Chapter 3 Affected Environment and Environmental Consequences

3.1 Introduction

This chapter summarizes the physical, biological, social and economic environments of the Freeman Project area and the effects on that 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, assessments and input prepared by Forest Service specialists, which are incorporated by reference in this draft environmental impact statement (EIS). The following reports and memoranda are incorporated by reference: Botanical Biological Evaluation, Botany Report and Noxious Weed Risk Assessment; Biological Assessment / Biological Evaluation (BE/BA) for Fish and Wildlife; Watershed and Soil Report; Silviculture Report; Fire and Fuels Report; Recreation, Visuals and the Heritage Resources Report. These reports or memoranda are part of the project record on file at the Beckwourth Ranger District in Blairsden, California. Printed copies of the DEIS are available upon request by contacting Sabrina Stadler, Project Leader, at (530) 836-2575.

3.2 Fire, Fuels and Air Quality Effects

3.2.1 Introduction

The following assessment is summarized from the fire, fuels and air quality report for the Freeman Project, which is incorporated here by reference (USFS PNF BRD 2006d). This section addresses direct, indirect and cumulative effects to forest fuels, fire suppression efficiency and safety, and air quality.

Fuels consist of live and dead wildland vegetation. Wildland fuels are described by size and shape, loading, and horizontal continuity and vertical arrangement. Light fuels consist of shrubs, grasses, and pine needles. These fuels ignite easily and burn rapidly. Wildfires in light fuels react quickly to changes in relative humidity and wind. Heavy fuels larger (greater than 1 inch in diameter) are limbs, logs and stumps that 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, limbs, and low shrubs lying 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 changing vertical fuel arrangement 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. Thinning aerial fuels removes the fuel “ladder” that can enable a surface fire to move into the canopy. In general, treating surface and aerial fuels enhances firefighting efficiency and firefighter and public safety by creating an environment where wildfires would be more likely to be caught at the initial attack stage.

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.

3.2.2 Summary of the Effects to Fire, Fuels and Air Quality

3.2.2.1 Alternative 1 (Proposed Action)

- Surface, ladder, and crown fuels are reduced. Flame length is reduced to less than 4 feet, and rate of spread and fireline intensity are also reduced. Crown base height is raised and torching and crowning indices increased under 90th percentile weather conditions. The potential for crown fire is reduced. Mortality is reduced to less than 10 % of the residual stand.

- Fire fighter and public safety are enhanced. Fireline production rates are increased and fires are less likely to escape initial attack. Effectiveness of other projects and treatments on private land is enhanced.

3.2.2.2 Alternative 2 (No-action)

- No reduction in surface, ladder, and crown fuels occurs. Flame length exceeds 8 feet, and rate of spread and fireline intensity remain high under 90th percentile weather conditions. Successful direct attack on wildfires is less likely, torching and crowning indices decrease over time as ladder fuels accumulate and canopy base height remains low, resulting in a greater potential for crown fires when compared to the Action Alternatives. Mortality exceeds 50% in most stands.
- Fireline production rates will degrade over time as surface and ladder fuels accumulate. There is no improvement in firefighter or public safety. There is no connectivity with other projects or treatments on private lands.

3.2.2.3 Alternative 3

- The effects are similar to the Proposed Action. 86 fewer acres of fuels treatment would occur. RHCA boundaries would expand to the extent of riparian vegetation. The change in fire behavior from the Proposed Action is slight as the effects are dispersed over the project area.

3.2.2.4 Alternative 4 (Preferred Alternative)

- The effects of this alternative are similar to the Proposed Action. Approximately 500 acres change treatment type from grapple pile and mastication to mechanical thinning. Less surface fuel is left (in mastication units) and ladder and crown fuels are treated more extensively. A greater portion of the Freeman Project would meet desired conditions for post-treatment fire behavior.

3.2.3 Scope of the Analysis

Geographic Analysis Area: The boundary of the Freeman Project area forms the analysis area for pre- and post-treatment fire behavior and fire regime condition class. Cumulative effects were analyzed within the Freeman Project boundary, with the inclusion of DFPZs that connect to the Project. The Freeman Project boundary was used for analysis due to the project area's relative isolation from outside fire activity. Grizzly Ridge on the west and Lake Davis to the east act as 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

Freeman 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. A summary of these events is included below to provide some context for the existing condition

3.2.4 Analysis Methodology

Post-treatment fire behavior as modeled reflects conditions immediately after all treatments are completed, including underburning. Fire behavior outputs used as indicator measures are defined below:

1. 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.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.
7. Surface Fire: A fire spreading in surface fuels.
8. 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.
9. 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).

Both the Sierra Nevada Forest Plan Amendment (2004) and the Herger-Feinstein Quincy Library Group (HFQLG) use the reduction of flame lengths as a measure of the 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.

Table 3.1 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.

Surface fuels also influence fireline production rates. Fuel Models 8 and 9 are used to represent treated (thinned and underburned) surface fuels, and Fuel Model 10 represents pre-treatment conditions. More detailed descriptions of fuel models in the project area are found under "Surface Fuels".

Table 3.2 Line production rates by fuel model (NWCG Fireline Handbook 2005).

Fuel Model	Engine Crew 5 person (chains/hr)*	Type 1 hand crew (chains/hr)	Type 2 hand crew (chains/hr)	Type 2 dozer, 20% slope (chains/hr)
8-Closed timber litter	24	40	24	70-105
9-Hardwood and conifer litter	22	28	16	50-85
10-Timber litter and understory	20	6	4	10-20

*Production rate for engine crew is for initial action only.

Pre- and post-treatment fire behavior was modeled using Fuels Management Analyst Plus (FMA), Version 3 (Carlton 2005). Forest Inventory Analysis (FIA) tree list data collected for the Freeman Project was input into FMA and surface and crown fire behavior was modeled using Crown Mass. The outputs model a wildfire under 90th percentile weather conditions in treated and untreated units. Units in Defensive Fuel Profile Zones (DFPZs) were modeled in the following stand types: eastside pine, Sierra mixed conifer, and white/red fir. Area Thin units were also modeled for comparison. The DFPZ units were modeled post-treatment as thinned to 40% canopy closure with an underburn. Area Thin units were modeled post-treatment thinned to 50% canopy closure with an underburn. Fuel Model 10 was used to model pre-treatment surface fuels, and FM 8 and 9 were used to model treated, underburned fuel beds. All FMA runs were made using a slope of 20% to approximate topographic conditions in the project area.

Fire behavior modeling outputs are site specific to the Freeman Project area, as local stand data was used. These outputs are only intended for use in the Freeman 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 coverage.

90th percentile weather conditions were used for modeling to be consistent with methodology used in the Sierra Nevada Forest Plan Amendment Record of Decision (2004) and by the Herger-Feinstein Quincy Library Group Forest Recovery Act FEIS. Data used in calculating 90th percentile conditions was taken from Smith Peak Lookout, a seasonal weather station within the Freeman Project area. The data was analyzed using Fire Family Plus (Main et al. Systems for Environmental Management 2003). A wind reduction factor of .3 was applied to untreated stands, while treated stands received a wind reduction factor of .4. These wind reduction factors were applied to 20-foot wind speeds to show sheltered and partially sheltered fuel conditions (Rothermel 1983).

