive plant species. Noxious weeds, once established, could indirectly impact sensitive plant species through allelopathy (the production and release of plant compounds that inhibit the growth of other plants), changing the fire regime, or direct competition for nutrients, light, or water. Subsequent weed control efforts such as hand-pulling, hoeing, mowing, or herbicide application could also negatively impact sensitive plants. Monitoring during project implementation and post project, avoidance of known sites and treatment of any weed populations discovered during implementation will greatly reduce the chances of an uncontrollable spread of weeds in the project area.

Cumulative Effects

Following standards and guidelines would greatly reduce the cumulative effects of noxious weeds. Noxious weeds will continue to pose a threat to native plant habitat and sensitive plant species. With timber and fuel activities of the Proposed Action that will open the stand, noxious weeds can more easily invade the area. Forest management activities in the past have probably spread noxious weeds and created habitat for them. Weed seeds can be spread by vehicles and disturbed areas are prone to noxious weed infestation. Many other factors contribute to weed spread; all types of forest recreation, wood cutting, state highways and county roads through the National Forest, grazing and activity on adjacent privately owned land all contribute to weed spread. A foreseeable future action is a chemical noxious weed treatment along roadsides within the Plumas-Sierra Weed Management Area. The Proposed Action for this project that has undergone public scoping would treat approximately 310 acres of weed occurrences across the

forest. The amount of treatment under this project that would fall within the Grizz Project area would equal approximately 4 acres or less than 1% of the forest-wide treatment.

3.9.3.3 Alternative 3

Direct and Indirect Effects

Treating a greater area than Alternative 1 may result in an increased risk of weed invasion by creating more potential habitat for noxious weeds. Noxious weeds can negatively impact sensitive plants by out competing them for resources and by altering habitat.

Cumulative Effects

The cumulative effects would be similar to Alternative 1.

Alternative 4

Direct and Indirect Effects

Treating fewer acres may result in a decreased risk of weed invasion because less potential habitat for noxious weeds would be created. Group select (GS) units are particularly vulnerable to noxious weed invasion because canopy may be completely removed in these areas. There are 17 less acres of GS treatment in this alternative than in Alternative 1.

Cumulative Effects

The cumulative effects would be similar to Alternative 1.

3.10 Plant Management Indicator Species

3.10.1 Introduction

The following assessment is summarized from Appendix D of the botany report for the Grizz Project, which is incorporated here by reference (USFS PNF BRD 2007g).The purpose of this report is to evaluate and disclose the impacts of the Grizz Project on plant Management Indicator Species (MIS) identified in the Plumas National Forest (PNF) Land and Resource Management Plan (LRMP) (USFS PNF 1988). For discussion regarding the affects of the Grizz Project to threatened, endangered or sensitive (TES) botanical species, please see the appropriate section or the Grizz BA/BE TES plants species, available in the Grizz Project file.

3.10.2 Affected Environment

3.10.2.1 Scope of the Analysis

Geographical Analysis Area: The Grizz Project botanical analysis area is approximately 19,400 acres; of which 19,000 are National Forest managed by the PNF and 400 acres are private land within National Forest boundary. All direct, indirect and cumulative effects discussed, occur within this 19,400 acre analysis area.

Timeframe of the Analysis: Past and current activities listed in Appendix E have altered the plant MIS and their special habitats. The effects of past activities are built into this analysis in that they are largely responsible for the existing landscape.

3.10.2.2 Analysis Methods

Project-level effects on MIS are analyzed and disclosed as part of EA under the National Environmental Policy Act (NEPA). This involves examining the impacts of the proposed project alternatives on MIS habitat by discussing how direct, indirect and cumulative effects will change the quantity and/or quality of habitat in the analysis area.

Adequately analyzing project effects to MIS plants, including TES species that are also MIS, involves the following steps:

- Identifying which MIS have habitat that would be either directly or indirectly affected by the project alternatives; these MIS are potentially affected by the project.
- Identifying the LRMP forest-level or bioregional-level monitoring requirements for this subset of forest MIS.
- Analyzing project-level effects on MIS habitats or habitat components for this subset of forest MIS.
- Discussing forest or bioregional scale habitat and/or population trends for this subset of forest MIS.

- Relating project-level impacts on MIS habitat to habitat and/or population trends for the affected MIS at the forest or bioregional scale.

MIS habitat trend is monitored, if required, using ecological and vegetation data for the PNF. The MIS selected for Project-Level MIS analysis for the Grizz Project are Quincy lupine and cryptic catchfly.

3.10.2.3 Current Conditions

Two occurrences of Quincy lupine (*Lupinus dalesiae*) were found in the project area occupying a total of 29 acres. At occurrence LUDA 11-081 canopy and duff cover are high and increasing. Since this species relies on disturbance to maintain favorable habitat conditions, this habitat is considered to be degrading.

There are approximately 27 acres of habitat occupied by cryptic catchfly (*Silene invisa*). The number of individual plants is not known. Two of these occurrences have several suboccurrences and one stretches across approximately 1000 meters along the north side of Grizzly Ridge at 6,800 feet above sea level. The occupied area is dominated by thick young red fir forest. Since this species occupies forest openings, this habitat is considered to be in a degraded condition.

3.10.3 Environmental Consequences

3.10.3.1 Alternative 2 (No-action Alternative)

Selection of the No-action Alternative may contribute to undesirable future habitat conditions for Quincy lupine and cryptic catchfly. Although some potential habitat in the Grizz Project area may remain in a degraded condition it is not likely to cause a forest-wide downward trend.

3.10.3.2 General Effects of the Action Alternatives

The effects will be the same for all of the action alternatives.

Direct and Indirect Effects

Quincy Lupine (*Lupinus dalesiae*)

Control areas will be established to flag and avoid the known populations of *Lupinus dalesiae*. It is unlikely that there will be any direct effects to these populations. Standard operating procedures (SOP) common to all action alternatives will minimize or eliminate potential adverse direct impacts.

Lupinus dalesiae may be indirectly affected by the project activities. Although the known occurrences will be protected within control areas, the surrounding habitat will be thinned mechanically. The reduced canopy cover, soil disturbance and burning will most likely enhance habitat for this species. Personal observations by PNF botanists have determined that this plant responds favorably to various types of disturbance. It is likely that project activities will enhance its potential habitat.

Cryptic Catchfly (*Silene invisa*)

The habitat for this plant will be directly affected by project activities. Disturbances include ground disturbance, canopy removal, underburning and pile burning. It is possible that burning may destroy plants and seeds. It is possible that some plants may be directly damaged by tree falling or equipment operation.

Plants will be indirectly affected by the removal of canopy cover and ground disturbance in suitable habitat. These indirect effects are likely to be favorable for the cryptic catchfly.

There are 3 occurrences of the cryptic catchfly in the project area. Small portions of these occurrences will be flagged and avoided. Treatment would be allowed within some of these occurrences because this species is known to respond favorably to disturbance.

Cumulative Effects

Quincy Lupine *(Lupinus dalesiae)*

It is anticipated that implementation of the action alternatives, in combination with past, present and reasonably foreseeable future actions would increase habitat capacity in the analysis area and Quincy lupine numbers would respond to the habitat changes such that there would be an upward trend in the population for the next 10-20 years. Improving habitat capacity on PNF lands would contribute to a stable trend in the Quincy lupine population.

Cryptic Catchfly *(Silene invisa)85*

It is anticipated that implementation of the action alternatives, in combination with past, present, and reasonably foreseeable future actions would increase habitat capacity in the analysis area and cryptic catchfly numbers would respond to the habitat changes such that there would be an upward trend in the population for the next 10-20 years. This conclusion is based on the implementation of control areas. Control areas within the known populations will remain undisturbed by project activities. This will insure that a seed source will be available to take advantage of the improved conditions. Improving habitat capacity on PNF lands would contribute to an increasing trend in the cryptic catchfly population.

3.11 Transportation System

3.11.1 Introduction

The following assessment is summarized from the transportation system report for the Grizz Project, which is incorporated here by reference (USFS PNF BRD 2007c). This assessment addresses how the proposed road actions affect the Grizz Project area. The roads in the Grizz Project area that are proposed for decommissioning or closure are causing resource impacts. These roads are not needed because other roads are available to provide the necessary access to implement group selection harvests and DFPZ construction. The Forest Service is directed to reduce impacts of the transportation system on resources by implementing road relocation or improvements as part of the Riparian Management Plan (see appendix R of the HFQLG final environmental impact statement) as required by the HFQLG Act (Section 401 (b) (1), (c) (2) (B) and (d) (4)).

The purpose of the National Forest road system is to provide suitable conditions for passage of all Forest Service and cooperator emergency vehicles and to meet resource management and public access needs. The road system and improvements should minimize adverse effects on resources such as watershed and wildlife values. Roads near streams or in riparian zones have the greatest probability of intercepting, concentrating and diverting flows from natural flow paths and should therefore be minimized where feasible. Road-stream crossings have the potential for failing and diverting water and should therefore be minimized where feasible. Roads can reduce and fragment wildlife habitat, but they can also provide access for habitat protection from wildfire and treatments designed to improve habitat quality. Roads should be minimized where adverse effects outweigh benefits to wildlife.

To protect watershed resources, the desired conditions for roads that would be retained and improved (through road construction, reconstruction, or relocation) include the following:

- Accommodation of the 100-year flood at stream crossings, including streamflow, bedload and debris
- No diversion of streamflow along roads in the event of crossing failure
- No diversion of natural hydrologic flow paths at stream crossings, including paths of streamflow, surface runoff and groundwater
- No roads located in wetlands and meadows and minimization of road effects on natural flow patterns in wetlands and meadows

3.11.2 Affected Environment

3.11.2.1 Scope of the Analysis

Geographic Analysis Area: The project area is located west of Lake Davis and east of Quincy in Plumas County, California, within the Beckwourth Ranger District of the PNF. The transportation analysis is limited to the roads affected by the Grizz Project (Appendix B).

Timeframe of Analysis: The transportation analysis will focus only on the time frame associated with completion of the Grizz Project which usually takes 2 or 3 years. This is because transportation activities will occur with vegetation treatment activities.

3.11.2.2 Analysis Methodology

The transportation system for the Grizz Project area was evaluated through a roads analysis. The following needs were identified based on that analysis and known access needs for proposed DFPZ and group selection treatments:

- Road reconstruction and maintenance are needed to bring existing classified roads into compliance with current maintenance standards and to provide access to the DFPZ and group selection treatment areas. Reconstruction and road maintenance are also necessary to reduce erosion and sedimentation and to provide for public safety.
- Road decommissioning is needed to reduce erosion, sedimentation and soil compaction and to reduce road density and wildlife impacts.
- Closure of spur roads is needed to reduce erosion, sedimentation, soil compaction and impacts to wildlife.
- Culvert replacement, removal, or upgrade is needed to improve watershed connectivity.
- Temporary road construction is needed to access treatment units where existing road access is absent.
- New road construction is needed to provide access to treatment areas where existing road access is impacting watershed resources.
- Harvest landing construction and reconstruction are needed to facilitate removal of wood products.

3.11.2.3 Current Conditions

Three major arterial routes access the project area: the Lake Davis Road (Plumas County Road 112) on the east side, the Argentine-Flournoy Road (25N42) and the Jackson Creek Road (23N11) on the west side. The Grizz Project area is considered to have a fully developed arterial and collector road system. Portions of roads are in poor locations within RHCAs and are causing direct stream impacts. There are many unsurfaced roads in the Grizz Project area that are contributing to degradation of water quality and aquatic habitat. The current status of the road system within the Grizz Project area is:

- There are a total of approximately 128.7 miles of existing classified roads in the project area. In addition to the existing classified roads, there are numerous unclassified roads, abandoned roads and skid trails in the project area.
- There are 1.4 miles of Level 1 roads assigned to intermittent service.
- There are 102.1 miles of Level 2 roads assigned where management direction requires the road to be open for limited passage of traffic.
- There are 24.8 miles of Level 3 roads where management direction requires the road to be open and maintained for safe travel by a prudent driver in a passenger car.
- There are 0.4 miles of Level 5 roads where management direction requires the road to provide a high degree of user comfort and convenience at moderate travel speeds.

3.11.3 Environmental Consequences

3.11.3.1 Alternative 2 (No-action Alternative)

Direct and Indirect Effects

Reconstruction of classified roads would not occur and impacts on watershed and user safety would continue on roads needing reconstruction. There would be no new direct impact on road surfaces from log haul activity. There would be no increase in hazards to driver safety from logging traffic. Classified roads, unclassified roads and abandoned skid trails would not be decommissioned and would continue to cause resource damage. Normal routine maintenance would occur based on current maintenance levels. Roads would continue to negatively impact watersheds and public safety because no roads would be reconstructed, decommissione or closed. Fire access would be restricted because some roads would remain, or become, impassable.

No rights-of-way would be needed for the normal road maintenance completed in this area.

Cumulative Effects

No reduction in classified or unclassified roads would occur during normal road maintenance completed in this area.

3.11.3.2 General Effects of the Action Alternatives

The road improvements proposed in the action alternatives would provide access needed for the treatment units. The proposed improvements would also provide access needed for fire suppression and fuels management. The action alternatives would generate traffic from log trucks, chip vans and support vehicles. Traffic-related safety problems would be mitigated with standard contract requirements.

Direct and Indirect Effects

The Grizz Project proposes road decommissioning of approximately 7.18 miles of existing system roads (see table 3.45). Decommissioning could include recontouring, removing drainage

structures, subsoiling, restoring vegetative cover and/or blocking access. Decommissioning of roads would reduce equivalent roaded acres (ERA) values, thereby lowering cumulative watershed impacts and soil compaction. None of the roads proposed for decommissioning are needed for the long-term transportation system. Roads slated for decommissioning are not needed for fire access or resource management and are causing watershed and wildlife impacts. Proposed road decommissioning, closure, or reconstruction would contribute to watershed restoration, including meadow enhancement, fish passage and stream stabilization. The Grizz Project also proposes new construction of 0.38 mile for alternatives 1, 3 and 4 prior to project implementation.

Table 3.45 Grizz Project classified road decommissioning included in alternatives 1, 3 and 4

Road Number	Classified Miles	Road Type
25N42J	0.19	Dead End Spur
24N94YA	0.27	Dead End Spur
24N94Y	0.98	Dead End Spur
24N60C	0.75	Dead End Spur
24N60B	0.31	Dead End Spur
24N57A1	0.09	Dead End Spur
24N54B	0.62	Dead End Spur
24N54A	0.97	Dead End Spur
23N23Y	1.49	Dead End Spur
23N22Y	1.51	Dead End Spur
Total Classified	**7.18**	

Through project planning, the public was given the opportunity to participate and comment on proposed road closures and decommissioning. The PNF is currently undergoing an off-highway vehicle (OHV) route inventory and designation process. Roads proposed for decommissioning or closure (Table 3.45) in this project are creating unacceptable resource damage, to the extent that a delay in their closure would result in unacceptable and irretrievable impacts on the resource.

Table 3.46 Grizz Project proposed road closure included in alternatives 1, 3, 4.

Road Number	Miles	Maintenance Level
24N57B	1.38	1
24N60B	0.63	1
Total miles	**2.01**	

Cumulative Effects

A net reduction of approximately 7.18 miles of classified roads in the action alternatives would occur after proposed road decommissioning is completed. Once decommissioned, roads would be available for reforestation and conversion back to a natural landscape.

3.11.3.3 Differences Between the Action Alternatives

All action alternatives have the same roads and mileage proposed for new construction, closure and decommission. The difference road actions proposed between the alternatives are road reconstruction and temporary road construction.

Alternative 1

There would be approximately 17.1 miles of road reconstructed for Alternative 1 (Table 3.47). Reconstruction activities include brushing, blading the road surface, improving drainage and replacing/upgrading culverts where need. Identification of hazard trees would follow guidelines in the PNF Roadside/Facility Hazard Tree Abatement Action Plan (USFS PNF 2003).

Table 3.47 Grizz Project proposed road reconstruction included in the action alternatives

Road Number	Alternative 1 (miles)	Alternative 3 (miles)	Alternative 4 (miles)
25N98	1.15	1.15	1.15
25N35	1.63	2.04	0.69
24N98Y	3.06	3.05	3.05
24N97A	1.19	1.19	1.19
24N91Y	N/A	0.99	0.99
24N75XA	0.51	0.51	0.51
24N75X	0.19	0.19	0.19
24N60Ct	0.89	0.89	0.89
24N58	1.05	1.05	1.05
24N57A2	1.30	1.30	1.30
24N57A	0.54	0.54	0.54
24N57	2.04	2.04	2.04
24N54	1.17	1.17	1.17
24N09	1.20	1.20	1.20
23N23Y	1.22	1.22	1.22
TOTAL	**17.14**	**18.53**	**17.18**

Approximately 5.3 miles of temporary roads would be constructed in Alternative 1. These roads would be decommissioned upon completion of the project. Existing harvest landings in treatment units would be reconstructed and new ones would be constructed.

Alternative 3

There would be approximately 18.5 miles of road reconstructed for Alternative 3 (Table 3.47). Reconstruction activities and identification of hazard trees would be similar to Alternative 1.

Approximately 5.8 miles of temporary roads would be constructed in Alternative 3. These roads would be decommissioned upon completion of the project. Existing harvest landings in group selection units and DFPZs would be reconstructed and new ones would be constructed.

Alternative 4

There would be approximately 17.2 miles of road reconstructed for Alternative 4 (Table 3.47). Reconstruction activities and identification of hazard trees would be similar to Alternative 1.

Approximately 4.7 miles of temporary roads would be constructed in Alternative 4. These roads would be decommissioned upon completion of the project. Existing harvest landings in group selection units and DFPZs would be reconstructed and new ones would be constructed.

3.12 Economics

3.12.1 Introduction

The following assessment is summarized from the economics report for the Grizz Project, which is incorporated here by reference (USFS PNF BRD 2007d). This assessment addresses the different affects the action and No-action Alternatives have on economics the.

The HFQLG FEIS Appendix S and Appendix T (USFS 1999) describe the direct, indirect and cumulative socioeconomic impacts of implementing the HFQLG Pilot Project. Therefore, this economic analysis will not revisit the information presented in the HFQLG FEIS, but will focus only on those revenues and treatment costs associated with implementing thinning and fuels reduction treatments within the Grizz Project area. The purpose of this economic analysis is to display the revenues and costs associated with each of the alternatives for comparison purposes.

This analysis does not include monetary values assigned to resource outputs such as wildlife, watersheds, soils, recreation, visual quality and fisheries. It is intended only as a relative measure of differences between alternatives based on direct costs and values used. Other values are discussed in the appropriate sections of this document.

3.12.2 Affected Environment

3.12.2.1 Scope of the Analysis

Geographic Analysis Area: The project area is the geographic boundary used in this analysis. Highway 70 and Plumas County Road 112 are the main haul roads that are outside the project area and will not be altered by this project.

Timeframe of Analysis: This economic analysis will focus only on the time frame associated with implementing thinning and fuels reduction treatments for the Grizz Project. The time frame for completing the timber harvest removal is approximately 2 to 3 years. Completion of the DFPZ through follow-up treatments such as grapple piling or underburning would take an additional 3 to 6 years after timber harvest removal is completed.

3.12.2.2 Analysis Methodology

Economic consequences are a measure of the overall value of the four alternatives 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.

Timber harvest values used in this economic analysis were based on the California State Board of Equalization Timber Harvest Values (January 1, 2007 – June 30, 2007). Harvest costs and road improvement costs were developed from the latest timber sale appraisal values. Mechanical (mastication, grapple pulling), manual (hand cutting, hand piling) and prescribed fire

(underburning, pile burning) treatments are based on the latest service contract prices, Knutson-Vandenberg (KV) and brush disposal sale area improvement plans

In general, the monetary value of each alternative depends on the amount and method of timber harvest and the acreage planned for fuels reduction treatments. Areas with positive timber harvest values would pay for associated fuels reduction activities on those acres. Fuels reduction treatment costs that exceed harvest revenues would become service contracts to be financed through appropriated funds when available.

The purpose of this economic analysis is to present the potential revenues and costs associated with each of the alternatives for comparison purposes.This economic analysis for the Grizz Project is focused on those revenues and treatment costs associated with implementing fuel reduction treatments, group selection and Area Thinning

Treatment Costs

Treatment or management costs include those costs associated with timber harvesting, biomass removal, road improvements, fuels treatments and mitigation measure 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.

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.

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 Grizz Project would have 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 and fuel supplies. 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, which typically range from 10 to 15 jobs per million board feet of timber harvested.

3.12.2.3 Current Conditions

As stated, this economic analysis will not revisit the information presented in the HFQLG FEIS. For a detailed description of the current condition of the economy, please see Appendix S and T of the HFQLG FEIS (1999). This appendix describes the current socioeconomic conditions of the affected Quincy Library Group area.

3.12.3 Environmental Consequences

3.12.3.1 Alternative 2 (No-action Alternative)

Direct and Indirect Effects

This alternative would not reduce critical fuel loadings or harvest any timber. No funds would be generated for the U.S. Treasury or returned to local counties (Table 3.48). No additional employment opportunities or wages paid to primary and service industry employees would be circulated through the local economy. Implementation of the No-action Alternative would have a negative impact on the local industries that depend on service contracts or a steady supply of timber as well as counties that use timber yield taxes to fund county programs. If the No-action Alternative were implemented, additional funds would be needed to conduct fuel reduction treatments or wildlife habitat, meadow and streambank restoration.

Cumulative Effects

The cumulative impact of No-action Alternative would negatively affect 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 currently lack opportunities related to fuels reduction, site preparation and timber harvest activities; the action alternatives would provide those opportunities. The local economy would also not receive benefits 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 to complete such activities. The loss of such infrastructure, including local mill closures, could significantly reduce or eliminate future economic and environmental opportunities from National Forest lands. The continuation of current conditions under Alternative 2 would preclude opportunities for long-term employment and rural community stability because the fuel reduction activities related to the creation and maintenance of DFPZs would not occur. With the No-action Alternative, the cost of wildland fire suppression would be high.

3.12.3.2 General Effects of the Action Alternatives

All action alternatives would provide employment opportunities and generate harvest revenues and timber yield taxes.

Direct and Indirect Effects

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 is also an induced effect that is 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.

Cumulative Effects

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 is also an induced effect that is 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.

3.12.3.3 Differences Between the Action Alternatives

Alternative 1

Implementing Alternative 1 would generate 94 full-time jobs (Table 3.48). The total project cost in Alternative 1 would be $977,000. Approximately 6.3 mmbf and 48 mtons of biomass would result from implementation of this alternative.

Table 3.48 Comparison of economic impacts by alternatives

Economic measures	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Total sawlog volume (mmbf*)	6.3	0	7.1	6.5
Total biomass volume (mtons**)	48	0	56	49
Sawlog and biomass harvest revenues	$1,544,000	$0	$1,801,000	$1,600,000
Total Cost	$2,151,000	$0	$2,500,000	$2,206,000
Net harvest revenues	-$606,000	$0	-$699,000	-$606,000
% Below Value	39%	0%	39%	38%
Nonharvest costs (DFPZ construction)	$371,000	$0	$300,000	$296,000
Total Project Value (Cost)	-$977,000	$0	-$999,000	-$902,000
Timber yield tax	$45,000	$0	$52,000	$46,000
Harvest jobs	82	0	93	84
Service jobs	12	0	10	10
Total harvest and service jobs	94	0	103	94
Total employee-related income	$4,053,000	$0	$4,426,000	$4,028,000

*mmbf=million board feet
**mtons=metric tons

Alternative 3

Implementing Alternative 3 would generate 103 full-time jobs (Table 3.48). The total project cost in Alternative 3 would be $999,000. Approximately 7.1 mmbf and 56 mtons of biomass would result from implementation of this alternative

Alternative 4

Implementing Alternative 4 would generate 94 full-time jobs (Table 3.48). The total project cost in Alternative 4 would be $902,000. Approximately 6.5 mmbf and 49 mtons of biomass would result from implementation of this alternative

3.13 Heritage

3.13.1 Introduction

The following assessment is summarized from the Heritage Report for the Grizz Project, which is incorporated here by reference (USFS PNF BRD 2007e). This assessment addresses the different alternatives' direct, indirect and cumulative effects on cultural and heritage resources. Cultural objects, historic structures and buildings and archaeological sites are the material remains of our national heritage. Together they are known as heritage or cultural resources. The PNF is responsible for and committed to, protecting and managing these nonrenewable resources for current and future generations to understand and enjoy.

Section 101 of the National Environmental Policy Act (NEPA) requires the federal government to preserve important historic, cultural and natural aspects of our national heritage. To accomplish this, federal agencies utilize the Section 106 process of the National Historic Preservation Act (NHPA). Passed by Congress three years before NEPA, 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 Subpart B. The coordination or linkage between the Section 106 process of the NHPA and the mandate to preserve our national heritage under NEPA is well understood and is formally established in 36 CFR 800.3b and 800.8.

NEPA includes reference to "…important historic, cultural and natural aspects of our national heritage". This terminology includes those resources defined as "historic properties" under NHPA (36 CFR 800.16(l)(1)). Therefore, agencies use the NHPA Section 106 process to consider, manage and protect historic properties during the planning and implementation stages of federal projects. Locally, the PNF uses a programmatic agreement between Region 5 of the US Forest Service, the California State Historic Preservation Officer and the Advisory Council on Historic Preservation to implement the Section 106 process.

3.13.2 Affected Environment

3.13.2.1 Scope of the Analysis

Geographic Analysis Area: The heritage resources geographic analysis area is the same as the Grizz Project area. This boundary was chosen because sites within the project area would be protected during the implementation of any of the action activities.

Timeframe of the Analysis: The temporal boundary is determined by the life of the project. This boundary was chosen because sites within the project area would be protected during the implementation of any of the action activities.

3.13.2.2 Current Conditions

There are a total of 60 known heritage resources sites within the Grizz Project area, which includes eight new sites that were discovered during field surveys or were separated from

previously recorded sites. Five of the sites are classified as prehistoric. These consist of campsites and tool production stations, primarily exhibiting flaked stone artifacts. Fifty-four of the sites are historic. One of these sites is the Walker Mine Tramway, which consists of 83 individual tramway towers or communications posts that are all considered a part of this one linear site. The other historic sites include historic habitation areas, most of which are associated with mining, ditches that brought water to the various mines, arborglyphs (carvings on aspen tress) and the Beckwourth Emigrant Trail. There is also one multicomponent site. Multicomponent sites contain cultural material from both the prehistoric and historic time periods. All known heritage resources within the Grizz Project area of potential affect, were field visited and site boundaries were flagged.

3.13.2.3 Analysis Methodology

Three phases of work were completed to understand the significant themes and extent of heritage resources within the Grizz Project area. First, research into the larger geographic history relevant to the project area was conducted to understand historic themes or events that have transpired in time and space. Next, heritage resource field surveys were conducted to identify cultural properties. Then, finally the amount and types of heritage resources within the project area are discussed.

The great majority of the project area had already been previously surveyed and the remaining area was surveyed for this project. A total of 14,981 acres were surveyed for 25 earlier projects. Due to excessive slopes and brush fields 849 acres were treated as non-surveyable. The remaining 2,133 acres of the Grizz Project area were surveyed during the field seasons of 2004 and 2005. Native-X Inc. Archaeological Services of Reno, Nevada completed the survey work and monitored all known heritage resources. The entire project area has been considered for heritage resources. All identified heritage resources have been fully recorded.

3.13.3 Environmental Consequences

3.13.3.1 Alternative 2 (No-action Alternative)

Direct and Indirect Effects

With no proposed activity, there would be no effect to heritage resources.

Cumulative Effects

Without direct or indirect effects from the No-action Alternative, there would be no cumulative effects to cultural resources.

3.13.3.2 General Effects of the Action Alternatives

Direct and Indirect Effects

Heritage Resource site boundaries are flagged SOPs (Appendix D) would be followed during implementation of any of the action alternatives. All artifacts and features would be avoided during project implementation therefore there would be no effect on heritage resources.

Cumulative Effects

There would be no direct or indirect effects to cultural resources from any of the alternatives therefore there would be no cumulative effects.

Chapter 4 Consultation of Agencies and Individuals

4.1 Introduction

The US Forest Service operates under the Endangered Species Act which requires consultation with the US Fish and Wildlife Service regarding impacts to potential endangered species from the PA and the action alternatives. Consultation is also done with federally recognized tribes to ensure that heritage resources are respected and will not be impacted by any potential project activities.

4.1.1 Air Quality

The Clean Air Act provides the principle framework for national, state and local efforts to protect air quality. Under the Clean Air Act, the Office of Air Quality Planning and Standards is responsible for setting standards for pollutants which are considered harmful to people and the environment. The 1990 Clean Air Act is the most recent version of a law first passed in 1970.

All burning that will be done on the Grizz Project will be in accordance with an approved smoke management plan approved by the Northern Sierra Air Quality Management District (NSAQMD). The smoke plan requires burning with wind directions that transport smoke away from communities and the amount of acres burned daily are limited. Burns are conducted during approved burn days, when atmospheric conditions favor smoke dispersion. Prescribed burning takes place in spring or fall after the first rains when fuels are relatively moist to reduce the potential for fire escape.

4.1.2 Botany

The latest US Fish and Wildlife Service (USFWS) species list for Plumas County, in which the project occurs, was accessed from the USFWS website on February 7, 2007 and incorporates the database update of January 4, 2007 (USDI, Fish and Wildlife Service, 2006). This list fulfills the requirements to provide a current species list pursuant to Section 7(c) of the Endangered Species Act, as amended.

The USFWS list of federally listed threatened and endangered plant species potentially occurring in the PNF includes two threatened species, *Orcuttia tenuis* (slender Orcutt grass) and *Senecio layneae* (also known as Packera layneae and Layne's butterweed); and one candidate species, *Ivesia webberi* (also known as Webber's ivesia). *Orcuttia tenuis* is limited to relatively deep vernal pools or vernal pool type habitat with clay soil. No vernal pools were found during field surveys and none are known to occur in the project area. *Senecio layneae* is found on serpentine soils, no serpentine was found during field surveys and none are known to occur in the project area. *Ivesia webberi* was searched for during field surveys and was not found. It is not known to occur in the project area. In addition, no plants on the USFWS list of threatened and endangered plant species of Plumas County were found during field surveys. Therefore no threatened or endangered species are considered likely to occur in the project area. Consequently, threatened and endangered species will not be discussed in the affected species section of the biological evaluation, nor will a botanical biological assessment be needed for this project.

4.1.3 Tribal Consulation

Locally, the Plumas National Forest utilizes a programmatic agreement between Region 5 of the US Forest Service, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation to implement the Section 106 process of the National Historic Preservation Act (NHPA). This programmatic agreement provides guidance for consultation under the NHPA and NEPA.

Under Subpart B- Section 106 of the NHPA, § 800.3 Initiation of the consultation process, the agency official shall make a reasonable and good faith effort to identify any Indian tribes or Native Hawaiian organizations that might attach religious and cultural significance to historic properties in the area of potential effects and invite them to be consulting parties. Such Indian tribe or Native Hawaiian organization that request in writing to be a consulting party shall be one.

The Grizz Project meets the National Historic Preservation Act (NHPA) by protecting heritage and cultural resources through the surveying and protection of sites within the project boundary as well as by tribal consulation. The following tribes have been consulted:

- Washoe Tribe of California and Nevada
- Greenville Rancheria
- Susanville Indian Rancheria

4.1.4 Water Quality

Section 208 of the Clean Wear Act required the States to prepare non-point source pollution plans, which were to be certified by the State and approved by the Environmental Protection Agency (EPA). In response to this law and in coordination with the State of California Water Resources Control Board (SWRCB) and EPA, Region Five began developing Best Management Practices (BMPs) for water quality management planning on National Forest System lands within the Sate of California in 1975.

The Grizz Project meets the Clean Water Act by implementing the BMPs of the Soil and Water Conservation Handbook. By using BMPs, the Grizz Project meets this Act according to the ROD of the 2004 SNFPA (USFS PSW 2004b).

4.1.5 Wildlife

From February 10 to August 3, 1999 a series of informal meetings and written correspondence occurred between the USDA Forest Service and USFWS regarding the development of the HFQLG FEIS (See programmatic Biological Assessment and Evaluation of Herger-Feinstein Quincy Library Group Forest Recovery Act (Rotta 1999) pg 5, for specific topics discussed and timelines). As a result, the Forest Service incorporated the recommended measures provided by USFWS for the bald eagle and California red-legged frog (USDA Forest Service 1999).

The Draft Study Plan for the Plumas and Lassen National Forests Administrative Study, dated September 12, 2001, was reviewed by the USFWS, as was the Proposed Action for the

Administrative Study dated December 10, 2002. A USFWS letter dated January 31, 2003 responded to the initial Proposed Action, expressing concern over road construction needed for access to group selection harvest units and its effect on fragmentation to old forest dependent species.

One of the measures mentioned above from the HFQLG FRA FEIS ROD directs the forests, in consultation with the USFWS, to complete a bald eagle management plan for any proposed management activities within an active bald eagle territory. Following this direction the BKRD consulted with Kathy Brown of the USFWS regarding the development of the Lake Davis Bald Eagle Habitat Management Plan (BEHMP) a series of informal emails during the month of April 2004. During the month of April the BKRD also solicited input from both Julie Cunningham and Ron Jurek of the California Department of Fish and Game (CDFG). All input gathered during this time was incorporated into the final BEHMP. The final BEHMP was sent to the USFWS on June 14, 2004. On July 12, 2004 the PNF received a letter from the USFWS stating, "We have reviewed this BEHMP and feel that it adequately addresses the needs of the Lake Davis bald eagles." As a result, the Forest Service incorporated the BEHMP into the Grizz Project design.

No consultation specific to the Grizz Project was done. A list of T&E species was provided by the "Federal Endangered and Threatened Species that may be affected by Projects on the Plumas National Forest", updated January 4, 2007, accessed via USFWS county list web page (http://www.fws.gov/sacramento/es/spp_lists/NFActionPage.cfm) (Appendix A).
On February 9, 2007 the PA and alternatives, to be analyzed with an EA, were sent via email to Jim Lidberg of the California Department of Fish & Game. No issues were raised and no correspondence has occurred since with regard to the Grizz Project.

Appendix A References

Chapter 1

USFS 1999. Final environmental impact statement-record of decision and summary: Herger-Feinstein Quincy Library Group Forest Recovery Act. USDA Forest Service Lassen, Plumas and Tahoe National Forests, Quincy, CA.