Table 3.3 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

3.2.5 Affected Environment

The Freeman Project lies between Grizzly Ridge on the west and Lake Davis to the east. Big Grizzly Creek enters the project area from the north, and drains into Lake Davis. A portion of Humbug Creek drains the southern end of the project. Freeman, Cow, and Dan Blough Creeks drain into Lake Davis from Grizzly Ridge. Elevation ranges from 6900 feet at the top of Grizzly ridge to 5800 feet in Grizzly Valley. The Freeman Project connects to three fuels treatments: Humbug and Happy Jack (proposed) to the west, and Grizz (proposed) to the northwest.

Red and white fir forest is found on the upper elevation north slopes of Grizzly Ridge. Lower on the slope, Sierra mixed conifer and eastside pine is found. Numerous meadows and aspen groves are intermingled throughout the project area. Stringers of lodge pole pine dissected by meadows are found along and east of Forest Road 24N10.

3.2.5.1 Fire History

Historic

Historic 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. A study plot in the Portola area 5 miles south of the project area found a median fire return interval of 7 years (Moody and Stephens 2002). 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).

Recent History

Beginning in the 1800s, the historic mixed conifer forest changed substantially. Logging of the larger ponderosa, Jeffery, and sugar pine allowed white fir to increase. Stocking levels increased, leaving residual stands susceptible to insect attack. These factors, in conjunction with the advent of organized wildland fire suppression in the 1920s have increased dead and down fuel loading, with resultant increase in potential fire size and intensity (Gruell 2001). Timber harvest removed many of the larger fire resistant trees.

Analysis of Plumas National Forest GIS data for the period 1970-2005 indicates that no fire larger than 10 acres has originated from the project area. 2 large fires (>100 acres) have burned into the project area from outside. In 1921, a 1555-acre fire burned through the southern portion of the project area. A second fire in 1929 (3299 acres) came over Grizzly Ridge from the west and burned a small portion of the western edge of the project. During the period 1970-1996, 43 fires (20 human caused) burned 7 acres, with the largest fire being 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. Grazing has been a constant presence in the project area since the 1890s and contributed to reducing grass fuels (Elliott 2005). However, the project area is within 5 miles of the city of Portola, and public use of the area for recreation and wood gathering appears to be on an upward trend, increasing the statistical chance of human caused fires (Plumas County Communities Wildfire Mitigation Plan 2005). The lack of large fire history in the Freeman Project area raises a concern that surface and ladder fuel accumulation is becoming a problem.

3.2.5.2 Surface Fuels

Surface fuels and surface fire intensity are the primary drivers of fire behavior, followed by ladder fuels and crown fuels (Reinhardt and Scott 2001; Alexander 1987). Surface fuels are described and categorized by Fuel Models (FM). Fuel models in the Freeman Project area were derived from Plumas NF GIS coverages and are described below (Anderson 1982, Rothermel 1983).

Fuel Model 1—This model represents dry grasslands and savannas with little shrub or timber present. 270 acres, or 2% of the fuels in the project area represent this fuel model. Fire behavior in FM 1 is fast moving with up to 4-foot flame lengths. In the Freeman Project area, this fuel model occurs in meadows with some live fuel content and does not exhibit spread rates as great as the typical FM 1.

Fuel Model 2—Open shrub and timber this model represents stands with a grass understory. FM 2 makes up 13% (2018 acres) of the Freeman Project area, and is mostly found in the flatter portions in the north and east as large meadows with stringers of pine. 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 fuelbed.

Fuel Model 5—This is a brush fuel model, 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. This model represents roughly 10% (1526 acres) of the project area.

Fuel Model 8—Short needle conifer stands consisting of red and white fir and lodge pole pine represents this fuel model. Surface fuels consist of compact litter with little undergrowth and dead woody fuel. This fuel model is used to represent post treatment fuel conditions, as fire behavior in FM 8 is usually slower burning and of lower intensity. Flame lengths typically do not exceed 1 foot, and initial attack in FM 8 is normally successful unless high winds are present. FM 8 comprises 19% (2767 acres) of the project area.

Fuel Model 9—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. Only 1% (147 acres) of FM 9 is found in the project area.

Fuel Model 10—Fire behavior in this fuel model demonstrates the highest intensity of the timber 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. FM 10 comprises 47% (7051 acres), the largest proportion of the Freeman Project area.

The remaining 10% of the project area is classified as FM 98 and 99. These models represent water, rock, or barren land with no flammable vegetation. Some wet meadows and sagebrush flats near Lake Davis are shown as FM 99, hence the relatively high percentage of these models.

3.2.5.3 Fire Regime Condition Class

Condition Class is used to describe the extent to which a landscape has deviated from historic fire return intervals (RMRS GTR-87-2002):

- 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: The 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: The 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.

Plumas NF Geographic Information System data (derived from Fire and Resource Assessment Program, Fire Regime and Condition Class, coverage cafrcc 03_02, 2003) for the project area shows that 60% of the landscape is in Condition Class 3, 26% in Condition Class 2, and only 13% in Condition Class 1. A significant portion of the Freeman project area is at risk of loss from a stand replacement fire.

3.2.5.4 Wildland/Urban Interface

1892 acres of the Freeman Project are classified as Wildland/Urban Interface (WUI). The project uses the descriptions and coverages of WUI as defined in the Plumas County Fire Plan (2005). WUI is broken into 3 classifications: Urban Core, Adjacent WUI (within ½ mile of a community), and Extended WUI (within 1 mile of a community). The southern portion of the Freeman Project is adjacent to Lake Davis Highlands, a resort community north of Portola. Lake Davis Highlands is in direct alignment with prevailing southwesterly winds, and is upslope from ignition sources such as Highway 70. This alignment puts Lake Davis Highlands at particular risk to wildfires. 678 acres of the project is Adjacent WUI, while 1214 acres are classified as Extended WUI. There is a small (.1 acre) piece of Urban Core in the project area (PNF coverage freeman_gs/proj_pcowui).

3.2.5.5 Air Quality

The First Order Fire Effects Model (Reinhardt et al.2000) was used to predict smoke emissions from pile burning, underburning and wildfire. 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.

Table 3.4 Emissions per acre by fire type.

Fire type	**PM 10** (Lbs per acre)	**PM 2.5 (Lbs per acre)**	**CO (Lbs per acre)**	**CO2 (Lbs per acre)**
Wildfire	1879	1592	20988	99871
Underburn	374	317	4170	20445
Pile burn	1705	1444	18652	112973

Emissions from the pile burn were similar to the wildfire, reflecting consumption of heavy fuels in both fire types. However, 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. Conversely, 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 Freeman Project area. Wildfire events can last for several weeks (1999 Mt. Hough Complex, 2000 Storrie Fire).

Portola and Lake Davis Highlands are within five miles of the Freeman Project area, and could be affected by smoke from prescribed fire. A north wind event could move smoke into Sierra Valley to the southeast; however burn projects would be conducted with a south or southwest wind that would move smoke away from developed areas. Smoke from prescribed fire activities would remain confined to the Lake Davis watershed under most atmospheric conditions, and would disperse in the afternoon as the morning inversion lifts. All burning is done 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 escape.