USFS PSW. 2001. Sierra Nevada forest plan amendment final environmental impact statement. USDA Forest Service Pacific Southwest Region, Vallejo, CA.

USFS 2003. Herger-Feinstein Quincy Library Group Forest Recovery Act final supplemental environmental impact statement and record of decision. USDA Forest Service Lassen, Plumas and Tahoe National Forests, Quincy, CA.

USFS PNF 1988. Plumas National Forest land and resource management plan. USDA Forest Service Plumas National Forest, Quincy, CA.

USFS PSW. 2004a. Sierra Nevada forest plan amendment final supplemental environmental impact statement. USDA Forest Service Pacific Southwest Region, Vallejo, CA.

USFS PSW. 2004b. Record of decision-Sierra Nevada forest plan amendment final supplemental environmental impact statement. USDA Forest Service Pacific Southwest Region, Vallejo, CA.

Chapter 2

USFS 1999. Final environmental impact statement-record of decision and summary: Herger-Feinstein Quincy Library Group Forest Recovery Act. USDA Forest Service Lassen, Plumas and Tahoe National Forests, Quincy, CA.

USFS PNF BRD 2001. Crystal Adams DFPZ/GS Environmental Assessment and Decision Notice. Beckwourth Ranger District, Plumas National Forest. September, 2001.

USFS 2003. Herger-Feinstein Quincy Library Group Forest Recovery Act final supplemental environmental impact statement and record of decision. USDA Forest Service Lassen, Plumas and Tahoe National Forests, Quincy, CA.

USFS PNF BRD 2003. Humbug DFPZ Environmental Assessment and Decision Notice. Beckwourth Ranger District, Plumas National Forest.

USFS PSW. 2004a. Sierra Nevada forest plan amendment final supplemental environmental impact statement. USDA Forest Service Pacific Southwest Region, Vallejo, CA.

USFS PSW. 2004b. Record of decision-Sierra Nevada forest plan amendment final supplemental environmental impact statement. USDA Forest Service Pacific Southwest Region, Vallejo, CA.

USFS PNF BRD 2006. Crystal Adams HFQLG Project Evaluation Form. August, 2006.

USFS PNF BRD 2006. Freeman Project FEIS and ROD. Beckwourth Ranger District, Plumas National Forest.

USFS PNF 2007. Plumas National Forest roadside/facility hazard tree abatement action plan, exhibit 1, page 2, March 31, 2003.

Botany

California Department of Food and Agriculture. 2004. ENCYCLOWEEDIA: Notes on Identification, Biology, and Management of Plants Defined as Noxious Weeds by California Law.http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm. Accessed December 1, 2004.

California Department of Food and Agriculture. 2006. ENCYCLOWEEDIA: Notes on Identification, Biology, and Management of Plants Defined as Noxious Weeds by California Law.http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm. Accessed March 20, 2006.

California Native Plant Society. 2001. Inventory of Rare and Endangered Vascular Plants of California. 6th edition.

Christy, J.A. and D.H. Wagner. 1996. Guide for the Identification of Rare, Threatened, or Sensitive Bryophytes in the Range of the Northern Spotted Owl, Western Washington, Western Oregon, and Northwestern Calif. Printed by the Bureau of Land Management, OR.

Hanson, L. 1999. Plumas National Forest Rare Plant Handbook, Published by USDA Forest Service, R5-BOT-TP-007.

Hanson, L. 2003a. Plumas National Forest Sensitive and Special Interest Plant Species List. 21 January 2003. Plumas National Forest, internal document.

Keeley, Jon E., Beyers, Jan L., 2001. Pre-Fire Manipulation Impacts on Alien Plant Invasion of Wildlands. USDA Grant Application (Relavent to RFP 2001-3, Task2) .

USFS 1999. Final environmental impact statement — record of decision and summary: Herger-Feinstein Quincy Library Group Forest Recovery Act. USDA Forest Service Lassen, Plumas, Tahoe National Forests, Quincy, CA.

USFS PNF 1988. Plumas National Forest land and resource management plan. USDA Forest Service Plumas National Forest, Quincy, CA.

USFS PSW. 2004a. Sierra Nevada forest plan amendment final supplemental environmental impact statement. USDA Forest Service Pacific Southwest Region, Vallejo, CA.

USDA Forest Service. 2005. Draft Conservation Guidelines for Seven Sensitive Fungi Species, Pacific Southwest Region, 2005, internal document.

USFS PNF BRD 2006k. Lake Davis Long Valley Watershed Analysis. Plumas National Forest Service, Beckwourth Ranger District, Blairsden, CA.

Wagner, W.H. Jr. and T.B. Devine. 1989. Moonworts (Botrychium: Ophioglossaceae) in the Jonesville area, Butte and Tehama Counties, California. Madrono 36(2):131-136.

Weingardt, Bernard. 2006. Letter to Forest Supervisors, July 26, 2006. Internal Document. File code 2670.

Gibson, T., 2006. Plumas Sierra Agriculture Department. Quincy, CA 95971.

USDA Forest Service. 2007. Interim Management Prescriptions for Sensitive and Special Interest Plants on the Plumas National Forest, Plumas National Forest, internal document.

USFS PNF BRD 2007g. Freeman Project Biological Evaluation for Threatened, Endangered or Sensitive Plant Species (including Appendices Plumas National Forest Service, Beckwourth Ranger District, Blairsden, CA.

Economics

USFS 1999. Final environmental impact statement-record of decision and summary: Herger-Feinstein Quincy Library Group Forest Recovery Act. USDA Forest Service Lassen, Plumas and Tahoe National Forests, Quincy, CA.

USFS PNF BRD 2007d. Economics (for the Grizz Project). Plumas National Forest Service, Beckwourth Ranger District, Blairsden, CA.

Transportation

USFS PNF 2003b. Plumas National Forest roadside/facility hazard tree abatement action plan, exhibit 1, page 2, March 31, 2003.

USFS PNF BRD 2007c. Transportation (for the Grizz Project). Plumas National Forest Service, Beckwourth Ranger District, Blairsden, CA.

Fuels/Air Quality

Agee, James K. 1993. Fire Ecology of Pacific Northwest Forests. Island Press. Washington, DC. Pp 239-241

Carlton, Don. 2005. Fuels Management Analyst Users Manual. Fire Program Solutions L.L.C.

Carlton, Don. 2005. Fuels Management Analyst v. 3. Fire Program Solutions L.L.C.

Gruell, George E. 2001. Fire in Sierra Nevada Forests. Mountain Press. Missoula, MT.

Main, W.A., Paaanen, D.M., Burgan, R.E., 2000. Fire Family Plus. USDA Forest Service, Systems for Environmental Management, Missoula, MT.

Moody, T.J. and Stephens, S.L. 2002. Plumas National Forest Fire Scar Reading and Cross Dating Report. Plumas National Forest.

National Wildfire Coordinating Group, 1992. Fire Behavior Field Reference Guide. PMS-436-6. NWCG, Washington, DC.

Reinhardt, E.D. and Scott, J.H. 2001. Assessing crown fire potential by linking models of surface and crown fire behavior. Research Paper RMRS-RP-29. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Rothermel, Richard C. 1983. How to predict the spread and intensity of forest and range fires. GTR-INT-143. Intermountain Forest and Range Experiment Station, Ogden, UT.

USFS PSW. 2004. Record of decision — Sierra Nevada forest plan amendment final supplemental environmental impact statement. USDA Forest Service Pacific Southwest Region, Vallejo, CA.

USFS PNF BRD 2007b. Grizz Fire and Fuels Analysis. Plumas National Forest Service, Beckwourth Ranger District, Blairsden, CA.

USFS PNF BRD 2007j. Grizz Air Quality Analysis. Plumas National Forest Service, Beckwourth Ranger District, Blairsden, CA

Heritage

USFS PNF BRD 2007e. Heritage Resource Compliance for the Environmental Analysis of the Grizz Defensible Fuel Profile Zone (DFPZ) Project. Plumas National Forest Service, Beckwourth Ranger District, Blairsden, CA.

Hydrology

Agee, James K., B. Bahro, M.A. Finney, P.N. Omi, D.B. Sapsis, C.N. Skinner, J.W. van Wagendonk and P.C. Weatherspoon. 2000. The use of shaded fuel breaks in landscape fire management. Forest Ecology and Management 127:55-66

Ahlgren, I.F. and C.E. Ahlgren. 1960. Ecological effects of forest fires. The Botanical Review 26: 483-533.

Berg, N.H., K.B. Roby, B.J. McGurk. 1996. Cumulative watershed effects: applicability of available methodologies to the Sierra Nevada. Pages 39-78 in Sierra Nevada Ecosystem Project: final report to Congress, vol. III, Assessments, commissioned reports and background information. Centers for Water and Wildland Resources, University of California, Davis, CA.

Boerner, R.J. 1982. Fire and nutrient cycling in temperate ecosystems. BioScience 32: 187-192.

Cawley, Ken. 1990. Cumulative watershed effect study of the Last Chance Watershed, Plumas National Forest, Quincy, California. United States Forest Service.

Clark, Bob. 1994. Soils, water and watersheds, In National Wildfire Coordinating Group, Fire Effects Guide. National Interagency Fire Center, Boise, ID.

DeBano, L.F. 1990. Effects of fire on soil properties. Paper presented at the Symposium on Management and Productivity of Western-Montane Forest Soils, Boise, ID. Apr 10-12, 1990.

Elliot, W.J. and P.R. Robichaud. 2001. Comparing erosion risks from forest operations to wildfire. In Schiess, P. and Krogstad, F (ends). 2001. Proceedings of A Forest Engineering Odyssey. College of Forest Resources, University of Washington and International Union of Forestry Research Organizations, Dec 10-12, 2001, Seattle, WA.

Erickson, H.E., R.L. Edmonds and C.E. Peterson. 1985. Decomposition of logging residues in Douglas-fir, western hemlock, Pacific silver fir and ponderosa pine ecosystems. Canadian Journal of Forest Research 15: 914-921.

Gomez, A., R.F. Powers, M.J. Singer and W.R. Horwath. 2002. Soil compaction effects on growth of young ponderosa pine following litter removal in California's Sierra Nevada. Soil Science Society of America Journal 66: 1334-1343.

Grigal, D.F. 2000. Effects of extensive forest management on soil productivity. Forest Ecology and Management 138: 167-185.

MacDonald, L.H. 2000. Evaluating and Managing Cumulative Effects: Process and Constraints. Environmental Management 26: 299-315.

McGurk, B.J. and D.R. Fong. 1995. Equivalent roaded area as a measure of cumulative effect of logging. Environmental Management 19: 609-621.

Menning, K.M., D.C. Erman, K.N. Johnson and J. Sessions. 1996. Modeling aquatic and riparian systems, assessing cumulative watershed effects and limiting watershed disturbance. Pages 33-51 in Sierra Nevada Ecosystem Project: final report to Congress, addendum. Centers for Water and Wildland Resources, University of California, Davis, CA.

Neary, D.G., C.C. Klopatek, L.F. DeBano, P.F. Ffolliott. 1999. Fire effects on belowground sustainability: a review and synthesis. Forest Ecology and Management 122: 51-71.

Pannkuk, C.D. and P.R. Robichaud. 2003. Effectiveness of needle cast at reducing erosion after forest fires. Water Resources Research 39:1333, doi:10.1029/2003 WR002318, 2003.

Powers, R.F., et al. 2005. The North American long-term soil productivity experiment: Findings from the first decade of research. Forest Ecology and Management 220: 31-50.

Raison, R.J., P.K. Khanna and P.V. Woods. 1984. Mechanisms of elemental transfer to the atmosphere during vegetation fires. Canadian Journal of Forest Research 15: 132-140.

Reid, L.M. 1998. Cumulative watershed effects: Caspar Creek and beyond. General Technical Report PSW-GTR-168. Pacific Southwest Research Station, USDA Forest Service, Berkeley, CA.

Swift, M.J. 1977. The roles of fungi and animals in the immobilisation and release of nutrient elements from decomposing branch-wood. Ecological Bulletin 25: 193-202.

USDA Forest Service. 1988a. Cumulative Off-site Effects Analysis, Interim Directive No. 1. Soil and Water Conservation Handbook. FSH.2509.22, chapter 20. USDA Forest Service, San Francisco, California.

USDA Forest Service. 1988b. Plumas National Forest Land and Resource Management Plan.

USDA Forest Service. 1988c. Plumas National Forest Soil Resource Inventory. USDA Forest Service, Quincy, California.

USDA Forest Service. 1995. Soil Quality Monitoring, R5 Supplement 2509.18-95-1. Soil Management Handbook. FSH 2509.18, chapter 2. USDA Forest Service, San Francisco, California.

USDA Forest Service. 1999. The Herger-Feinstein Quincy Library Group Forest Recovery Act Final Environmental Impact Statement.

USFS PNF BRD 2007f. Grizz Project: Cumulative Watershed Effects and Soil Assessment. Plumas National Forest Service, Beckwourth Ranger District, Blairsden, CA.

Westmoreland, R. 2004. 2004 HFQLG Soil Monitoring Report. Sierraville Ranger District. Tahoe National Forest. Sierraville, CA, 8pp.

Silviculture

Dixon, G. E. 2003. Essential FVS: A User's Guide to the Forest Vegetation Simulator. Internal Rep. Fort Collins, CO: U. S. Department of Agriculture, Forest Service, Forest Management Service Center. 193p.

Dunning, D. and L.H. Reineke, 1933. Preliminary yield tables for second-growth stands in the California pine region. USDA Technical Bulletin No. 354.

Ferrell, G. T. 1980. Risk-rating systems for mature red fir and white fir in northern California. USDA Forest Service Pacific Southwest Forest and Range Experiment Station General Technical Report PSW-39. 27p.

USFS PNF BRD 2007a. Grizz Project Forest Vegetation Report. Plumas National Forest Service, Beckwourth Ranger District, Blairsden, CA.

Wildlife

Bart, J. 1995. Amount of suitable habitat and viability of Northern spotted owls. Conservation Biology, volume 9, number 4, pages 943-946. August 1995.

Bombay, Helen L., T.M.Benson, B.E.Valentine and R.A.Stefani. 2003. A Willow Flycatcher Survey Protocol for California. May 29th, 2003.

California Department of Fish and Game (CDFG). California Interagency Wildlife Task Group. 2005. California Wildlife Habitat Relationships (CWHR) version 8.1 personal computer program. Sacramento, CA.

California Natural Diversity Database (CNDDB). 2006. Special Animals List (824 Taxa). State of California, The Resources Agency, Department of Fish and Game, Biogeographic Data Branch, Sacramento, CA. Febuary 2006. http://www.dfg.ca/gov/bdb/htmal/animals.html.

California Regional Water Quality Board. 2005. Water Quality Control Policy for Addresing Impaired Waers: Regulatory Sructure and Options. Adoped by Resolution 2005-0050. California Regional Water Quality Control Board Central Valley Region, Sacramento, CA.

Fellers, G.M. and Freel, K.L. 1995. A Standardized Protocol for Surveying Aquatic Amphibians. National Park Service Technical Report NPS/WRUC/NRTR-95-01..

Franklin, A.B., R.J. Gutierrez, J.D. Nichols, M.E. Seamans, G.C. White, G.S. Zimmerman, J.E. Hines, T.E. Munton, W.S. LaHaye, J.A. Blakesly, G.N. Steger, B.R. Noon, D.W.H. Shaw, J.J. Keane, T.L. McDonald and S.Britting. 2003. Population dynamics of the California spotted owl: a meta-analysis. Final Report to USDA Forest Service, Pacific Southwest Research Station. Berkley, CA.

Grigg. 2007 (see USFS PNF BRD 2007b)

Hunsaker, C.T., B.B. Boroski and G.N. Steger. 2002. Relations between canopy cover and the occurrence and productivity of California spotted owls. Pages 697-700. In J.M. Scot, P.J. Heglund, M.L. Morrison, J.B. Haufler, M.G. Raphael., W.A. Wall and F.B. Samson, Editors. Predicting species occurrence: issues of accuracy and scale. Island Press. Washington D.C.

Irwin, L.L., D.Rock and S.Rock. 2004. Adaptive management monitoring of spotted owls: Annual Progress Report – January 2004. Unpublished report: National Council for Air and Stream Improvement. Corvallis, OR.

Lehmkuhl, John F., Kistler K.D., Begley, J.S. and Boulanger J. 2006. Demography of Northern Flying Squirrels Informs Ecosystem Management of Western Interior Forests. Ecological Applications, 16(2), pp. 584-600, 2006 by the Ecological Society of America.

McGrath, M.T., S. DeStafano, R.A. Riggs, L.L. Irwin and G.J. Roloff. 2003. Spatially explicit influences on northern goshawk nesting habitat in the interior Pacific Northwest. Wildlife Monographs No. 154. 63pp.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.

Pearson, Robert R and K.B. Livezey. 2003. Distribution, Numbers and Site Characteristics of Spotted Owls and Barred Owls in the Cascade Mountains of Washington. The Journal of Raptor Research Vol. 37, December 2003.

Reese, D. A. 1993. Western pond turtle survey techniques. Unpublished report.

Richardson, C.T. and Miller C.K. 1997. Recommendations for protecting raptors from human distrubance: a review. Wildlife Society Bulletin 25:634-638.

Rotta, G.W. 1999. Biological assessment and evaluation of Herger-Feinstein Quincy Library Group Forest Recovery Act. 219 pp.