3.2.6 Environmental Consequences

3.2.6.1 Alternative 1 (Proposed Action)

Direct and Indirect Effects

Fire behavior modeling outputs are shown below in Table 3.5, and are applicable for all the action alternatives. The combination of mechanical treatments and underburning reduce surface, ladder, and canopy fuels. Flame length, rate of spread, and fireline intensity all decrease significantly from the No-action Alternative (Table 3.6). Torching and crowning indices increase, as does canopy base height, reducing the crown fire hazard. Mortality in the residual stand is decreased by 53-68% 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, so there could be a period of up to 4 years where residual fuel from thinning activities would slightly increase flame length. Whole-tree yarding would be used wherever possible to keep slash to a minimum. The initial reduction in surface and ladder fuels would improve the existing condition.

DFPZ and WUI units would be evaluated after treatment; those units not meeting desired surface fuel conditions would be underburned, grapple piled and burned, or masticated. In some units, desired conditions might be met without the need for follow up underburning. Area thinning and group selection units would be also be evaluated and further treated as needed to meet desired conditions. Aspen units would be at less risk to stand replacing fires by removal of the more flammable conifers currently encroaching on aspen stands. One unit (120) would be treated by underburning only.

Treatments in DFPZ and WUI units would enhance firefighter production rates by reducing flame lengths and rates of spread to levels where initial attack success is likely (less than 4 foot flame length). Improved access to escape routes and safety zones would benefit firefighter safety. Treatments would provide anchor points for initial attack on wildfires and for initiating prescribed fires. Lake Davis Highlands would receive additional protection from wildfire ignitions originating from the southwest. Area thinning units would perform similarly to DFPZ and WUI units once all treatments were completed. RHCA would be mechanically thinned where equipment booms can reach in; otherwise RHCAs would be hand thinned up to 8-inch dbh. Hand thin units would be piled and burned, with piling and burning taking place away from riparian vegetation.

Emissions for prescribed fire and pile burning are shown in Table 3.4. The exact number of acres and amount of emissions is in question, as not all fuels treatments may require underburning to meet desired conditions. Mitigation of smoke impacts to Portola and Lake Davis Highlands would consist of burning under favorable atmospheric conditions, limiting acres burned daily, allowing piles to dry before ignition, and ceasing ignition if smoke dispersion conditions degrade. Monitoring of smoke transport is required by NSAQMD in the smoke management plan. Daily coordination with NSAQMD and review of a daily spot weather forecast from the Redding Fire Weather office is required prior to igniting any prescribed fire.

Table 3.5 Fire behavior outputs for action alternatives (1, 3, 4).

Unit	Treatment Type	Flame length (ft)	Rate of spread (ch/hr)	Fireline intensity (BTU/ft/sec)	Torching index (mph)	Crowning index (mph)	Canopy base height (ft)	Fire type	Mortality (%)
3	DFPZ Mech. Thin	1.2	2.3	69	39.38	40.54	14	surface	2
4	Area Thin	3.1	9.6	69	49.24	42.68	18	surface	2
8	DFPZ Mech. Thin	1.2	2.3	69	39.38	40.54	14	surface	2
24	DFPZ Mech. Thin	1.2	2.3	8	34.60	41.61	23	surface	5
30	Area Thin	3.1	9.6	69	79.40	35.39	31	surface	9
33	DFPZ Mech. Thin	3.1	9.6	69	49.24	30.99	18	surface	5
53	DFPZ Mech. Thin	3.1	9.6	69	49.24	30.99	18	surface	5
76	DFPZ/WUI Mech. Thin	3.1	9.6	69	49.24	30.99	18	surface	5
82	DFPZ/WUI Mech. Thin	1.2	2.3	8	34.60	41.61	23	surface	5
86	Area Thin	3.1	9.6	69	34.30	49.43	12	surface	1
132	DFPZ Mech. Thin	3.1	9.6	69	49.24	30.99	18	surface	5

Cumulative Effects

The Proposed Action would decrease flame lengths, fireline intensity and rate of spread. Crown base height, torching and crowning indices would all be increased, all of these factors combined would reduce crown fire hazard and 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 based on a review of similar projects completed since the mid 1990's. Treated DFPZ and WUI units would be monitored, and maintenance would begin as surface fuels accumulate to 5-7 tons per acre and regeneration of understory vegetation occurs. Prescribed fire and mechanical treatment would be used to maintain DFPZs. Group selection units would also be monitored and grapple piled, masticated, or underburned as needed for regeneration.

The Proposed Action would provide connectivity to adjacent projects such as the Humbug and Happy Jack DFPZs to the west and the proposed Grizz DFPZ to the northwest. Connectivity to fuels work on private land proposed near Lake Davis Highlands would also occur. 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:

- Past timber sales from 1980 to the present has 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.
- Insect infestations during drought conditions in the late 1980s have prompted several salvage sales from 1990 to the present. Some mortality is still occurring and is continually adding to the fuel loading within the project area. Much of the insect mortality is likely due to stress from overstocking, and the Proposed Action would reduce number of stems per acre within treatment units.
- Public fuel wood permits were issued in the 1980s and 1990s to help reduce lodgepole pine stocking levels and remove dead trees. 400 acres near Camp 5 were opened, with a limited effect to fuels, as much dead and down lodgepole remains. Some of this material would be removed where treatments occur.
- Grazing would continue and slightly reduce fine fuels in allotments.
- Human caused ignitions from recreation users, woodcutters, and OHVs would continue to increase. 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 and 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 Freeman Project. Continuity within the HFQLG DFPZ network would be maintained and treatment effectiveness enhanced by the Proposed

Action. Coordination would be necessary to reduce cumulative impacts from smoke from pile and underburns in these projects and the Proposed Action. Connectivity to projects on private lands would be created.

- The proposed pike eradication project at Lake Davis would have unknown effects, as a Proposed Action has not been issued as of this writing. A combination of poisoning and lowering of the lake is the most likely action. Blowing dust from exposed lakebed could impact air quality. Smoke from prescribed fire in the Freeman Project could add to impaired air on windy days. Visitor use in the Lake Davis area could decline in the event the lake was drained.

The implementation of this alternative 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.

3.2.6.2 Alternative 2 (No-action)

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. 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. Torch and crowning indices, as well as canopy base height would remain low, with a higher likelihood of passive and active crown fires (Table 3.6). Mortality in untreated stands would exceed 60 percent in most cases. Lake Davis Highlands would continue to be at risk from wildfire ignitions to the southwest.

Table 3.6 Fire behavior outputs for the No-action Alternative (2).