Silva Environmental. 2006. Final Report Plumas NF – Beckwourth RD Grizz NOGO 2005-2006. Silva Environmental. November 2006.

USDA Forest Service. 1988. Plumas National Forest Land and Resource Management Plan (PNF LRMP) and Environmental Impact Statement (EIS). USDA Forest Service, Pacific Southwest Region. CA.

USDA Forest Service. 1993. Protocol for Surveying for Spotted Owls in Proposed Management Activity Areas and Habitat Conservation Areas. March 12th, 1991 (Revised February 1993). USDA Forest Service, Pacific Southwest Region. CA.

USDA Forest Service. 1999. Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLGFRA) Final Environmental Impact Statement (FEIS) and Record of Decision (ROD). USDA Forest Service, Pacific Southwest Region, Lassen, Plumas, Tahoe National Forests. Quincy, CA.

USDA Forest Service. 2000. Survey Protocol for the Great Gray Owl in the Sierra Nevada of California. May 2000.

USDA Forest Service. 2000. Survey Methodology for Northern Goshawks in the Pacific Southwest Region. USDA Forest Service. August 9th, 2000.

USDA Forest Service. 2000. Sierra Nevada Forest Plan Amendment Biological Assessment, Revised December 20th, 2000

USDA Forest Service. 2001. Sierra Nevada Forest Plan Amendment (SNFPA) Final Environmental Impact Statement (FEIS) and Record of Decision (ROD). USDA Forest Service, Pacific Southwest Region. Vallejo, CA. January 2001.

USDA Forest Service. 2003. Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLGFRA) Final Supplemental Environmental Impact Statement (FSEIS) and Record of Decision (ROD). USDA Forest Service, Pacific Southwest Region, Lassen, Plumas, Tahoe National Forests. Quincy, CA.

USDA Forest Service. 2004. Sierra Nevada Forest Plan Amendment (SNFPA) Final Supplemental Environmental Impact Statement (FSEIS) and Record of Decision (ROD). USDA Forest Service, Pacific Southwest Region. Vallejo, CA. January 2004.

USDA Forest Service. 2006. Plumas Lassen Study 2005 Annual Report. USDA Forest Service, Pacific Southwest Research Station. March 2006.

USDA Forest Service. 2006. Plumas National Forest Management Indicator Species Report. USDA Forest Service, Pacific Southwest Region, Plumas National Forest. Quincy, CA. June 2006.

USFS PNF BRD 2007b. Fire, Fuels and Air Quality. Plumas National Forest Service, Beckwourth Ranger District, Blairsden, CA.

USFS PNF BRD 2007h. Grizz Project: Biological Assessment/Biological Evaluation Terrestial and Aquatic Wildlife. Plumas National Forest Service, Beckwourth Ranger District, Blairsden, CA.

USFS PNF BRD 2007i. Grizz Project: Management Indicator Species Report. Plumas National Forest Service, Beckwourth Ranger District, Blairsden, CA.

USDI Fish and Wildlife Service (USFWS). 2004. Endangered and Threatened Wildlife and Plants; 12-month Finding for a Petition to List the West Coast Distinct Population Segment of the Fisher (*Martes pennanti*); Proposed Rule. Federal Register. Vol. 69 No. 68. April 8th, 2004. 18769-18792.

USDI Fish and Wildlife Service (USFWS). 2005. Endangered and Threatened Wildlife and Plants: 90-Day Finding on a Petition To List the California Spotted Owl as Threatened or Endangered. Federal Register. Vol. 70 No. 118. June 21st, 2005.

USDI Fish and Wildlife Service (USFWS). 2006. Endangered and Threatened Wildlife and Plants; 12-month Finding for a Petition to List the California Spotted Owl (*Strix occidentalis occidentalis*) as Threatened or Endangered. Federal Register. Vol. 71 No. 100. May 24tht, 2006.

Verner, J., K.S. McKelvey, B.R. Noon, R.J. Gutierrez, G.I. Gould, and T.W. Beck. 1992. The California Spotted Owl: A Technical Assessment of its Current Status. GTR PSW-133. USDA Forest Service, Pacific Southwest Research Station. Albany, CA. 285 pp.

Zielinski, W. J., T. E. Kucera. 1995. American Marten, Fisher, Lynx and Wolverine: Survey Methods for Their Detection. USDA Forest Service. PSW-GTR-157. August 1995.

Wildlife-Personal Communication

Hopkins, T. 1993, 2001. Forest Fisheries Biologist – Supervisor's Office, Plumas National Forest. Quincy, CA 95971.

Matthews, E. 2003. Consultant, Mathews and Associates, Susanville, CA 96130.

Nickerson, R. 2005. Wildlife Biologist – Beckwourth Ranger District, Plumas National Forest. Blairsden, CA 96103.

Lidberg, J. 2003. CDF&G Unit Biologist – California Department of Fish and Game. Meadow Valley, CA 95956.

Rakich, S. 2006. Culturist – Beckwourth Ranger District, Plumas National Forest, Blairsden, CA 96103.

Rickman, T. 1998. Wildlife Biologist – Eagle Lake Ranger District, Lassen National Forest. Susanville, CA 96130.

Roberts, C. 2002. District Wildlife Biologist – Feather River Ranger District, Plumas National Forest. Oroville, CA 95965.

Rotta, G. 2004. District Wildlife Biologist – Mt. Hough Ranger District, Plumas National Forest. Quincy, CA 95971.

Stermer, C. 2005. Habitat Conservation Division, California Department of Fish and Game. Sacramento, CA 95814.

Williams, M. 2002. Wildlife Biologist – Almanor Ranger District, Lassen National Forest. Chester, CA 96020.

Wilson, C. 1994. District Wildlife Biologist – Sierraville Ranger District, Tahoe National Forest. Sierraville, CA 96126.

Appendix B Unit Description and Proposed Transportation Activities

Table B.1. A summary of the Grizz Project **Alternative 1 (Proposed Action)** illustrating the number of group selection acres, silvicultural treatments, zone and special prescription that each unit falls into.

Unit	Acres	Resource Zone	Treatment	Groups (Acres)	Logging System	Post Treatment
003	68	Area Thin/Other	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	
005	204	Area Thin/Other	Mechanical Fuels Treatment		Grapple	Grapple
006	32	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
010	22	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
022	257	Area Thin/Other	Mechanical Thin/Group	Yes (18)	Feller Buncher Mechanical	
027	13	Area Thin/Other	Mechanical Fuels Treatment		Grapple	Pile Burn
036	18	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	Pile Burn
037	48	Area Thin/Other	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	
042	12	Area Thin/Other	Mechanical Fuels Treatment		Grapple	Pile Burn
044	107	Area Thin/Other	Mechanical Thin/Group	Yes (8)	Feller Buncher Mechanical	
049	16	Area Thin/Other	Mechanical Fuels Treatment		Grapple	
051	31	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
082	102	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
083	21	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
084	55	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
087	19	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Pile Burn
088	33	DFPZ	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
089	28	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
090	30	Area Thin/Other	Mechanical Thin/Group	Yes(2)	Feller Buncher Mechanical	
095	19	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
096	9	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
103	87	DFPZ	Mechanical	Yes (6)	Feller Buncher	

Unit	Acres	Resource Zone	Treatment	Groups (Acres)	Logging System	Post Treatment
			Thin/Group		Mechanical	
104	21	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Pile Burn
105	14	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
106	59	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
108	40	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Pile Burn
109	26	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
110	53	DFPZ	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	
113	45	DFPZ	Mechanical Thin/Group	Yes (3)	Feller Buncher Mechanical	
127	61	Area Thin/Other	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	
130	27	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
132	38	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
134	97	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
136	11	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
137	16	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
138	88	DFPZ	Mechanical Thin/Group	Yes (6)	Feller Buncher Mechanical	
142	38	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
146	24	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
147	46	DFPZ	Mechanical Thin/Group	Yes (3)	Feller Buncher Mechanical	
149	37	DFPZ	Mechanical Fuels Treatment		Grapple	
153	28	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
155	12	DFPZ	Underburn		Manual	
156	7	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
157	32	DFPZ	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
158	37	DFPZ	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
159	54	DFPZ	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	

Unit	Acres	Resource Zone	Treatment	Groups (Acres)	Logging System	Post Treatment
177	40	DFPZ	Mechanical Fuels Treatment		Grapple	Under/Pile Burn
179	15	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
181	42	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
187	23	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
188	12	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
189	30	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
190	264	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
191	5	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
196	28	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
197	30	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
199	46	DFPZ	Mechanical Thin/Group	Yes (3)	Feller Buncher Mechanical	
200	85	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	Grapple
201	18	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	Grapple
202	8	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
204	43	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
217	49	DFPZ	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	
218	257	DFPZ	Mechanical Thin/Group	Yes (19)	Feller Buncher Mechanical	
220	17	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
223	317	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
225	7	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
226	30	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
227	67	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
228	4	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
230	14	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
232	29	DFPZ	Mechanical		Feller Buncher	

Unit	Acres	Resource Zone	Treatment	Groups (Acres)	Logging System	Post Treatment
			Thin		Mechanical	
233	36	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
235	39	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
237	251	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
249	21	DFPZ	Mechanical Fuels Treatment		Grapple	
250	18	DFPZ	Mechanical Fuels Treatment		Grapple	

Table B.2. A summary of the Grizz Project **Alternative 3** illustrating the number of group selection acres, silvicultural treatments, zone and special prescription that each unit falls into.

Unit	Acres	Resource Zone	Treatment	Groups (Acres)	Logging System	Post Treatment
10	22	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
22	257	Area Thin/Other	Mechanical Thin/Group	Yes (18)	Feller Buncher Mechanical	
36	18	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	Pile Burn
37	48	Area Thin/Other	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	
44	107	Area Thin/Other	Mechanical Thin/Group	Yes (8)	Feller Buncher Mechanical	
64	46	DFPZ	Mechanical Thin/Group	Yes (3)	Feller Buncher Mechanical	
69	115	DFPZ	Mechanical Thin/Group	Yes (8)	Feller Buncher Mechanical	
82	102	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
83	21	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
84	55	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
87	19	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Pile Burn
88	33	DFPZ	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
89	28	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
90	30	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
95	19	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
96	9	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple

Unit	Acres	Resource Zone	Treatment	Groups (Acres)	Logging System	Post Treatment
103	87	DFPZ	Mechanical Thin/Group	Yes (6)	Feller Buncher Mechanical	
104	21	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Pile Burn
105	14	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
106	59	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
108	40	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Pile Burn
109	26	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
110	53	DFPZ	Mechanical Thin/Group	Yes (3)	Feller Buncher Mechanical	
113	45	DFPZ	Mechanical Thin/Group	Yes (3)	Feller Buncher Mechanical	
127	61	Area Thin/Other	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	
130	27	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
132	38	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
134	97	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
136	11	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
137	16	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
138	88	DFPZ	Mechanical Thin/Group	Yes (7)	Feller Buncher Mechanical	
142	38	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
147	46	DFPZ	Mechanical Thin/Group	Yes (3)	Feller Buncher Mechanical	
149	37	DFPZ	Mechanical Fuels Treatment		Grapple	

Unit	Acres	Resource Zone	Treatment	Groups (Acres)	Logging System	Post Treatment
153	28	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
155	12	DFPZ	Underburn		Manual	
156	7	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
157	32	DFPZ	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
158	37	DFPZ	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
159	54	DFPZ	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	
177	40	DFPZ	Mechanical Fuels Treatment		Grapple	Under/Pile Burn
179	15	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
181	42	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
187	23	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
188	12	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
189	30	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
190	264	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
191	5	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
196	28	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
197	30	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
199	46	DFPZ	Mechanical Thin/Group	Yes (3)	Feller Buncher Mechanical	
200	84	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	Grapple
202	8	Area Thin/Other	Mechanical Thin		Feller Buncher	

Unit	Acres	Resource Zone	Treatment	Groups (Acres)	Logging System	Post Treatment
					Mechanical	
204	43	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
217	49	DFPZ	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	
218	259	DFPZ	Mechanical Thin/Group	Yes (19)	Feller Buncher Mechanical	
220	17	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
223	317	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
225	7	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
226	30	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
227	67	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
228	4	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
230	14	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
232	29	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
235	39	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
249	21	DFPZ	Mechanical Fuels Treatment		Grapple	
250	18	DFPZ	Mechanical Fuels Treatment		Grapple	
251	6	DFPZ	Mechanical Fuels Treatment		Grapple	
252	6	DFPZ	Mechanical Fuels Treatment		Grapple	
253	10	DFPZ	Mechanical Fuels Treatment		Grapple	
254	28	DFPZ	Mechanical Fuels		Grapple	

Unit	Acres	Resource Zone	Treatment	Groups (Acres)	Logging System	Post Treatment
			Treatment			
255	22	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
256	28	DFPZ	Mechanical Fuels Treatment		Grapple	
257	69	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
258	30	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
259	25	DFPZ	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
260	73	DFPZ	Mechanical Thin/Group	Yes (5)	Feller Buncher Mechanical	
261	203	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
262	99	Area Thin/Other	Mechanical Thin/Group	Yes (8)	Feller Buncher Mechanical	
263	17	Area Thin/Other	Mechanical Thin/Group	Yes (1)	Feller Buncher Mechanical	
264	81	Area Thin/Other	Mechanical Thin/Group	Yes (5)	Feller Buncher Mechanical	
268	124	Area Thin/Other	Mechanical Thin/Group	Yes (10)	Feller Buncher Mechanical	
269	44	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
270	33	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	

Table B.3. A summary of the Grizz Project **Alternative 4** illustrating the number of group selection acres, silvicultural treatments, zone and special prescription that each unit falls into.

Unit	Acres	Resource Zone	Treatment	Groups (Acres)	Logging System	Post Treatment
10	22	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
36	18	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	Pile Burn
37	48	Area Thin/Other	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	
64	46	DFPZ	Mechanical Thin/Group	Yes (3)	Feller Buncher Mechanical	
69	115	DFPZ	Mechanical Thin/Group	Yes (8)	Feller Buncher Mechanical	
82	102	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
83	21	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
84	55	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
87	19	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Pile Burn
88	33	DFPZ	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
89	28	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
90	30	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
95	19	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
96	9	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
103	87	DFPZ	Mechanical Thin/Group	Yes (6)	Feller Buncher Mechanical	
104	21	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Pile Burn
105	14	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
106	59	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
108	40	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Pile Burn
109	26	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
110	53	DFPZ	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	
113	45	DFPZ	Mechanical	Yes (3)	Feller Buncher	

Unit	Acres	Resource Zone	Treatment	Groups (Acres)	Logging System	Post Treatment
			Thin/Group		Mechanical	
127	61	Area Thin/Other	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	
130	27	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
132	38	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
134	97	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
136	11	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
137	16	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
138	88	DFPZ	Mechanical Thin/Group	Yes (7)	Feller Buncher Mechanical	
142	38	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
147	46	DFPZ	Mechanical Thin/Group	Yes (3)	Feller Buncher Mechanical	
149	37	DFPZ	Mechanical Fuels Treatment		Grapple	
153	28	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
155	12	DFPZ	Underburn		Manual	
156	7	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
157	32	DFPZ	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
158	37	DFPZ	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
159	54	DFPZ	Mechanical Thin/Group	Yes (4)	Feller Buncher Mechanical	
160	107	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
177	40	DFPZ	Mechanical Fuels Treatment		Grapple	Under/Pile Burn
179	15	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
181	42	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
187	23	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
188	12	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
189	30	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
190	264	Area Thin/Other	Mechanical		Feller Buncher	

Unit	Acres	Resource Zone	Treatment	Groups (Acres)	Logging System	Post Treatment
			Thin		Mechanical	
191	5	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
196	28	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
197	30	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
199	46	DFPZ	Mechanical Thin/Group	Yes (3)	Feller Buncher Mechanical	
217	49	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
218	259	DFPZ	Mechanical Thin/Group	Yes (19)	Feller Buncher Mechanical	
220	17	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
223	317	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
225	7	DFPZ	Mechanical Fuels Treatment		Grapple	Pile Burn
226	30	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
227	67	DFPZ	Mechanical Thin		Feller Buncher Mechanical	Grapple
228	4	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
230	14	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
232	29	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
249	21	DFPZ	Mechanical Fuels Treatment		Grapple	
250	18	DFPZ	Mechanical Fuels Treatment		Grapple	
251	6	DFPZ	Mechanical Fuels Treatment		Grapple	
252	6	DFPZ	Mechanical Fuels Treatment		Grapple	
253	10	DFPZ	Mechanical Fuels Treatment		Grapple	
254	28	DFPZ	Mechanical Fuels Treatment		Grapple	
255	22	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
256	28	DFPZ	Mechanical Fuels		Grapple	

Unit	Acres	Resource Zone	Treatment	Groups (Acres)	Logging System	Post Treatment
			Treatment			
257	69	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
258	30	DFPZ	Mechanical Thin		Feller Buncher Mechanical	
259	25	DFPZ	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	
260	73	DFPZ	Mechanical Thin/Group	Yes (5)	Feller Buncher Mechanical	
263	17	Area Thin/Other	Mechanical Thin/Group	Yes (1)	Feller Buncher Mechanical	
264	246	Area Thin/Other	Mechanical Thin/Group	Yes (19)	Feller Buncher Mechanical	
265	107	Area Thin/Other	Mechanical Thin/Group	Yes (5)	Feller Buncher Mechanical	
266	21	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	Grapple
267	32	Area Thin/Other	Mechanical Thin		Feller Buncher Mechanical	
268	124	Area Thin/Other	Mechanical Thin/Group	Yes (10)	Feller Buncher Mechanical	
269	44	Area Thin/Other	Mechanical Thin/Group	Yes (2)	Feller Buncher Mechanical	

Table B.4. Displaying proposed road actions for **Alternative 1** including the road number, action and length of each road in the Grizz Project

Road #	Action	Length (miles)
25N98	Reconstruction	1.15
25N42J	Decommission after use	0.19
25N35	Reconstruction	1.63
24N98Y	Reconstruction	3.06
24N97A	Reconstruction	1.19
24N94YA	Decommission	0.27
24N94Y	Decommission	0.98
24N75XA	Reconstruction	0.51
24N75X	Reconstruction	0.19
24N60C	Decommission	0.75
24N60C	Reconstruction	0.89
24N60B	Decommission	0.31
24N58	Reconstruction	1.05
24N57B	Close after use	1.38
24N57A2	New construction	0.38
24N57A2	Reconstruction	1.3
24N57A1	Decommission	0.09
24N57A	Reconstruction	0.54
24N57	Reconstruction	2.04
24N54B	Decommission after use	0.62
24N54A	Decommission after use	0.97
24N54	Reconstruction	1.17
24N11XA	Close	0.63
24N09	Reconstruction	1.2
23N45	Decommission	1.49
23N23Y	Reconstruction	1.22
23N22Y	Decommission	1.51

OHV Route Designation Process road closure criteria (must fit at least one or more below):
1. Dead end spurs or routes that show no evidence of OHV use, which are also contributing to resource damage.
2. User created routes in areas that are already closed by existing Forest Orders.
3. Routes are creating egregious resource damage, to the extent that a delay in their closure would result in unacceptable and irretrievable impacts to the resource.

N/A road is not going to be closed or decommissioned.
TOC-Non-system roads closed to allow the Proposed Action to be implemented without undo watershed damage.

Table B.5. Displaying proposed road actions for **Alternative 3** including the road number, action and length of each road in the Grizz Project

Road #	Action	Length (miles)
25N98	Reconstruction	1.15
25N42J	Decommission after use	0.19
25N35	Reconstruction	2.04
24N98Y	Reconstruction	3.06
24N97A	Reconstruction	1.19
24N94YA	Decommission	0.27
24N94Y	Decommission	0.98
24N91Y	Reconstruction	0.99
24N75XA	Reconstruction	0.51
24N75X	Reconstruction	0.19
24N60C	Decommission	0.75
24N60C	Reconstruction	0.89
24N60B	Decommission	0.31
24N58	Reconstruction	1.05
24N57B	Close after use	1.38
24N57A2	New construction	0.38
24N57A2	Reconstruction	1.3
24N57A1	Decommission	0.09
24N57A	Reconstruction	0.54
24N57	Reconstruction	2.04
24N54B	Decommission after use	0.62
24N54A	Decommission after use	0.97
24N54	Reconstruction	1.17
24N11XA	Close	0.63
24N09	Reconstruction	1.2
23N45	Decommission	1.49
23N23Y	Reconstruction	1.22
23N22Y	Decommission	1.51

Table B.6. Displaying proposed road actions for **Alternative 4** including the road number, action and length of each road in the Grizz Project

Road #	Action	Length (miles)
25N98	Reconstruction	1.15
25N42J	Decommission after use	0.19
25N35	Reconstruction	0.69
24N98Y	Reconstruction	3.05
24N97A	Reconstruction	1.19
24N94YA	Decommission	0.27
24N94Y	Decommission	0.98
24N91Y	Reconstruction	0.99
24N75XA	Reconstruction	0.51
24N75X	Reconstruction	0.19
24N60C	Decommission	0.75
24N60C	Reconstruction	0.89
24N60B	Decommission	0.31
24N58	Reconstruction	1.05
24N57B	Close after use	1.38
24N57A2	New construction	0.38
24N57A2	Reconstruction	1.3
24N57A1	Decommission	0.09
24N57A	Reconstruction	0.54
24N57	Reconstruction	2.04
24N54B	Decommission after use	0.62
24N54A	Decommission after use	0.97
24N54	Reconstruction	1.17
24N11XA	Close	0.63
24N09	Reconstruction	1.2
23N45	Decommission	1.49
23N23Y	Reconstruction	1.22
23N22Y	Decommission	1.51

Appendix C Standards and Guidelines

Table C.1. Standards and Guidelines Applicable to All Activities occurring in the HFQLG Pilot project area (Table 2 of the SNFPA ROD).

HFQLG Land Allocation	Standards and Guidelines
Offbase and deferred areas	The following HFQLG resource management activities are prohibited: DFPZ construction, group selection, individual tree selection, all road building, all timber harvesting activities and any riparian management that involves road construction or timber harvesting.
Late successional old growth (LSOG) rank 4 and 5	Group selection and individual tree selection are not allowed in LSOG 4 and 5 stands. DFPZ construction is allowed in LSOG 4 and 5 stands. Design DFPZs to avoid old forest stands (CWHR classes 5M, 5D, 6) within this allocation.
California spotted owl PACs	The following resource management activities - DFPZs, group selection, individual tree selection and riparian restoration projects and other timber harvesting - are not allowed within spotted owl PACs.
California spotted owl habitat areas (SOHAs)	The following resource management activities - DFPZs, group selection, individual tree selection and riparian restoration projects and other timber harvesting - are not allowed within spotted owl SOHAs.
National forest lands outside of the above allocations and available for vegetation and fuels management activities specified in the HFQLG Act	**DFPZs**
	Eastside pine types and all other CWHR 4M and 4D classes: • Design projects to retain at least 30% of existing basal area, generally comprised of the largest trees. · • Design projects to retain all live trees ≥30 inches dbh; exceptions allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable. · • For CHWR 4M and 4D classes that are not eastside pine types, retain, where available, 5% of total post-treatment canopy cover in lower layers comprised of trees 6 - 24-inches dbh. · • No other canopy cover requirements apply.
	CWHR 5M, 5D and 6 classes except those referenced above: • Design projects to retain a minimum of 40% canopy cover. • Design projects 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 largest trees. · • Design projects to retain, where available, 5% of total post-treatment canopy cover in lower layers comprised of trees 6-24 inches dbh. · • Design projects to retain all live trees ≥30 inches dbh; exceptions allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable.
	All other CWHR class stands: • Retain all live trees ≥30 inches dbh, except to allow for operations. Minimize operations impacts to ≥30-inch trees as much as practicable.
	Group Selection

	• Design projects to retain all live trees ≥30” dbh, except allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable.
	Area Thinning (individual tree selection)
	All eastside pine types: · • Design projects to retain at least 30% of existing basal area, generally comprised of the largest trees · • Design projects to retain all live trees ≥30 inches dbh; exceptions allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable. · • Canopy cover change is not restricted.
	CWHR classes 4D, 4M, 5D, 5M and 6 (except eastside pine type): · • Where vegetative conditions permit, design projects to retain ≥50% canopy cover after treatment averaged within the treatment unit, except where site-specific project objectives cannot be met. Where 50 percent canopy cover retention cannot be met as described above, design projects to retain a minimum of 40% canopy cover averaged within the treatment unit. · • Design projects to avoid reducing canopy cover by more than 30% from pre-treatment levels. · • Design projects to retain at least 40% of the existing basal area, generally comprised of the largest trees. · • Design projects to retain, where available, 5% of total post-treatment canopy cover in lower layers comprised of trees 6-24 inches dbh. · • Design projects to retain all live trees ≥30 inches dbh; exceptions allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable.
	Down wood and snags
	• 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. Within eastside vegetation types, generally retain an average of three large down logs 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. • Determine snag retention levels on an individual project basis. Design projects to sustain across a 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 ridge tops), 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 eastside pine and eastside mixed conifer forest types, three 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.
	Spotted owl surveys
	• Prior to undertaking vegetation treatments in spotted owl habitat having unknown occupancy, conduct surveys in compliance with the Pacific Southwest Region survey direction and protocols and designate PACs where appropriate according to survey results.

Appendix D Standard Operating Procedures

Fire/Air Quality

For all prescribed burning, comply with air quality permits issued by the Northern Sierra Air Quality Management District. A prescribed burn plan, including a mandatory smoke management plan (SMP), would be required prior to any prescribed fire. The SMP is reviewed and approved by the local air quality management District office.

Conduct prescribed burning in a manner that avoids excessive buildup of smoke in any particular airshed.

Other than in visual corridors, no more than 10% mortality in the residual crop trees following the underburn and no areas of mortality greater than 2 acres.

Watershed

Protect water quality through the use of BMPs, which are employed by the Forest Service and the State of California to prevent water quality degradation and to meet state water quality objectives relating to non-point sources of pollution. In addition, use site-specific mitigation measures that relate directly to these BMPs to minimize erosion and resultant sedimentation.

Apply the Standards and Guidelines identified in the PNF LRMP SMZ and SAT Guidelines (as adopted under the HFQLG EIS) relating to timber sale activities in all RHCAs. Activities in RHCAs will improve or maintain the structure and function of the RHCA and fish and wildlife habitat.

Streamside Areas

For intermittent and ephemeral streams showing scour and deposition and wetlands less than one acre in size, use RHCA widths of a minimum of 100 feet in width (horizontal distance) or the height of one site potential tree, whichever is greater. For perennial fish-bearing streams, use RHCA widths of 300 feet horizontal distance as measured from both sides center of the stream channel, or to the top of the inner gorge, or the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, whichever is greatest. Extend RHCAs around wetlands greater than one acre and perennial non fish-bearing streams to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or to the extent of moderately and highly unstable areas, or a 150’ horizontal distance, whichever is greatest.

Employ streamside management zone (SMZ) widths that are 50’ for those stream segments that do not display scour and deposition and are not classified as RHCAs.

Exclude equipment from RHCA, except at equipment crossings and within hardwood treatment areas (See Hardwoods), unless specifically allowed for in the environmental document. Minimize the number of crossings. Crossings will be back-bladed after use, as necessary, to restore the natural relief and reduce erosion.

Remove any slash generated by project activities from stream courses as soon as practicable, not exceeding 48 hours.

Do not locate landings within RHCAs. Mulch and then subsoil landings and other disturbances within 200 feet of stream channels.

Remove no trees adjacent to channels that provide bank stability and/or contribute to channel integrity (except for hazard trees).

Drainages disrupted by existing and activity related landings, skid trails and temporary roads would be restored to their natural contour. This would occur during subsoiling operations.

Do not locate skid trails parallel to the bottom of swales. Treat swales as stream courses, crossing at right angles and skidding away from these features.

While underburning, do not ignite fire within 50' of stream channels or riparian vegetation, whichever is greatest. Allow backing fire to creep into RHCAs if fuels naturally carry this fire. Retain at least 90% of large woody debris in channels and leave 50-75% of the ground unburned within the interior 50' of RHCAs. Within these core areas, ensure that burned areas appear intermittent, not concentrated. Maintain a minimum of 75% ground cover over RHCAs and SMZs. Locate burn piles from or above the "green line" or at least 25' away from channels having evident scour and deposition, whichever is greater. Burn piles prior to under burning.

Retain 5 tons/acre of fuels less than 15" in diameter and 10-15 tons/acre of the largest down logs greater than 15" in diameter, where available.

Aspen

Aspen Stands with defined Stream Channels

No equipment within 25 feet of any stream course. Machinery can work adjacent and reach into the exclusion zone with the extendable boom. Skid trails will be perpendicular to the stream course within 50 feet of the stream and spacing of skids will be no closer than 120 feet. No trees will be removed that are providing stability to the streambank.

Along perennial fish-bearing streams where Aspen are not of sufficient size to provide shade to the stream channel conifers will be left to provide shade.

Aspen Stands with no definable stream channel

Aspen stands within wet areas where no definable stream channels are present will be harvested in dry periods when the upper eight inches of the soil is essentially dry or the ground is frozen to a depth of five inches or snow depth is at least 18 inches or is compacted by equipment to eight inches. For this measure soil is defined as "dry" when no portion can be molded by hand compression and hold that shape when the hand is tapped.

Meadows

Skid trails and landings will not be constructed within meadows. Mechanical equipment will be restricted to slopes up to 25% within meadows. Areas within 50' of the meadow edges will not be subsoiled. Buffer zones, varying from 50' to 150', will be established and maintained around seeps, springs and associated wetland areas. Mechanical treatment within the meadow will occur when the upper eight inches of the soil is essentially dry or the ground is frozen to a depth of five inches or snow depth is at least 18 inches or is compacted by equipment to eight inches. For this measure soil is defined as "dry" when no portion can be molded by hand compression and hold that shape when the hand is tapped.

Soil Protection Measures

To control the surface erosion, the LRMP requires a minimum of 40% ground cover on soils with a low erosion hazard rating. The minimum ground cover increases to 50%, 60% and 70% for soils with an erosion hazard rating of moderate, high and very high, respectively. If ground cover standards are not met, implement mitigation methods such as leaving chips on site to ensure standards will be met.

Conduct ground based harvest operations only when the upper 8” of the soil is essentially dry, or the ground is frozen to a depth of 5”, or snow depth is at least 18” or is compacted by equipment to 8”. For this measure, soil is defined as “dry” when no portion of the top 8” can be molded by hand compression and hold that shape when the hand is tapped. Allow cut-to-length harvesters and forwarders to operate on moist soil, when the depth of the organic mat is greater than 18”.

Restrict skidding equipment to designated skid trails, unless, through consultation with the District’s hydrologist, geologist or soil scientist, it is determined that departure from skid trails would not likely impair the soil. Generally use a range of skid trail spacing, 80-120’ center to center, when trails are parallel and generally perpendicular to the stream. Reusing existing skid trails, with spacing closer than prescribed, is acceptable.

Based upon the soil type, existing landings and skid trails used by the project and newly created skid trails with compacted soil, will be subsoiled using a subsoiling/slash placement implement mounted on an excavator and displaced soil will be leveled and slash scattered, as presented in the environmental analysis or agreed upon by the Sale Administrator and the District Hydrologist.

Where specified by the District’s physical scientist, subsoil skid trails, landings and non-system roads within the project area through the full depth of compaction to restore soil porosity. In addition, all temporary roads and those non-system roads to be decommissioned would be subsoiled. Selected landings and terminating skid trails would be subsoiled with a winged subsoiler or other equipment capable of lifting and fracturing compacted soil without mixing the soil horizons to a depth of at least 24”. Constructed skid trails would be subsoiled to a minimum depth of 24“, water-barred and blocked. All primary skid trails, experiencing three or more passes with equipment, would be subsoiled with a winged subsoiler to a minimum depth of 20”. Post-harvest compaction monitoring would be completed, both project skid trails and landings, as well as legacy trails and landings, would be subsoiled to achieve FS Region 5 soil compaction standards. The subsoiler would be lifted where substantial root and bole damage to larger trees would occur from subsoiling. Skids with slope over 25% may not be subsoiled, but would be frequently waterbarred. Areas within 50’ of ephemeral draws, swales, connected drainages and meadow edges would not be subsoiled. Subsoiling would not occur on shallow soils where the displacement of rocks disrupts soil horizons or where there are concerns about the spread of root disease, or damage to tree roots.

Block vehicle access to temporary roads and install water-bars prior to subsoiling them.

Allow low ground pressure (under 8.0 psi) harvesting equipment to travel off of designated skid trails to bring logs to trails. Allow low ground pressure (under 8.0 psi when "unloaded") excavators to work on slopes up to 45% to pile excess fuels.

Silviculture

Pine and Douglas fir stumps > 14" will be treated with a borate compound for the control of Annosus root disease. Generally, retain sugar pine and hardwoods in thinned units, with exceptions allowed for safety and operability. Protect trees identified or trees being tested as genetically superior or resistant to blister rust or dwarf mistletoe.

Landings

Landings will generally not be within 100 feet of the stream course. District hydrologist or soil scientist will approve, on a site specific basis landings that need to be closer than a 100 fet of a streamcourse. These landings will be tilled, seeded, mulched after use and available slash will be spread out across landing to improve infiltration and minimize erosion upon site visit. Reference: BMP 1-12

Botany

Protect known sensitive and special interest species according to PNF's current interim management prescriptions for specific species.

If additional TES Plant species are found during the life of the project, conduct an assessment and apply appropriate management prescriptions.

Noxious Weed Management

The SOPs 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
- 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 should 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, orchard grass, 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 should be isolated and avoided with equipment (and equipment washed as in # 1 above).

Wildlife

Unless determined to be unnecessary following pre-implementation surveys, limited operating periods (LOPs) to protect key wildlife species listed in the HFQLG FEIS (page 2-8, table 2.3), 2004 SNFPA ROD (pages 54-62) and the Biological Evaluation/Biological Assessment would apply.

Where subsequent surveys identify occupied threatened, endangered, or sensitive species habitat, establish PACs, den site buffers, or other protections as described in the SNFPA EIS and HFQLG EIS. Include protections for any additional sensitive species identified in the BE/BA. In the event of a TES species being verified occurs after project award, the appropriate LOPs would be applied. Other mitigations may take place as agreed upon by the Sale Administrator and District Wildlife Biologist.

In areas of known populations of TES amphibians, apply direction from the HFQLG FEIS/ROD and the SNFPA ROD. Apply additional protection measures as follows: do not burn slash piles within RHCAs during the LOP and when burned, assure that 1) no fuel is dumped on the pile and fusees or a single torch is used to light the pile and 2) light piles from a single location rather than multiple locations, allowing sheltering amphibians to escape.