Unit	Flame length (ft)	Rate of spread (ch/hr)	Fireline intensity (BTU/ft/sec)	Torching index (mph)	Crowning index (mph)	Canopy base height (ft)	Fire type	Mortality (%)
3	8.5	14.7	212	0	40.50	1	passive	68
4	11.3	17.8	212	0	42.68	1	passive	59
8	8.5	14.7	212	0	30.41	1	passive	68
24	12.1	24.3	114	0	20.07	1	passive	73
30	9.7	15.9	212	5.31	26.44	5	passive	74
33	10.4	17.5	212	0	27.63	3	passive	65
53	10.4	17.5	212	0	27.63	3	passive	65
76	10.4	17.5	212	0	27.63	3	passive	65
82	12.1	24.3	212	0	20.47	1	passive	73
86	11.0	18.4	212	0	28.49	1	passive	58
132	10.4	17.5	212	0	27.63	3	passive	65

There would be no emissions from prescribed burning associated with the Freeman Project. Wildfires would have the potential to impact air quality and public health in Portola and Lake Davis Highlands, dependent on wind direction, fire size, and fire duration. Fire managers would have few options available to mitigate smoke impacts from a wildfire event. There would be no improvement in either firefighter and public safety or fire manager's 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. Surface fuels would continue to accumulate from insect, disease and overstocking, and 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 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:

- Past timber sales from 1980 to the present has contributed to increased numbers of white fir as desirable pine species were cut. White fir stocking levels and residual slash from past harvests would be not be reduced.
- Insect infestations during drought conditions in the late 1980s have prompted several salvage sales from 1990 to the present. Much of the insect mortality is likely due to stress from overstocking, and this condition would worsen over time.
- Public fuel wood permits were issued in the 1980s and 1990s to help reduce lodgepole pine stocking levels and remove dead trees. 400 acres near Camp 5 were opened, with a limited effect to fuels, as much dead and down lodgepole remains.
- Grazing would continue and slightly reduce fine fuels in allotments.
- Human caused ignitions from recreation users, woodcutters, and OHVs would continue to increase. Initial attack success would degrade as surface and ladder fuels increase over time. Firefighter and public safety would be compromised.
- Roadside snags would continue to be removed by woodcutters. Snag-related injuries and spotting from burning snags would be reduced and add to firefighter and public safety.
- The Humbug DFPZ project to the west and the proposed Grizz DFPZ to the northwest connect to the Freeman Project. Connectivity within the HFQLG DFPZ network would be compromised and a gap in treatments would be created. Treatments on private lands would not be as effective.
- The proposed pike eradication project at Lake Davis would have unknown effects, as a Proposed Action has not been issued as of this writing. A combination of poisoning and lowering of the lake is the most likely action. Blowing dust from exposed lakebed could impact air quality. There would be no additional smoke impacts to the area other than from wildfires. Visitor use in the Lake Davis area could decline in the event the lake was drained.

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

3.2.6.3 Alternative 3

Direct and Indirect Effects

The effects of Alternative 3 would be similar to the Proposed Action, except that Alternative 3 would thin and pile material rather than remove conifers surrounding aspen stands as biomass. In the Proposed Action, aspen stands were surrounded by extended treatment zones. In these zones, all conifers < 30"dbh would be removed. Alternative 3 proposes to thin rather than remove conifers surrounding the aspen stands. In the DFPZ, DFPZ/WUI and WUI Zones, where units are adjacent to aspen stands, this extended treatment zone has been absorbed into the adjacent unit, whenever one exists. When there is not an adjacent unit, the surrounding stand will not be treated and was therefore eliminated. There would be 86 less acres that would not be treated under this alternative. Fire behavior in treated units would be the same as seen in the Proposed Action (Table 3.5). Additional (RHCA) acres may be added due to using riparian vegetation as an indicator rather than a defined buffer as in the Proposed Action. The 86 acres not treated under Alternative 3 would experience similar fire behavior as shown under the No-action Alternative and be at greater risk of loss to wildfire. Aspen units would have a slightly greater susceptibility to a crown fire, as some conifer would remain adjacent to the aspen stands and contribute crown and surface fuels to the fuel bed. However, these differences are not significant or measurable as the change in treatment is small and is dispersed throughout the project area. Little change in fire suppression effectiveness and firefighter and public safety would be noticed from the Proposed Action.

Cumulative Effects

Cumulative effects are similar to those in the Proposed Action.

3.2.6.4 Alternative 4 (Preferred Alternative)

Direct and Indirect Effects

This alternative treats aspen in the same fashion as Alternative 3. The most significant difference is that 500 more acres would be treated in DFPZ and WUI by mechanical thinning as opposed to grapple piling or mastication. Mechanical thinning is more efficient and removes more fuels from the site than grapple piling or mastication (Graham et al. 2004). Fire behavior in these units would be similar to mechanical thinning units shown in Table 3.5. These units would meet desired conditions for flame length and rate of spread without the intermediate step of burning grapple piles or having mastication debris left in the fuel bed. Canopy base height would be higher, torching and crowning indices would increase, and the risk of passive and active crown fire would be reduced compared to the No-action Alternative. Fire fighter and public safety would thus be further improved with the addition of more mechanical thinning. The direct effects seen in the Proposed Action would be spread over 500 additional acres in this alternative.

With more fuel removed from the fuelbed, emissions would be less during underburning. Pile burning emissions would also be reduced as fewer acres would be grapple piled and burned.

Cumulative Effects

Cumulative effects would be similar to the Proposed Action. The implementation of this alternative in conjunction with the past, present, and foreseeable future projects as mentioned under the Proposed Action section would reduce surface, ladder, and crown fuels, improve firefighter and public safety, and enhance fireline production rates to the greatest extent of the three action alternatives.

3.3 Forest Resource Effects

3.3.1 Introduction

The following assessment is summarized from the forest vegetation report for the Freeman Project, which is incorporated by reference (USFS PNF BRD 2006g). This assessment addresses how the different alternatives impact forest vegetation, as 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.

Although much of our current direction gives us desired conditions in terms of canopy cover (CC), 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. Canopy cover can be measured in several different ways but the measurements made by one instrument, calculated by regression analysis, or made by ocular estimate have no comparison to measurements made in a different manner. Because of this, there is no agreed upon standard for density based on canopy cover. CC is related to density and therefore, basal area, but is very dependent on stand history- was the stand open grown or dense early in stand development; has there been partial harvesting, etc.? A local correlation between basal area and CC for this project is derived using the modeling output for the purpose of developing marking guidelines.

Stocking is typically compared against normal basal area (Dunning and Reineke 1933). 'Normal' in this context is maximum site occupancy 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 are growing with little competition from surrounding trees. Net cubic foot volume growth of wood is strongly related to stand density up to this level of basal area. 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 are not related until a point of very high density (usually around 90% of normal) where stands begin to stagnate. Over the middle range (55-90), the amount of biomass being grown is basically constant. At the low end of this range this biomass is being spread over fewer stems, i.e. fewer fatter trees. At the high end of the range, that same amount of biomass is spread to more skinny trees. Trees are completing with one another for growing space throughout this range and some lose out and die from lack of sunlight as they are shaded.

For maximum yield of wood, 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.

In the DFPZ/WUI 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.

3.3.2 Summary of the Effects

3.3.2.1 Alternative 1 (Proposed Action)

This alternative treats 3,968 acres by mechanical removal (aspen PAC thinning, helicopter ITS, mechanical thin, mechanical thin in aspen). Of these, 1,780 acres are in DFPZ or DFPZ/WUI and will be treated to the 40% CC prescription (including the eagle selection prescription which is designed to develop eagle habitat).