Down wood and snags

Down wood and snag retention will follow the Standards and Guides in Table 2 of the 2004 SNFPA ROD. Within westside vegetation types, an average of 10-15 tons of large down wood (lwd) per acre will generally be retained over the treatment unit. Within eastside vegetation types, an average of 3 large down logs will generally be retained per acre.

Snag retention levels will be determined on an individual, project basis. However, they will consider the guidelines set forth in the Standards and Guides (USFS 2004) including retaining 4 or the largest snags per acre in westside, mixed conifer and ponderosa pine types, 6 of the largest snags per acre in the red fir forest type, 3 of the largest snags per acre in the eastside and eastside pine types and 4 of the largest snags in westside hardwood ecosystems. Snags larger than 15" dbh will be used to meet these guidelines.

In areas that are considered deficient in lwd, cull logs may be left at the stump rather than being skidded to the landing. The location and amount will be agreed upon by the Sale Administrator and the District Wildlife Biologist.

Heritage Resources

The proposed project has the potential to affect heritage resources. As outlined in the Programmatic Agreement, the following protection measures will be implemented, as appropriate, for all heritage resources located within the project area. The application of the following protection measures would result in the project having "no effect" on heritage resources and the Forest would have taken into account the effect of the project on heritage resource sites in compliance with the Progromattic Agreement and Section 106 of the NHPA.

If any unrecorded heritage resources (artifacts, features, or sites) are encountered as a result of project operations, all activities in the vicinity of such finds will immediately cease pending an examination by the District Archaeologist.

- At a minimum, heritage resource sites shall be excluded from areas where activities associated with the project will occur.
    1. All proposed activities, facilities, improvements and disturbances shall avoid heritage resource sites. Avoidance means that no activities associated with the project that may affect heritage resource sites shall occur within a site's boundaries, including any defined buffer zones. Portions of the project may need to be modified, redesigned, or eliminated to properly avoid heritage resource sites.
    2. All known heritage resource sites within the area of potential effect shall be clearly delineated prior to implementing any associated activities that have the potential to affect heritage resource sites.
    3. Buffer zones may be established to ensure added protection where the Forest or District Archaeologist determines that they are necessary. The use of buffer zones in conjunction with other avoidance measures are particularly applicable where setting contributes to the property's eligibility under 36 CFR 60.4, or where it may be an important attribute of some types of heritage resource sites (e.g., historic buildings or structures; historic or cultural properties important to Native Americans). The size of buffer zones needs to be determined by the Forest or District Archaeologist on a case-by-case basis.
    4. When any changes in proposed activities are necessary to avoid heritage resource sites, e.g., project modifications, these changes shall be completed prior to implementing the project.
    5. Monitoring during project implementation, in conjunction with other measures, may be used to enhance the effectiveness of protection measures.
    6. Upon approval of the Forest or District Archaeologist, low intensity underburning may be allowed over selected prehistoric sites as long as fuel loads are relatively light.
    7. The Forest or District Archaeologist may approve the use of mechanical equipment to remove brush or woody material from within specifically identified areas within site boundaries under prescribed measures designed to prevent or

minimize effects. Vegetative or other protective padding may be used in conjunction with the Archaeologist's authorization of certain equipment types within site boundaries.

8. Upon approval of the Forest or District Archaeologist, existing breaches within linear sites may be designated on the ground and reused for project activities.
9. Roads and trails that currently overlie historic linear sites may continue to be used as transportation routes without notification. However, if there are activities that will change the morphology of the existing road or trail (that is overlaying a historic linear site), these activities need to be reviewed by the Forest or District Archaeologist.
10. Roads proposed to be decommissioned that extend through archaeological sites will need to be blocked instead of sub-soiled.

Visual Quality Management (Immediate Foreground of Visual Corridors)

To the extent feasible, locate landings and primary skidtrails away from the immediate foreground of Sensitivity Level I and II travel corridors. Limit size of landings so that they are not visually evident from the sensitive travel routes following completion of treatment activities.

Minimize stump heights in both mechanical and handthinning units adjacent to sensitive travel corridors, typically resulting in stumps 6" or less in height within 300' of the travel corridor.

During tree marking, open and enhance views of residual old growth trees near the visual corridor where possible.

Target consumption of burn piles of 95% or greater.

Target underburn mortality levels of 5% or less.

Transportation

Design all stream crossings to accommodate a 100-year flood and provide fish passage as necessary. Decommission temporary roads after use.

Design and obliterate temporary stream crossings to protect water quality and adjacent riparian vegetation (see "Streamside Areas" section for additional procedures for protecting riparian vegetation).

Stabilize and strategically place water bars on temporary roads where drainage control issues are evident or expected. After use, barricade roads to discourage vehicle traffic, using available natural materials such as rocks, logs, root wads and earth, to appear somewhat natural, have low installation costs and require little to no maintenance.

Maximum draw-down volumes will be estimated prior to use of the draft site. Minimum pool levels will be maintained during drafting using measurements such as staff gauges, stadia rods, tape measures, etc.

Abate dust from logging traffic with water from water drafting sites that are selected based on stream flow and suitability of access. Construct water-drafting sites so that oil, diesel fuel, or other spilled pollutants would not enter the stream. Back down ramps will be constructed and or

maintained to ensure the stream bank stability is maintained and sedimentation is minimized. Rocking, chipping, mulching, or other effective methods are acceptable in achieving this objective.

When water is scarce, alternative sources such as chlorite, sulfonate or other dust abatement materials would be used.

Implementation

Within the project contract area, allow minor adjustments in boundaries of units if compatible with Forest Plan direction, the desired conditions and anticipated environmental effects disclosed by the project's NEPA document.

Range

Range improvements will be protected from damage caused by the project. Forest Representatives will administer contracts and burn plans. Contracts and burn plans will display where range improvements are located and include provisions to rebuild to standard any range improvements which are damaged by the contractor. Range improvements for each allotment are listed in Part 3 of the permittees Term Grazing Permit.

The Forest Service Contract Administrator and the Forest Service Prescribed Burn Manager should coordinate with the Forest Service Range Conservationist early each spring to discuss the portions of the project that will be implemented that year. The Forest Service Range Conservationist should discuss those project activities in the Annual Operating Instructions meeting with the permittee prior to the District Ranger's approval of that years Annual Operating Instructions.

Appendix E Cumulative Effects

Cumulative effects are the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably future actions regardless of what agency or private entity undertakes such other actions. Cumulative impacts can result from individually minor events that cause significant impact over time (40CFR1508.7). A list of past actions and events within the project area (Table E.1) allow resource specialists to conduct the requisite "hard look" analysis of cumulative impacts within the Grizz Project. Because of different analysis areas and methods, each resource specialist will consider the projects listed in Table E.1 in their analysis differently.

Table E.1.List of past, present and future foreseeable projects used by resources specialists to analyse cumulative effects for the Grizz Project.

Project Name	ID Number	Year	Acres	Volume	Treatment Type	Miscellaneous
Past Project						
Iron Dyke THP	2-01-070-PLU	2004	162	N/A	-Commercial thinning	Private
Little Long Valley Creek THP	2-02-263-PLU(1)	2006	100	N/A	-Shelterwood removal	Private
South Lava THP	2-04-146-PLU(1)	2004	752	N/A	-Clearcutting (355) -Selection (12) -Commercial thinning (370)	Private
Walker Mine THP	2-97-323-PLU	2002	430	N/A	-Selection (19) -Shelterwood removal (256) -Commercial thinning (75) -Sanitation salvage (75)	Private
Walker Mine II-B THP	2-02-170-PLU	2006?	135	N/A	-Commercial thinning (45) -Thinning (90)	Private
Grizzly THP	2-03-062-PLU	2006	1,985	N/A	-Clearcutting (219) -Selection (154) -Commercial thinning >14" (22) -Commercial thinning <14" (1590)	Private
Tram Salvage TS		N/A	455	N/A	-Salvage thinning	USFS
Paradise Salvage TS		N/A	365	N/A	-Salvage thinning	USFS
Cascade Pretreatment Area		N/A	205	N/A	-Slash treatment	USFS
Cascade Compartment Addendum		N/A	~205	N/A	-Thinning/selection	USFS
Summitt Lake Goose Nesting Mounds		N/A	5	N/A	-Waterfowl nest construction	USFS
East End Small		N/A	142	125 MBF	-Salvage thinning	USFS

Salvage TS						
Far Out West II/III		1979	40	N/A	-Placer, open pit, gold mining claim	USFS
Prospect Salvage Sale		1981	2	N/A	-Salvage thinning	USFS
Oldhouse		1982	-3,789* -1,000**	3,000 MBF	-ITS	USFS -total sale area was 4,639 acres
Cascade		1985	2,700	N/A	-ITS	USFS
Walker Timber Sale		1988	-5,832* -2900**	226 MBF	-ITS (overstory removal)	USFS
Eastern Edge Salvage Sale		1989	2,592	100 MBF	-Salvage thinning	USFS
Blakeless Insect Salvage Sale		1990	-1082** -2705*	2 MMBF	-Salvage thinning	USFS
Bozo Insect Salvage Sale		1990	2,335	2 MMBF	-Salvage thinning	USFS
Nye Salvage Sale		1990	8,333	3,386 MBF	-Salvage thinning	USFS
Penman Insect Salvage Resale		1990	640*	1,732 MBF	-Salvage thinning	USFS -Total project acres=3,602
Summit Salvage Timber Sale		1990-1994	5,095	10 MMBF	-Salvage thinning	USFS
Cinderella Salvage Timber Sale		1991	2,283	2.5 MMBF	-Salvage thinning	USFS
Walker Mine Tailings		1991	N/A	N/A	-Rerouting Dolly Creek	USFS
Diamondback Timber Sale		1991	2,840		-N/A	USFS
Cascade Resale		1991	2,700	5,801 MBF	-Resale of unsold timber of Cascade	USFS -All within the Grizz project area
Alice Insect Small Salvage Timber Sale		1993	2,221	1,424 MBF	-Salvage thinning	USFS
Blake Insect Salvage Sale		1994	171	658 MBF	-Salvage thinning	USFS
Powderhouse TS		1995	~600	1.6 MMBF	-Thinning -Overstory removal	USFS
Emigrant Salvage TS		1995	330	3 MMBF	-Salvage thinning -Shelterwood	USFS
Bozo II		1995	832	735 MBF	-Insect salvage thinning	USFS -All within Grizz project area
Cate Place MP Thin		1997	8,323	3 MMBF	-Salvage thinning -Thinning	USFS
Walker Mine Operations		1987	N/A		-Mine tunnel sealed -Mine mainly operated pre-1940	
Current Projects						
Grizzly Valley Community Allotment		Ongoing	-12,169 (total) -6.645**	N/A	-157 cow/calf pairs from Roberti Ranch	Permitted season: 6/16-09/15

					-120 cow/calf pairs from Mervin Ramelli -277 total cow/calf pairs	
Chase Allotment		Ongoing	-14,156 (total) -42**	N/A	-400 cow/calf pairs -Permitted to graze every other year	Permitted season: 06/01-06/15,10/01-10/15
Humbug DFPZ		2006			-Thinning -Underburning	USFS
Future Foreseeable Projects						
Ingalls DFPZ		2009			-DFPZ Thinning	
Dolly Creek Diversion Channel		2007	New channel (~4,000') construction to divert creek	N/A	-Channel construction	
Freeman DFPZ		2008		11 MMBF	-DFPZ Thinning -Area Thinning -Group Selection -Underburn	
Happy Jack DFPZ		2007		5.5 MMBF	-DFPZ Thinning -Area Thinning -Group Selection -Underburn	
Walker KV Hand Thin		2007	-148 acres of natural stand hand thin/pile -49 acres plantation thinning	N/A	-Hand Thinning	-49 acres of plantation thinning in wildlife analysis area

*Wildlife Analysis Area only
**Grizz Project Planning Area only
MBF-Thousand board feet
MMBF-Million board feet

Appendix F Grizz Monitoring

Introduction

Monitoring activities on the Grizz Project will be a useful tool to land management. Information from monitoring will then guide future activities and/or adjust current management practices. The following efforts will take place on areas deemed to be of particular concern during project development.

Overall goals of monitoring activities will be:

Provide information useful to mangers applying the principles of adaptive management.

Assist the public in gauging the success of implementing the resource management activities as designed.

Assess the effectiveness of the resource management activities in achieving resource objectives.

Programmatic HFQLG monitoring will occur concurrently (USFS HFQLG EIS 1999), testing the effectiveness of the entire HFQLG Pilot Project, of which Grizz is only one project. Since main HFQLG monitoring sites are determined randomly, it is not known yet how many of these sites will be included in the Grizz Project area. Direction for HFQLG Pilot Project monitoring is derived from the HFQLG FEIS, Chapter 6 and the Record of decision (ROD). This monitoring plan is comprised of three parts:

Part I is the process developed to track viability concerns expressed in the HGQLG ROD.

Part II (Implementation Monitoring) has three levels of assessment, Ranger District project evaluations, topic specific questions and interagency project reviews.

Part III (Effectiveness Monitoring) assesses the degree to which implemented resource management activities meet resource objectives.

Monitoring for Watershed Effects

Implementation and effectiveness monitoring for cumulative watershed effects are currently accomplished through the Best Management Practice Effectiveness Evaluation Process (BMPEEP), developed for Region 5. In this process individual BMPs are evaluated on-site where management practices are installed.

4.1.5.1 Sampling Design

Sites to be evaluated are identified by random or non-random sampling selection procedures. The random selection process for monitored sites involves looking at projects within the Beckwourth Ranger District. Within the selected project, randomly selected units that meet certain issues deemed appropriate by the hydrologist are then designated for monitoring. If the unit does not require monitoring, another is chosen within the project area. Randomly identified sites are very important for drawing statistical conclusions on the implementation and effectiveness of BMPs. Non-random selected sites are clearly identified and kept separate from the randomly selected sites by the Forest Hydrologist during data storage and analysis.

Non-random selected sites are identified in various ways:

- Identified as part of a monitoring plan prescribed in an EA, EIS or LRMP.
- Identified as part of a Settlement or Negotiated Agreement.
- Part of a routine site visit.
- Sites that are of particular interest to site administrators, specialist and/or management due to their sensitivity, uniqueness and so forth.
- Selected for a particular reason specific to local needs.
- Units 1, 9, 48, 74, 57 and 78 will be monitored. These units will be subsoiled and receive implementation monitoring post treatment.

4.1.5.2 California Regional Water Quality Silvicultural Waiver Monitoring

As of January 30, 2003, the State of California Regional Water Quality Board, Central Valley Region, adopted a resolution granting the Forest Service a water quality waiver. In lieu of submitting a report of waste discharge and obtaining waste discharge requirements of timber harvest activities, the Forest Service will, along with other requirements, monitor as required:

BMP implementation and effectiveness monitoring at programmatic level

Project-specific monitoring (Attachment A, CA State Board Water Quality Waiver)

4.1.5.3 RHCA Monitoring

RHCA monitoring will observe and track sediment transport into streams. Monitoring methods will be similar to BMP Procedure TO1. Two random sample plots per unit would be chosen. Plots would only be placed in the treated portion of the RHCA. There would be a least one sample per 25’, 50’ and 100’ buffer width.

Effectiveness and Implementation Monitoring for Botanical Resources

4.1.5.4 Implementation Monitoring

Implementation monitoring will begin in the year following project implementation. The objective will be to answer the following two questions from the HFQLG Monitoring Plan (1999):

- Were TES plants surveyed and protected?
- Were noxious weed introductions prevented and existing infestations suppressed?

4.1.5.5 Effectiveness Monitoring

Effectiveness monitoring will begin three years after project implementation. The objective will be to answer the following four questions from the HFQLG Monitoring Plan (1999):

- How do TES plant species respond to resource management activities? Randomly selected units without TES plants will also be selected to determine if any new TES plant occurrences have occurred in response to management activities.
- Were existing infestations of noxious weeds eliminated or contained?
- Were all new infestations of noxious weeds eliminated or did some become established?

- Did new infestations of noxious weeds occur during or following project implementation?

A sample pool of botanical sites will be developed to address each of the above questions and will be drawn from potential sites within the project area (Table 2 and Table 3). The number of sites in each sample pool is limited to thirty and if that limit is exceeded then the sites to be monitored will be chosen randomly. If the limit is not reached then every site in the pool will be monitored. The monitoring will be done by forest service botanists who will conduct field visits and record and analyze the results.

This monitoring plan follows the direction of the HFQLG Forest Recovery Act. Monitoring requirements are detailed in Chapter 6, Monitoring Strategy, of the HFQLG FRA Final Environmental Impact Statement.

Table 2. Pool of *potential* sample sites in the Grizz Project area for TES plants

Unit number	Prescription	Species	Occurrence Number	Mitigation
233	Mechanical thin	*Botrychium sp.*	BOSP 11-001A	Control Area
233	Mechanical thin	*Botrychium sp.*	BOSP 11-001B	Control Area
233	Mechanical thin	*Botrychium sp.*	BOSP 11-001C	Control Area
233	Mechanical thin	*Botrychium sp.*	BOSP 11-001D	Control Area
233	Mechanical thin	*Botrychium sp.*	BOSP 11-001E	Control Area
190	Mechanical thin	*Botrychium sp.*	BOSP 11-002A	Control Area
190	Mechanical thin	*Botrychium sp.*	BOSP 11-002B	Control Area
103	Mechanical thin/group	*Botrychium sp.*	BOSP 11-003A	Control Area
223	Mechanical thin	*Botrychium sp.*	BOSP 11-004A	Control Area
223	Mechanical thin	*Botrychium sp.*	BOSP 11-004B	Control Area
181	Mechanical fuels treatment	*Didymodon norrisii*	DINO 11-017F	Control Area
181	Mechanical fuels treatment	*Didymodon norrisii*	DINO 11-017G	Control Area
89	Mechanical thin	*Lupinus dalesiae*	LUDA 11-081A	Control Area
95	Mechanical thin	*Lupinus dalesiae*	LUDA 11-081a	Control Area
96	Mechanical thin	*Lupinus dalesiae*	LUDA 11-081a	Control Area
82	Mechanical thin	*Lupinus dalesiae*	LUDA 11082	Control Area
82	Mechanical thin	*Lupinus dalesiae*	LUDA 11082	Control Area
130	Mechanical thin/group	*Silene invisa*	11-023	Control Area
130	Mechanical thin/group	*Silene invisa*	11-023	Control Area
226	Mechanical thin	*Trichodon cylindricus*	11-002	Control Area
223	Mechanical thin	*Trichodon cylindricus*	11-003	Control Area
233	Mechanical thin	*Trichodon cylindricus*	11-004C	Control Area
233	Mechanical thin	*Trichodon cylindricus*	11-00DD	Control Area

Table 3. Pool of *potential* sample sites in the Grizz Project area for noxious weeds

Unit number	Species	Occurrence Number	Mitigation
89	*Cirsium arvense*	077	Control Area
103	*Cirsium arvense*	076	Control Area
None	*Cirsium arvense*	075	Control Area
None	*Lepidium latifolium*	014-1	Control Area
None	*Lepidium latifolium*	005	Control Area
None	*Centaurea maculosa*	003	Control Area
Non	*Centaurea maculosa*	010	Control Area

Implementation Canopy Cover Retention Monitoring

Canopy cover plays a vital role in ecosystem processes and wildlife habitat. The HFQLG standard and guidelines require specific canopy cover management objectives. Implementation of a canopy cover monitoring program will address the needs for guiding adaptive management action. Canopy cover monitoring will attend to the following concerns and needs:

- canopy cover will be measured after project implementation to confirm a minimum of 40% canopy cover in DFPZs, 50% in individual tree selection areas and 60% in riparian habitat conservation areas.
- Provide information useful to managers applying the principles of adaptive management.
- Assess the effectiveness of silvicultural activities in achieving canopy cover objectives.

Canopy cover sampling will be done using the GRS densitometer (Figure 1). This common canopy cover sampling tool is also used by the California Department of Fish and Game. Since our management direction measures wildlife in terms of CWHR specifications set by the California DFG, application of the densitometer will lend to overall consistency in management.

Depending upon the size of the area being surveyed, the number of sample points will vary. The goal of sampling will be to cover an area thoroughly without over-sampling. canopy cover will be calculated using the following formula:

(canopy hits/sample points) * 100 = percent canopy cover

where “canopy hits” is the vertical interception of crown cover with the crosshairs as viewed through the densitometer.

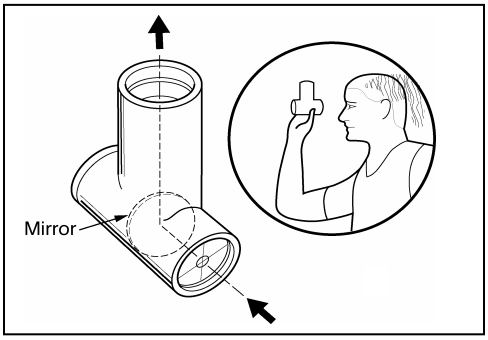

Figure 1. Different perspectives of vertical densitometer

Implementation Monitoring for Prescribed Fire

Elements that may be measured in prescribed fire monitoring may include the following:

- surface fuels
- mortality
- canopy base height
- flame length (feet)

These measures relate to fire types (surface, active crown, passive crown, etc.) and allow the fuels specialists to model and predict fire behavior.

4.1.5.6 DFPZ Maintenance Monitoring

Although the DFPZs were designed to remain effective for 10-years, monitoring will begin no later than 4 years after construction is completed. The monitoring plan would be completed at least every two years thereafter. Results of this monitoring would be available to the public. When surface fuel conditions reach a level of five to seven tons per acre, DFPZ maintenance activities may be necessary

4.1.5.7 Photo plot monitoring

Plots will be placed in RHCAs, edges of burn units and near areas of special resource concern. Private property, archaeological, botanical and wildlife sites are some of the areas of special resource concern. Plots will also be placed near areas with high fuel loading, logs and snags to show fire behavior, consumption and retention.

The Burn Boss and Fuel Officer will determine the photo plot location during burn plan development. GPS will be used to mark and establish plots for photo monitoring. Photos will be taken pre-burm and as the flaming front is passing through the plot area. Different angles might be taken to best illustrate fire behavior. Plots will be revisited one to two days after ignition to compare and contrast consumption and scorch. Revisits to plots will occur one, three and five years after ignition. Photos will be taken to illustrate scorch, mortality and regeneration.

Features that we want to display with photos:

Pre-burn—to show existing fuel conditions.

Photos during ignition - to show fire intensity/behavior.

Postburn—taken 1-2 days post ignition to show burn accomplishments (consumption, scorch)

Postburn—taken 1, 3, 5 years post ignition to show accomplishments and effects of fire behavior. (scorch, mortality, regeneration)

Appendix G Riparian Management Objectives

Riparian Management Objectives

In general, the HFQFLG-EIS guidelines prohibit activities within the RHCA unless they are specifically designed to improve the structure and function of the RHCA and benefit fish habitat.

The Riparian Management Objectives (RMOs) in Appendix L of the HFQLG-EIS that specifically relate to Hydrology and apply to the construction of the DFPZ and operations within RHCAs are presented below:

The following riparian management objectives would apply to the Grizz project. Under all action alternatives, treatments are proposed within many of the RHCAs. In the discussion that follows, most references to treatment within RHCAs are specifically limited to those treatment areas. No RHCA treatment would occur under the No-action alternative.

The objective of the RHCA treatments within treatment units is to reduce the potential for adverse impacts from high intensity wildfire. Historically, fire has been an integral disturbance agent in riparian systems (Dwire and Kauffman 2003). However, fire suppression has reduced the influence of fire, resulting in fuel accumulation and increased likelihood of large, severe wildfires (Taylor and Skinner 1998). These RHCA treatments would provide a safer and more effective fire suppression environment, improve forest health, and provide for a more sustainable vegetation condition consistent with protecting and maintaining riparian habitat values, as discussed below. Field surveys were conducted to verify the existence and condition of the streams within units that would be mechanically treated. All RHCA treatments are designed to minimize erosion from soil disturbance, and to protect and maintain the riparian vegetation that provides bank stabilization and habitat for wildlife, fish, and other aquatic species. The ten riparian management objectives for the Project are discussed below.

1) Maintain or restore water quality to a degree that provides for stable and productive riparian and aquatic ecosystems. Water quality parameters that apply to these ecosystems include timing and character of temperature, sediment and nutrients.

In addition to reducing the risk of high-intensity fires, thinning RHCAs will allow the ecosystem within this corridor to return to a more productive historic condition. Competition between co-dominates and dominant trees will decrease and growth rates will increase while mortality rates decline. Over time, the crowns of larger more fire resistant trees will fill in increasing the necessary shade for temperature regulation. Retaining 60 percent crown cover, where available, along fish bearing streams and 40 percent everywhere else.

Thinning which will occur throughout most RHCA’s within the project area would encourage forest growth, which would hasten the development of larger trees and the recruitment of large woody debris to stream channels. Large woody debris is generally scarce throughout the RHCA's due to a shortage of old growth vegetation. In addition, thinning overstocked RHCAs can decrease tree mortality. Reducing tree mortality within the RHCA will mean less risk of debris jams. Reducing the quantity of dead and downed trees inside the channel will result in fewer point erosion sources. This point source erosion is caused when hydrologic forces erode the bank

around the ends of woody obstructions in otherwise stable channels. Reducing the sources of sediment will have a positive effect on water quality as it relates to turbidity and sedimentation within the channel.

No change is expected in dissolved oxygen levels as they relate to treatments, since any newly created slash would be removed from stream courses within 48 hours after deposition. Thinning RHCAs adjacent to low velocity streams may actually improve oxygen levels by decreasing nutrient overloading from materials decaying in place. All of the streams within the Grizz project are low to moderate velocity. In streams, the consumption of organic matter by bacteria requires oxygen. The amount of oxygen required for bacterial decomposition is the biochemical oxygen demand (BOD), a commonly used measure of water quality. When consumption by bacteria is high, oxygen levels in the water are reduced. When oxygen levels are too low fish and other organisms die.

Where RHCAs would be mechanically treated, ground based equipment would only be used on slopes less than or equal to 25% and on stable soils. RHCAs within sensitive areas (e.g., springs, bogs, erosive soils, etc.) would not be entered with ground-based equipment. All mechanical equipment would be excluded from within 100 feet (horizontal) of fish bearing streams, 50 feet of perennial streams, and 25 feet from intermittent and ephemeral streams. These streamside zones would serve as effective filter and absorptive zones for sediment originating from upslope treatment areas. Removal of vegetation within these equipment exclusion zones would be allowed and, would be determined on a site-by-site case to protect the sensitive attributes associated with the riparian area.

No ignition of prescribed fire would occur within 50 horizontal feet of all streams; however, backing fire would be allowed into these areas. Short-term sediment delivery to streams may occur after burning. However, scorched conifers often drop needles following low or moderate severity fires. This needle cast provides ground cover that can help reduce rill and interrill erosion and sediment delivery (Pannkuk and Robichaud 2003). Despite the risk of erosion, the greater long-term benefit of treating these RHCAs is the potential protection from catastrophic wildfire.

Sediment may be reduced due to proposed road activities. Approximately, 7.25 miles of roads are proposed for decommissioning. This action would allow vegetative recovery, which can decrease compaction, increase infiltration into the roadbed, increase soil stability and limit concentrated flow as well as surface erosion derived from temporary roads. All temporary roads would be decommissioned after use.

Retention of larger fuels, forest floor cover, and deciduous hardwood trees would help maintain the nutrient reservoir stored in organic material.

2) Maintain or restore the stream channel integrity, channel processes and sediment regime under which the riparian and aquatic ecosystems developed. Elements of the sediment regime include the timing, volume and character of sediment input and transport.

In addition to reducing the risk for high-intensity fires, thinning of the RHCA will allow the ecosystem within this corridor to return to a more stable historic condition. Historically woody debris was a combination of large and intermediate logs. Debris jams; especially log-jams of small material will alter the natural sediment regime. Small material decays at a faster rate; entrainment of sediments is short term as decaying logs fail. During peak events small material cannot hold sediment in place. Released sediment will affect timing, volume and character of the input. End cutting and scouring within the channel caused by heavy loading of dead and downed material will influence the timing, volume and character of sediment being transported through the system.

Ground disturbance by equipment would be limited because only slopes less than or equal to 25% would be entered with ground-based equipment. Retention and concentration of large diameter snags within RHCAs would occur. There may be short-term erosion from management activities, as discussed above, with a longer-term reduction in the risk of catastrophic wildfire. Approximately, 7.25 of roads are proposed for decommissioning/closing, which would reduce erosion into the aquatic system. The green-line characteristics would not be compromised and thus stream channel integrity would be maintained.

3) Maintain or restore in-stream flow to support desired riparian and aquatic habitats, the stability and effective function of stream channels and the ability to route flood discharges.

Thinning of the RHCAs will reduce transpiration and interception. If transpiration is reduced, then runoff and groundwater infiltration could increase. Also interception of rain, snow and the subsequent evaporation effects water availability. Reduction of the canopy cover and removal of conifers throughout the RHCA will initially reduce the interception of precipitation and possibly provide more water to meadows and wetlands. Runoff may increase in the short term. This additional water may increase baseflow to perennial streams and extend intermittent stream flow further into late spring or early summer.

The main objective is to reduce the potential for catastrophic wildfire and thus retain the RHCA's desired riparian and aquatic habitats, effective stream channel function, and the ability to route flood discharges. In-stream flows would be assessed during equipment operations, with respect to drafting requirements.

Within RHCAs, the green-line would be preserved and remain unaffected by harvest activities. Within the immediate riparian areas the physical effects derived from in-channel large woody debris (LWD) would be sustained, as no natural in-channel debris would be removed. Future recruitment of LWD would be encouraged through release of the existing conifers, and the snag retention standards for channel morphology, channel function, and bank stability.

The effect of water diversion on future instream flow is beyond the scope of this project.

4) Maintain or restore the natural timing and variability of the water table in meadows and wetlands.

Plants are continuously pumping water from the ground to the atmosphere through a process called transpiration. Transpiration is a function of the density, root mass, and size of that vegetation. If transpiration is reduced, then runoff and groundwater infiltration could increase. Also interception of rain, snow and the subsequent evaporation effects water availability. Reduction of the canopy cover and removal of conifers throughout the RHCA and meadows will provide more water to meadows and wetlands. This additional water will increase baseflow to perennial streams and extend intermittent stream flow further into late spring or early summer.

Activities proposed in the project area are not expected to negatively impact the timing and variability of water tables within meadows and wetlands. All sensitive riparian areas (springs, seeps, bogs, and wetlands) would be protected by the Scientific Analysis Team (SAT) guideline buffers and the implementation of Best Management Practices (BMPs). Wet meadows and green-lines would not be entered. Ground based equipment would only be allowed on stable soils and slopes less than or equal to 25% within RHCAs and 35% within meadows.

5) Maintain or restore the diversity and productive nature of native and desired non-native plant communities in the riparian zone.

Thinning of conifers and retention of all hardwood species within RHCAs would reduce competition and improve diversity.

6) Maintain or restore riparian vegetation to provide an amount and distribution of large woody debris characteristics of natural aquatic riparian ecosystems.

Large woody material adds structure to stream channels and creates fish habitat. It also provides habitat for small burrowing mammals and acts as a reservoir, retaining moisture throughout the summer months. This moisture is used by a host of organisms. Another benefit of large woody material is it provides nutrients to the ecosystem over the long term.

Thinning of the RHCAs will return the project area to a level of stocking and health that is more closely related to its natural condition. While biomass volume may be near historic levels, we must recognize that instead of being in the boles of a few large trees it is in numerous small, less fire resistant trees. Removing the ladder fuels will encourage the stand to return to its natural state and greatly enhance it by reducing competition for nutrients, water and sunlight.

Within treatment units, the objective is to reduce the concentrations of fine fuels. Where down logs exist, 10-15 tons per acre of the largest down logs having diameters greater than 12 inches would be retained. There would be minimal burning of LWD logs greater than 12 inches dbh. Thinning within RHCAs may release the residual conifers and deciduous trees to increase diameter growth. LWD retention standards would be implemented. Potential recruitment of LWD into the stream channel would be retained and enhanced. There would be a reduction in potential

catastrophic wildfire, and therefore a greater potential of LWD retention. Back burning would occur during times where there is increased moisture, resulting in less LWD consumption. Also, the prescription is to consume the fine fuels- residual fine fuel (less than 3 inches in diameter) and would not exceed 5 tons per acre.

7) Maintain or restore habitat to support populations of well-distributed native and desired non-native plant, vertebrate and invertebrate populations that contribute to the viability of riparian plant communities.

Living plants provide erosion control, shade, and their root systems create macro-pores increasing infiltration rates. The decomposition of plants contributes to soil matter and composition, provides nutrients, and water storage. During thinning of the RHCAs measures will be applied to insure ground cover levels are maintained and vegetation providing stability to channel banks is not removed. Riparian zones (specifically the green-line), springs, seeps, and bogs would be identified and protected from harvest activities. Impacts would further be reduced by the application of BMPs and standard management requirements.

Vertebrates that influence the viability of riparian plant communities include pocket gophers, moles, butterflies, bats, and ground squirrels. Thinning of the RHCAs will have no detrimental effect on these species, thus their populations will continue to maintain the viability of riparian plant communities.

Invertebrates contribute to the viability of riparian plant communities in many ways. They act as decomposers, shredding dead plant materials and they burrow into woody debris. Invertebrates recycle nutrients and influence soil structure. They improve soil porosity and improve oxygen-penetrating capabilities. To maintain invertebrate populations, compaction and ground cover disturbance will be minimized through the use of low ground pressure equipment, and sub-soiling of skid trails.

8) Maintain or restore riparian vegetation to provide adequate summer and winter thermal regulation within the riparian and aquatic zones.

Summer and winter thermal regulation within the riparian and aquatic zones would be maintained. Trees shading stream channels would not be harvested and canopy cover within the RHCAs would be maintained at 40 percent and would not be reduced below 60 percent along any fish-bearing stream. Activities proposed in the project area are not expected to negatively impact riparian vegetation. Group selection harvest would only occur outside of RHCAs.

9) Maintain or restore vegetation to help achieve rates of surface erosion, bank erosion and channel migration characteristics of those under which the desired communities developed.

Riparian vegetation will be protected and maintained while coniferous ladder fuels are thinned. Except at designated crossing stream banks will not be impacted by equipment and it is not expected bank erosion will be accelerated either by equipment or by the implementation of the project.