Of the 54 acres being hand thinned in this alternative, 44 acres will not meet the desired condition of 40 or 50% CC (DFPZ or area thin). In other words, hand thinning is often not an effective treatment to reduce canopy cover. Similarly, of the 787 acres of grapple pile/mastication/thin to 11” dbh treatment, 569 acres will not meet the desired condition, due to the diameter limit. These treatments are proposed due to slope, watershed effects, lack of access, or other concerns.

Alternative 1 has variable width extended treatment zones around the aspen stands in which all conifers <30” dbh would be removed. These zones cover approximately 400 acres (as mapped using an average 75’ width) of conifer forest that would be cut to allow sunlight into the aspen stand. These 400 acres would be changed to the early seral (0-2) CWHR class from size class 4 (Table 3.15), along with the 175 acres in groups.

Based on calculations from FVS harvest stand tables, approximately 176 pounds of borax would be applied to approximately 1,254 acres.

3.3.2.2 Alternative 2 (No-action)

Under the No-action Alternative, according to FVS, the desired condition of 40% CC or below would only occur in the SMC4P/S and WFR4/5P types. In twenty years none of the types will have canopy cover at or below 40%. Approximately 1,800 acres proposed for treatment under the action alternatives would have stocking levels over 70% of normal and would be at risk of loss to bark beetles if not treated. Tree competition would lead to mortality, generally of trees too small to be of much use as snags, and increases in fuel loading would result. No diseased trees would be removed through thinning or group selection.

3.3.2.3 Alternative 3

This alternative treats 3,718 acres by mechanical removal. Of the 52 acres being hand thinned in this alternative, 42 acres will not meet the desired condition of 40 or 50% CC (DFPZ or area thin). Of the 939 acres of grapple pile/mastication/thin to 11” dbh treatment, 768 acres will not meet the desired condition, due to the diameter limit. There are no extended treatment zones on the aspen stands.

Based on calculations from FVS harvest stand tables, approximately 187 pounds of borax would be applied to approximately 1,333 acres.

3.3.2.4 Alternative 4 (Preferred Alternative)

In this alternative, 4,508 acres will be treated mechanically. Of the 43 acres being hand thinned in this alternative, 34 acres will not meet the desired condition of 40 or 50% CC (DFPZ or area thin) Of the 279 acres of grapple pile/mastication/thin to 11" dbh treatment, 173 acres will not meet the desired condition, due to the diameter limit. This alternative achieves the desired condition on significantly more acres than the others. This alternative also has no aspen extended treatment zones.

Based on calculations from FVS harvest stand tables, approximately 220 pounds of borax would be applied to approximately 1,837 acres.

3.3.3 Scope of the Analysis

Geographic Analysis Area: The geographic areas assessed for this analysis are the stand (for attributes such as density and health) and the project area (for seral stage distribution).

Timeframe of Analysis: Modeling was taken out 20 years, which is a reasonable time interval before the stand would be entered again for treatment.

3.3.4 Analysis Method

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

Stand exam plots were taken in 52 units and aggregated into 10 CWHR types (some 'types' used in the analysis combine similar CWHR types in order to have enough plots to make the data statistically significant), focusing on larger size classes than will be treated mechanically (Table 3.7). No data was collected in the RFR5D type, 221 acres of which are planned for treatment in Alternative 1. The type that was sampled that is most similar is the WFR5M/SMC5M and the results of modeling should be similar.

This data was modeled using the Forest Vegetation Simulator-FVS (Dixon 2003) to predict the outcome of different treatments. Five prescriptions were modeled: no action, thinning to 40% canopy cover in a DFPZ, thinning to a 50% canopy cover outside the DFPZ (area thinning), hand thinning to an eight inch upper diameter (generally RHCAs and steeper areas), and 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 unit boundaries are most often based on topographic features, land allocation and roads. Each action alternative has a different mix of treatment types. Information is summarized by type, with the various treatments by type displayed for each alternative in a separate table.

Table 3.7 Stand exam units in the Freeman Project area

CWHR Strata	Units data was collected from
SMC4P/S	3,8,75
WFR4/5P	3,8,10,48,75,88
SMC/WFR3S/M	13,96,118
WFR/SMC5M	20,113
WFR4D	24,82,99,116
LPN4M/3/4/5D	25,27,60,130,136
EPN4M/D	33,41,53,72,76,119,132,138
WFR/RFR4M	9,73,86,87,93,103,108,111
SMC4M	4,52,63,91,94,97
SMC3/4D	26,29,30,40,83,105,126,131,133,139

3.3.5 Affected Environment

3.3.5.1 Stand History

The project area was extensively harvested during the period of railroad logging with subsequent natural regeneration creating a 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 predominately pine stands near Lake Davis have had little harvest in the past 20 years, due to archeological concerns, bald eagle nesting, and visual sensitivity. These stands would have developed under a frequent low intensity fire regime. The policy of fire suppression for the past 80 years led to an increase in white fir and lodgepole pine, which are more susceptible to fire, as well as an overall increase in stocking.

Upland stands on the moister, northeast facing slope had a less frequent fire return interval, naturally burning in a mosaic fashion that perpetuated the mixed conifer type. Fire suppression in this type also 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, first 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 which 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, leaving many formerly overstocked stands understocked and loaded with dead and down fuel. Mortality has also occurred in dense pine stands, especially in lodgepole pine. Not all dead material was removed in salvage harvests, creating increased fuel loadings and adding to the risk of stand replacing fire.

Relative to early historical forest structure, the existing forest has a greater uniformity of age classes and lesser structural complexity, principally because of fewer large diameter trees. Natural regeneration resulted in large areas dominated by 11-24" dbh (diameter at breast height) trees (Table 3.8.). Many stands have few large trees, snags, or large down logs. Large tree (>24" dbh) density ranges from less than 1 to 12 per acre, averaging less than 2 large trees per acre, compared to 5-30 large trees per acre in the pre-European period.

Table 3.8 Existing CWHR size class

CWHR Size Class (dbh)	Existing (%)	Existing (Acres)
0-2 (0-6")	10	1,220
3 (6-11")	19	2,192
4 (11-24")	62	7,354
>5 (>24")	9	1,082
Total	100	11,848*

*total acres of forested land within project area

The aspen type has been most altered from the historic range, due to changes in the hydrologic regime from the creation of Lake Davis, road building, timber harvest, livestock grazing, and fire suppression. Only remnant fragments of aspen stands currently exist.

3.3.5.2 Insects and Disease

Many stands in the project area have been affected by insects and diseases. Diseases include annosus root disease, white pine blister rust, and dwarf mistletoe. With the exception of white pine blister rust, an introduced disease, these pathogens are endemic to forests as part of the natural disturbance regime. Unnaturally high stocking levels and an increase in the amount of white fir have contributed to epidemic pathogen problems.