Thinning RHCAs will promote diversity and increase production of riparian communities. Burning of isolated burn piles outside of the RHCA will remove groundcover at point locations, but soil moving from these points will be trapped by ground cover immediately adjacent to the piles.

The maximum erosion hazard for soil types within the project area, ranging from low to high, suggests that channel development has occurred under significant sediment loads. The riparian green-line of stream channels would not be impacted by the proposed management activities, and natural recovery processes within the streamside area would help moderate stream temperatures. Riparian vegetation may increase in vigor due to increased water yield and reduced competition by conifers through thinning in the RHCAs. Within the immediate riparian areas, the physical effects derived from in-channel LWD would be retained, as no natural debris would be removed. Future recruitment of LWD, which is structurally important for channel morphology, channel function, and bank stability, would be encouraged through snag retention requirements and release of existing live conifers.

10) Maintain and restore riparian and aquatic habitats necessary to foster the unique genetic fish stocks that evolved within the specific geo-climatic ecoregion.

Maintenance of the riparian habitat necessary to foster unique genetic fish stocks will be accomplished by prescribing treatment that will maintain bank stability, ground cover and restrict erosion. In all the action alternatives no mechanical treatment will occur in the first 100 feet of all fish bearing streams.

Short term increase in sediment yields during storm events within the analysis area could reduce available gravels for spawning and, to a minor degree, may alter the composition of aquatic invertebrates in Little Grizzly, Blakeless, and Long Valley Creeks but it is expected that any change would be minimal and not measurable. It is expected that water temperatures in the intermittent and perennial streams early in the summer would not be affected by project activities, since vegetative shading would not be reduced to detrimental levels within the RHCA's.

It is expected that the alternatives would not have a substantial impact on the fish populations in Little Grizzly, Blakeless, and Long Valley Creeks. The best opportunity to improve channel conditions and fishery habitat along these streams is through the decommissioning and relocation of roads adjacent to stream channels, stream channel restoration and improved grazing strategies along streams.

Appendix H Grizz Project Maps

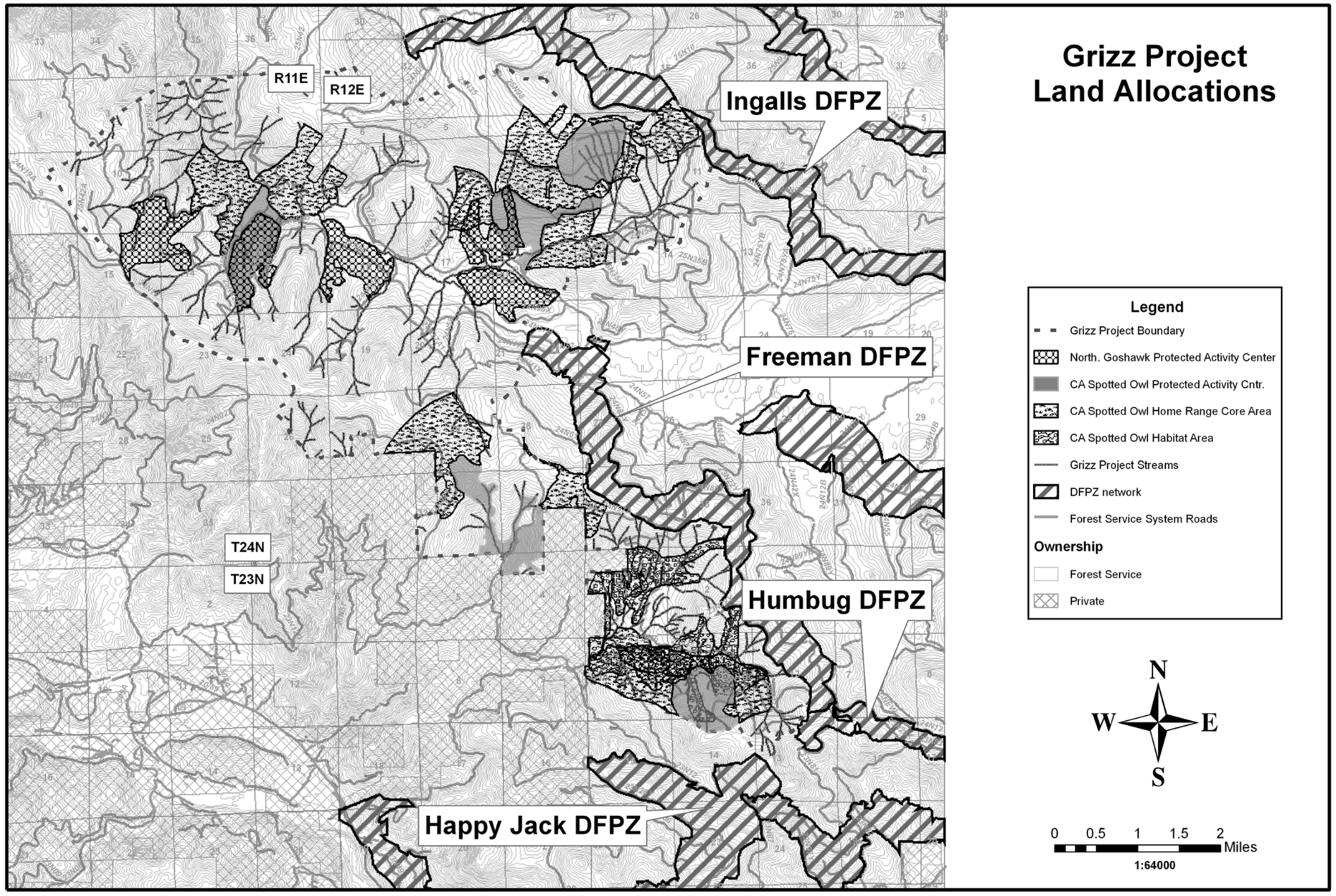

Figure H.1 Grizz Project land allocations

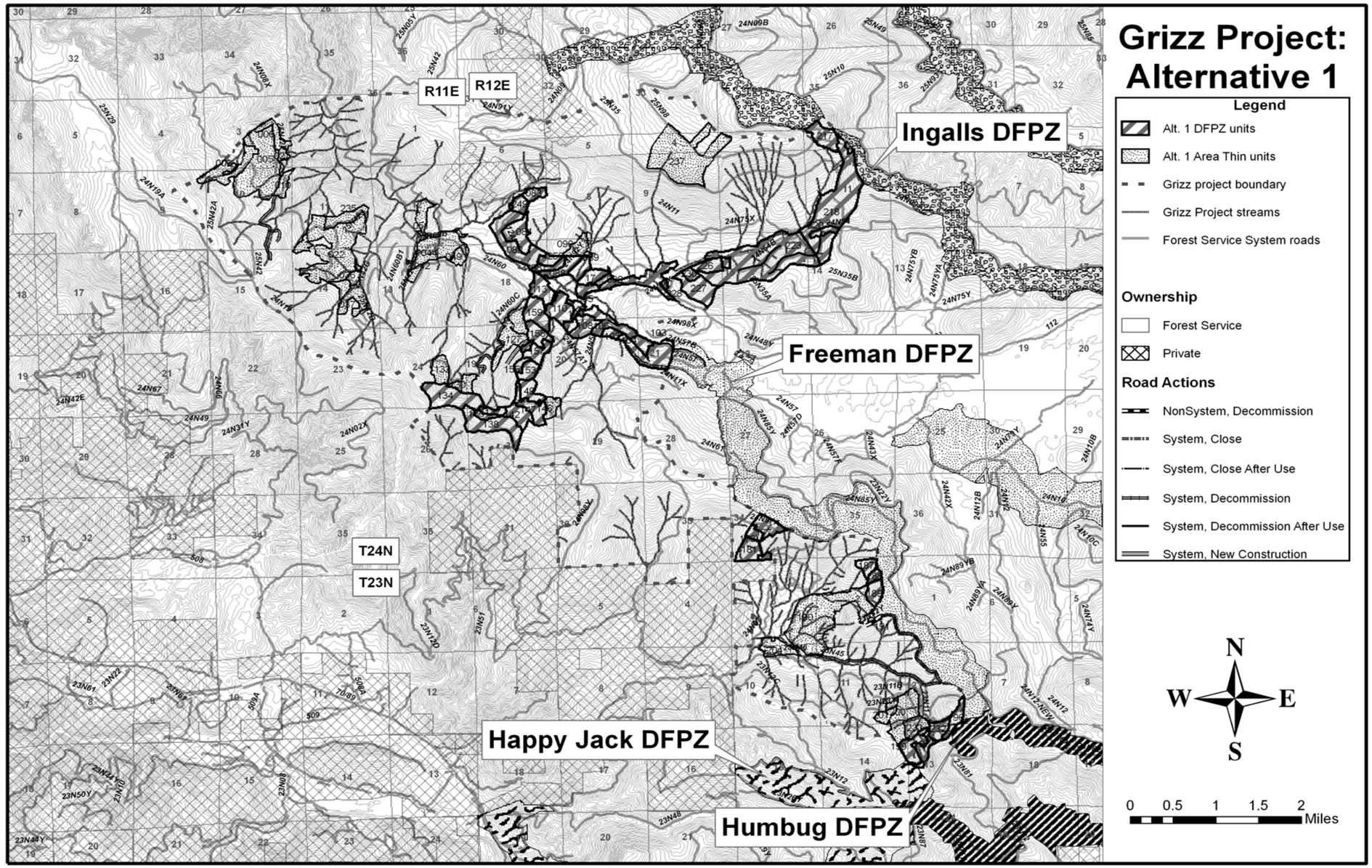

Figure H.2 Grizz Project Alternative 1 (Proposed Action)

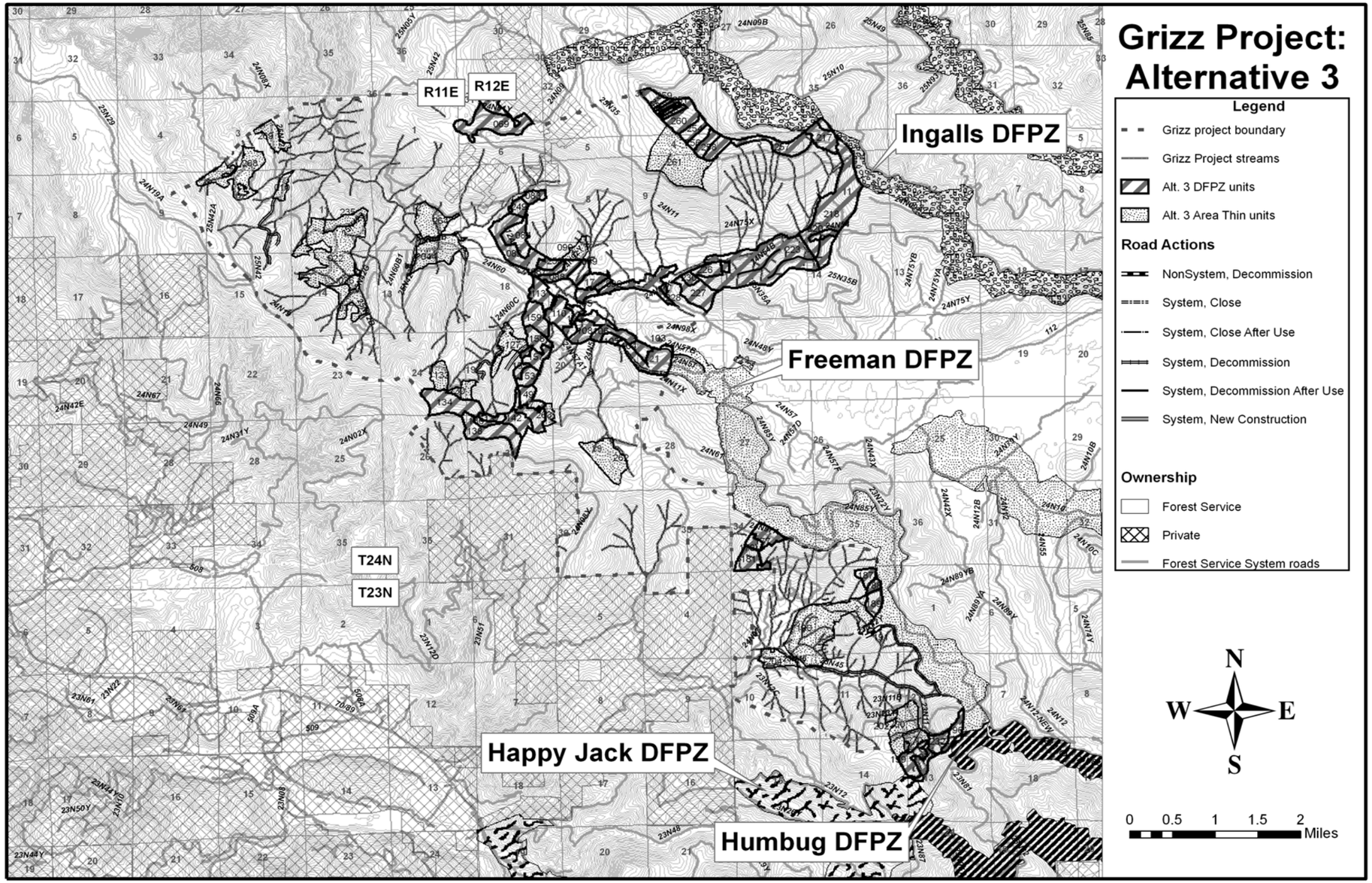

Figure H.3 Grizz Project Alternative 3.

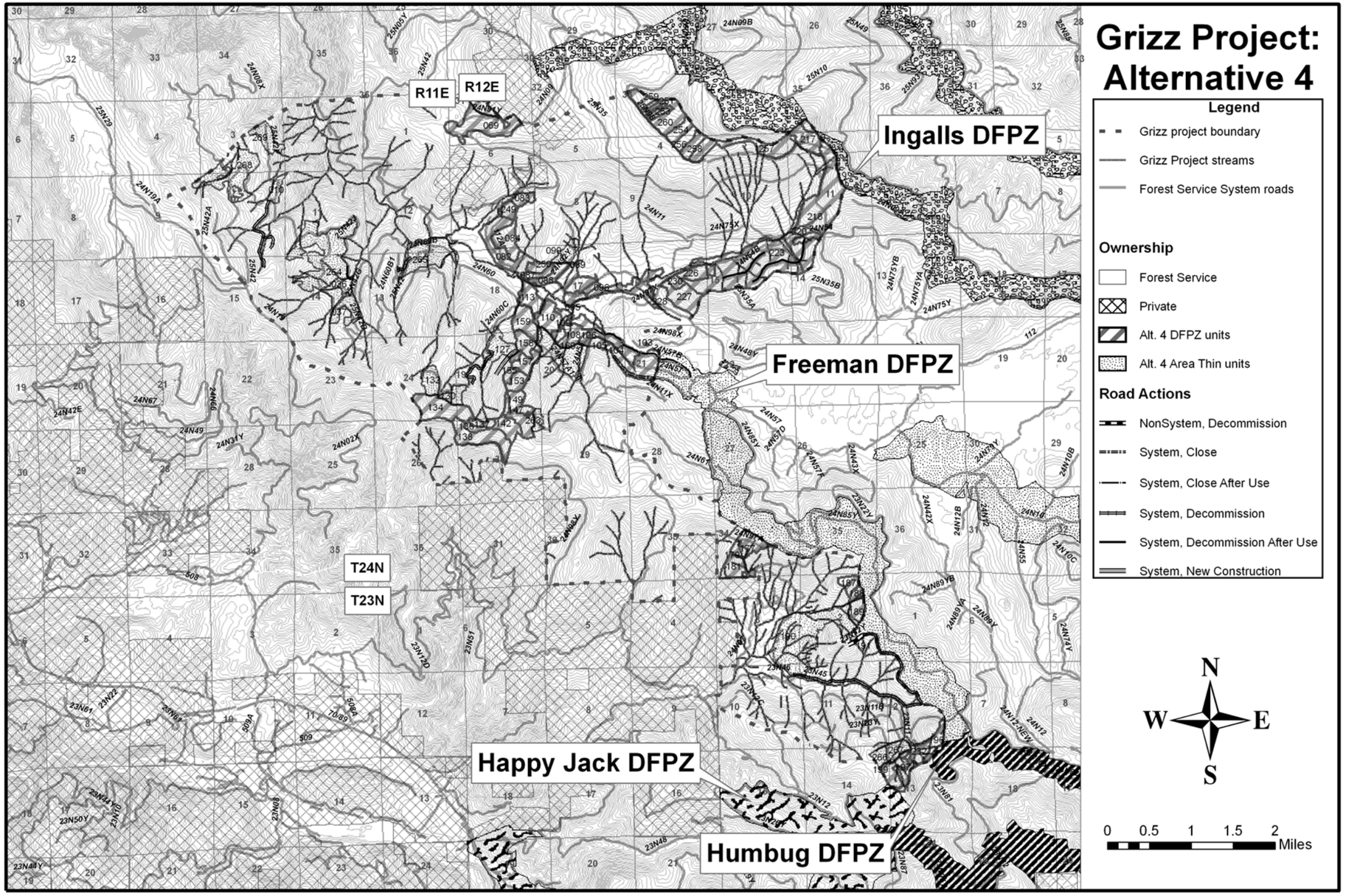

Figure H.4 Grizz Project Alternative 4.