Disease

Blister rust

Sugar pine is at great risk from an introduced, non-native disease, blister rust (*Cronartium ribicola*). Large trees do not typically succumb to the disease, which physically girdles the tree with a canker, although the tree may be weakened to the point where it is susceptible to other diseases or insects. A small percentage of sugar pines (less than 10%) exhibit "major gene resistance" to the disease, a genetically dominant trait which is readily passed on to the next generation of trees. Mature trees are tested to see if they possess this trait, and if they are found to be resistant, are carefully protected as a future seed source. There are several of these trees within the project area. As fortunate as this resistance is, there are already strains of blister rust that have mutated such that this resistance is overcome. Perhaps more promising in the long run is “slow rusting”, a type of disease resistance that is genetically and physiologically more complex and as such, difficult to artificially breed for, but which is also much less likely to be overcome by mutations in the disease. Until we better understand what the future holds, it is prudent not to harvest any live sugar pine unless the removal of a tree is necessary to meet a specific management objective (such as a hazard tree).These mature trees, even those that are not “major gene resistant” contribute greatly to the genetic pool of the next generation, which inevitably will be reduced by as much as 90% as a result of blister rust.

Dwarf mistletoe

Dwarf mistletoe (*Arceuthobium* spp.), is a parasitic plant that lives off trees, impacts tree health and growth. Dwarf mistletoes are generally host specific, but the same species of mistletoe infects both ponderosa and Jeffery pine. Mistletoe is generally less of a problem in the mixed conifer type than in single species stands because of this host specificity. Although a natural part of the ecosystem, early harvesting which removed the highest quality trees caused this parasitic plant to proliferate. The “witch’s broom”, an overgrowth of branches that occurs in response to infection, is particularly flammable, and rapidly spreads ground fire up into tree crowns. Mistletoe spreads easily to understory trees through the dispersion of sticky seeds. Trees less than 30” dbh and heavily infected with mistletoe will be harvested, unless specifically needed as a habitat component for wildlife. These wildlife trees generally lie along the edges of meadows and in stands managed for bald eagle habitat. The intent is not to totally eliminate mistletoe, but rather to reduce the impact so that enough young trees survive and grow to be large trees.

Annosus root disease

Annosus root disease, (*Heterobasidion annosum*), is spread by airborne spores. There are specific strains of the disease for pine and fir and one does not infect the other. Fir trees can be infected through basal wounds and root grafting but generally are not killed outright by the disease. Pine is typically infected through cut stumps and mortality is rapid. Trees are weakened and die in a circular pattern spreading from the central infected stump. The only remedy is to plant a different tree species. Again, due to the host specificity, this is less of a problem in mixed conifer stands.

A common silvicultural practice to prevent the spread of annosus is to apply a layer of borax to freshly cut stumps soon after harvest. According to the manufacturer, Wilbur-Ellis, the directions state that when applied properly, one pound of Sporax (the copyright name of borax) will adequately cover 50 square feet of stump surfaces. This method is very effective in mitigating the spread of *Heterobasidion annosum* spores (Kliejunas 1989; Schmitt, Parmeter, and Kliejunas 2000; Adams 2004; Kliejunas and Woodruff 2004; Information Ventures 2005).

Alternatives to borax include shifting the species composition of a stand, where possible, to take advantage of the host specificity of annosus. Unfortunately, there is no definite way to eradicate annosus. The fungi can exist in the root system of dead trees as a saprophyte for up to 50 years. Attempts at eradication usually involve ripping up all stumps and stems and then drying them out fully. This method is very expensive and has a major impact to soils. Harvesting timber in weather conditions under which the disease cannot survive (temperatures above 104° F and below 41° F) is also not practical. Another approach to reduce the spread of annosus is to introduce a competing fungus, *Phlebiopsis gigantea*. The premise is that a more benign organism provides a protective effect from *Heterobasidion annosum* by establishing itself on the host before *annosum* can. The effectiveness of this practice has not been established in western US forests due to concerns regarding the introduction of a non-native organism into the ecosystem. In addition, *Phlebiopsis gigantean* is not currently allowed by law to be used as a pesticide. It would be illegal to do so with prior approval from the United States Environmental Protection Agency (EPA).

Forest Insects

Bark beetles, such as *Dendroctonus brevicomus*, *D. valens* and *Ips* sp., primarily infect pines when stressed due to drought or overstocked stand conditions. Although current bark beetle mortality pockets are small, the potential exists for a bark beetle epidemic due to the large number of stands that are overstocked in the project area. Red and white fir are primarily affected by *Scolytus ventralis* (fir engraver beetle). In the early 1990's, low rainfall and overstocked stands combined to create epidemic levels of fir engraver attacks.

Trees stressed from drought or over competition are obvious targets for beetles and can easily be overwhelmed by a massive beetle attack. Stressed trees within stands can also attract beetle attacks, thus serving as vectors for the spread of forest pests. Maintaining a healthy, resilient stand is the best defense against insect attacks. Healthy trees are more capable of fending off beetle attacks through pitching out insects before they lay eggs.

3.3.6 Environmental Consequences

3.3.6.1 Action Alternatives

Direct and Indirect Effects

FVS is a distance independent model (as are the vast majority of forestry models-spatial information about tree location is generally too expensive and impractical to collect) and cannot 'make decisions' on the basis of a tree's location relative to the other trees in the stand. Modeling provides information on the average condition, but cannot account for the spatial heterogeneity characteristic of many of the stands. Trees larger than the diameters (but < 30" dbh), listed in Table 3.9 could be harvested if they occur in intermediate or suppressed crown positions or in poor health. High risk trees, at risk of dying within 20 years (Ferrell 1980), such as those with large cankers, mistletoe in the upper crown, evidence of rot, progressive crown dieback, off-color foliage, and/or active insect activity, will also be harvested if not needed to meet desired snag levels.

The application of borax to the cut surface of pine stumps greater than or equal to 14” diameter will prevent colonization by annosus spores.

Mechanical Thinning to 40% Canopy Cover in the DFPZ

The intention of DFPZ treatments is to create a condition where a crown fire will drop to the ground and fire fighters can perform a direct attack against wildfire (USFS 1999). The desire is to have relatively open stands dominated by large trees, with some smaller trees present in small clumps or individually. The forest floor will be relatively open. The accumulation of litter and duff resulting from decades of fire exclusion will be reduced. Overall, fuel treatments will be accomplished through thinning from below to a 40% CC and prescribed fire. Thinning from below is not only the most desirable prescription to reduce the risk of stand replacing wildfire, but also, in most cases, is the best silvicultural system to grow large trees.

In mechanical harvest units within the DFPZ, stands will be thinned to 40% CC. The standard to leave a minimum ‘% of existing basal area’ (30% for all eastside pine types 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. In other words, the prescription will be to meet the desired canopy cover, which is well within the basal area standard. Table 3.9 displays the diameters associated with these thresholds, as modeled using FVS.

Table 3.9 Maximum diameter to achieve minimum canopy cover and basal area requirements by type within the Freeman DFPZ/GS Project (FVS modeled).

CWHR Strata	Upper diameter limit to achieve 40% Canopy Cover (dbh)	Upper diameter limit to achieve 50% Canopy Cover (dbh)	Upper diameter limit to achieve 30% Basal Area retained (dbh)*	Upper diameter limit to achieve 40% Basal Area retained (dbh)*
SMC4P/S	4	0	N/A	N/A
WFR4/5P	4	0	N/A	N/A
SMC/WFR3S/M	10	8	N/A	N/A
WFR/SMC5M	6	2	N/A	32
WRF4D	16	8	24	N/A
LPN4M/3/4/5D	20	18**	30	N/A
EPN4M/D	18	16	28	N/A
WFR/RFR4M	14	2	30	N/A
SMC4M	12	6	34	N/A
SMC3/4D	16	8	26	N/A

* N/A is shown for types where the basal area retention standard does not apply. ** Although Table 3.9 indicates that this types is already below 50% CC, that value is an artifact of the way stands were averaged in the modeling. In reality, most stands of this type will need to be thinned to achieve 50% CC.

Mechanical thin units also contain RHCAs, the inner portion (equipment exclusion zone) of which (see RHCA treatment section for details) will not be treated mechanically. Across the entire project, this equipment exclusion zone amounts to approximately 5% of the area. This area has a higher desired CC, 60%, and will be hand thinned. There is concern that additional openings in the form of landings and skid trails (put in after the unit is marked to the desired 40% CC) will further reduce habitat suitability for closed canopy dependent species. Generally, existing landings and skid trails are used where they are in suitable locations and these are factored into the initial CC used in the modeling from which the basal area and upper diameter limit (UDL) guidelines used in marking are derived. In some cases, skid trails have to be straightened due to using whole tree yarding and/or landings have to be expanded to accommodate biomass material to be chipped. Sale administrators estimate that an additional 3-5% of the area could be put into new landings and skid trails. The retention of higher CC in equipment exclusion zones should compensate for the estimated 3-5% of the area in new landings and skid trails, but in particular instances where larger landings and an extensive new skid trail system are known to be needed, the marking guidelines will be modified to retain higher CC in the remainder of the unit.

No types are above 70% of normal after the thinning (Table 3.10). All types are below 55% of normal and remain so for at least 20 years. In pine stands, thinning to a 40% CC is consistent with the approximate desired level of stocking for maximum yield. In mixed conifer and fir types, thinning to a 40% CC will under-stock the stand from the standpoint of maximizing yield. Some of the mixed types (SMC4P/S, WFR4/5P) are already under-stocked and below 40% CC 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- 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 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 EPN4M/D type (the most common type being treated in the project) has an increase in average tree diameter from 10” to 21” just as a result of the thinning (by removing the smallest trees in the stand). This effect continues as the trees released from crowding occupy new growing space. This type would have an average diameter of 11’ in 2026 if left untreated, but is expected to have an average diameter of 23” in 2026 when thinned to a 40% CC.

Mistletoe, insects, 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.

Table 3.10 Attributes post treatment and in 2026 for the 'Thin to 40% Canopy Cover' (DFPZ mechanical thin) prescription for stands in the Freeman Project (FVS modeled).

CWHR Strata	Post Treat Basal Area (ft2/ acre)	Post Treat % 'Normal' Basal Area	Post Treat ave dbh (in)	Post Treat CC (%)	Year 2026 Basal Area (ft2/ acre)	Year 2026 % 'Normal' Basal Area	Year 2026 ave dbh (in)	Year 2026 CC (%)
SMC4P/S	99	31	7	31	141	44	9	44
WFR4/5P	104	26	7	34	142	36	8	45
SMC/WFR3S/M	123	48	11	40	160	62	13	45
WFR/SMC5M	192	52	20	40	193	52	21	40
WRF4D	172	42	18	40	193	49	18	42
LPN4M/3/4/5D	123	58	14	40	138	65	16	42
EPN4M/D	138	65	21	40	147	69	23	40
WFR/RFR4M	164	41	11	40	193	49	13	45
SMC4M	155	48	15	40	181	56	17	43
SMC3/4D	154	48	18	40	172	53	20	42

**The SMC4P/S and WFR4/5P types are not thinned in the model due to the existing condition of canopy cover below 40% .

Area Thinning Treatments

Outside of the DFPZ, treatments will include mechanical thinning (pre-commercial and commercial), hand thinning (on steep slopes and within inner RHCAs), 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 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/WUI. Where there is sufficient stocking in healthy trees, fir and mixed conifer stands will be thinned to a CC of approximately 50% (Table 3.11).

Thinning to a 50% CC puts all the types except SMC/WFR3S/M, LPN4M/3/4/4D, EPN4M/D, and SMC4M at or below 55% of 'normal' basal area, which will result in some loss of growth at the stand level. SMC4P/S, WFR4/5P, and WFR/RFR4M are still below 55% in 20 years. At these lower stocking levels, diameter growth of individual trees will be enhanced. Thinning to 50% CC keeps EPN4M/D above 70% of 'normal' basal area and at risk for bark beetles. In 20 years, in addition to EPN4M/D, SMC/WFR3S/M and LPN4M/3/4/5D also have basal areas above 70% of normal and are at risk.

Thinning to 11" dbh Upper Diameter Limit

This prescription models the grapple pile and mastication treatments both within the DFPZ and Area Thinning Zone. This prescription is applied where the trees to be removed are generally below saw log 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. Grapple piling will be preceded by hand felling of undesired material (generally 11” dbh and less), which could include excess trees in plantations 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 to reduce ladder fuels. Piles will be burned within a year or two of treatment. Mastication will be used to kill shrubs and undesirable small trees and redistribute the fuel to a less flammable state that will decompose more rapidly. Grapple piling has a similar effect to hand thinning in terms of residual stand density, but has the additional advantage of being able to treat brush and pile larger undesirable material.

Table 3.11 Attributes post treatment and in 2026 for the ‘Thin TO 50% Canopy Cover’ (mechanical thin outside of DFPZ) prescription for stands in the Freeman Project (FVS modeled).

CWHR Strata	Post Treat Basal Area (ft^2/acre)	Post Treat Percent of ‘Normal’ Basal Area	Post Treat ave dbh (in)	Post Treat CC (%)*	Year 2026 Basal area (ft^2/acre)	Year 2026 %‘Normal’ Basal Area	Year 2026 ave dbh (in)	Year 2026 CC (%)*
SMC4P/S	99	31	7	32	143	44	8	44
WFR4/5P	104	26	6	35	144	36	8	47
SMC/WFR3S/M	145	56	9	50	204	79	11	57
WFR/SMC5M	201	54	13	47	210	57	14	48
WRF4D	204	51	15	43	236	59	15	53
LPN4M/3/4/5D	143	67	13	47	161	76	14	47
EPN4M/D	175	83	17	50	194	92	19	51
WFR/RFR4M	170	43	8	43	203	51	9	51
SMC4M	173	54	10	50	211	66	11	54
SMC3/4D	185	57	13	50	213	66	15	52

* The SMC4P/S, WFR4/5P, WFR/SMC5M , LPN4M/3/4/5D, and WFR/RFR4M types are not thinned in the model due to the existing condition of CC below 50%.

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 but rearranges material in a manner that reduces the risk of crown fire initiation and allows for more rapid decomposition. Table 3.12 displays the modeled results of this treatment.

In all types except WFR4D, EPN4M/D and SMC3/4D, thinning to 11” dbh would reduce the CC to below 40%. In this case, the UDL for thinning would be as shown in Table 3.9. In the EPN4M/D and SMC3/4D types this treatment would not achieve the desired 40% CC. For EPN4M/D the stocking is at 92% of normal (high risk) and increases to 96% of normal in 20 years.

Table 3.12 Attributes post treatment and in 2026 for the 'Thin to 11" dbh' (mastication and grapple pile treatment) prescription for stands in the Freeman Project (FVS modeled).

CWHR Strata	Post Treat Basal area (ft^2/acre)	Post Treat %'Normal' Basal Area	Post Treat ave dbh (in)	Post Treat CC (%)*	Year 2026 Basal area (ft^2/acre)	Year 2026 % 'Normal' Basal Area	Year 2026 ave dbh (in)	Year 2026 CC (%)*
SMC4P/S	83	26	17	23	104	32	20	26
WFR4/5P	89	22	17	24	109	27	19	26
SMC/WFR3S/M	76	24	18	21	86	35	20	23
WFR/SMC5M	178	48	25	35	176	48	26	35
WRF4D	182	46	18	41	202	51	18	43
LPN4M/3/4/5D	128	60	18	36	136	64	20	37
EPN4M/D	183	86	18	50	199	94	20	51
WFR/RFR4M	147	37	18	32	165	42	20	33
SMC4M	136	42	18	33	155	48	19	35
SMC3/4D	160	50	18	41	179	56	20	43

*For stands where thinning to 11" dbh would result in a condition below 40 or 50%, the desired canopy cover becomes the limiting factor.

Thinning to 8" dbh Upper Diameter Limit

An 8"dbh UDL is felt to be the upper end of feasibility for hand piling without prohibitive cost. Additionally, there are concerns about putting larger material into burn piles, both from the perspective of wasting a resource that may be economically removed in the future and concerns about soil impacts with the long residual burn time of that sized material. Hand thinning will occur in inner RHCAs to a minimum of 60% CC and on slopes greater than 40-45%.

In the SMC4P/S and WFR4/5P types thinning to 8" dbh would reduce the CC to below 40%, in which case the desired CC would be the limiting factor (Table 3.13). In all other types the CC is above the desired condition of 40%. EPN4M/D is at 100% of normal even after thinning to 8" dbh and at high risk of insect mortality.

Group Selection Treatments

Group selection (GS) creates small 0.5-2 acre openings in the forest canopy. To allow establishment of tree species intolerant of shade, ideally openings are approximately twice the surrounding canopy height in width. 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, 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. If the regeneration is not successful, the result is a high-graded stand in which timber yield cannot be sustained. In DFPZ units that also have GS, canopy will drop below 40%.

Table 3.13 Stand attributes under 'thin to 8" dbh upper diameter limit' in 2006 and 2026 within the Freeman DFPZ/GS project (FVS modeled).

CWHR Strata	Post Treat Basal area (ft^2/acre)	Post Treat %'Normal' Basal Area	Post Treat ave dbh (in)	Post Treat CC(%)*	Year 2026 Basal area (ft^2/acre)	Year 2026 Percent of 'Normal' Basal Area	Year 2026 ave dbh (in)	Year 2026 CC (%)*
SMC4P/S	95	30	15	27	126	39	18	32
WFR4/5P	99	30	15	27	124	31	18	31
SMC/WFR3S/M	115	45	12	35	142	55	14	38
WFR/SMC5M	188	51	22	38	187	51	23	38
WRF4D	205	52	15	48	228	57	16	50
LPN4M/3/4/5D	136	64	17	38	146	69	19	40
EPN4M/D	211	100	16	56	218	103	19	56
WFR/RFR4M	159	40	17	35	181	46	19	37
SMC4M	159	49	15	41	183	57	17	43
SMC3/4D	174	54	16	45	199	62	19	47

*For stands where thinning to 8" dbh would result in a condition below 40 or 50%, the desired canopy cover becomes the limiting factor

Under a regulated (sustainable over time), 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 (Table 3.14). This distribution assumes that it takes size class 0 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 (as proxy for age) class distribution for stands in federal ownership 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 3.15).

Table 3.14 The distribution of size class based on a balanced uneven-aged approach to growing for trees in poor site conditions.

Age	CWHR Type Size Class	Area (%)
0-20	0-2	10
20-40	3	10
40-60	4	10
60-80	4	10
80-100	4	10
100-120	5	10
120-140	5	10
140-160	5	10
160-180	5	10
180-200	5	10

Table 3.15 The regulated vs. existing conditions and the effect of the Proposed Action and alternatives on size class distribution.

Size Class	Age	Regulated Condition *	Existing condition	Alternative 1	Alternative 3	Alternative 4
		% (Acres)	% (Acres)**	% (Acres)	% (Acres)	% (Acres)
0-2 (0-6"dbh)	0-20	10 (1,184)	10 (1,220)	15 (1,795)	12 (1,395)	12 (1,394)
3 (6-10"dbh)	20-40	10 (1,184)	19 (2,192)	19 (2,192)	19 (2,192)	19 (2,192)
4 (11-23"dbh)	40-100	30 (3,554)	62 (7,354)	61 (7,186)	61 (7,186)	61 (7,186)
5 (24" dbh+)	100-200	50 (5,920)	9 (1,082)	6 (674)	9 (1,074)	9 (1,075)

*under uneven-aged management 200-year rotation
**Aspen treatments within aspen stands are not factored into the total, since this is an intentional type conversion rather than conifer regeneration.

Under HFQLG FRA, GS harvest is based on a 150-year rotation for Dunning sites 1 and 2 (Forest Service site classes 1-3) and 200 years for Dunning sites 3 through 5 (Forest Service site classes 4 and 5). If you assume that site classes are evenly distributed, a reasonable estimate of annual acres cut is 1/175 or 0.57 percent of the QLG pilot project area. Since it is impractical to harvest every area every year, a cutting cycle of 20 years was proposed. With entries every 20 years, the annual harvest in a given area would be 0.57% times 20 or 11.4% of the available land base. A key point is that the HFQLG legislation included all acres in calculating the expected annual accomplishment. This included spotted owl PACs and SOHAs, low sites, recent burns, and RHCAs, all of which would theoretically be up for harvest within the 175-year rotation. The rationale for including these areas in the 5-year pilot is that the over-accomplishment can be easily adjusted for in later years (USFS 1999, Appendix E). The effect of including all lands in the harvest base is to increase the amount of harvest scheduled in any given year.

The map developed by the QLG group showed that out of 14,967 acres (a small area was added to the project after this analysis was done, the acres used here are from an earlier version of the project area) in the project area, 12,700 are available for GS. This translates to acreage in groups of 72 at the 0.57% annual rate, 724 acres at a 10-year re-entry interval and 1,448 acres at a 20-year interval.

Not all of this area is actually available for harvesting timber. Besides the protections in place for various wildlife species (i.e., protected activity centers (PAC), spotted owl habitat areas (SOHA)) 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, particularly if on steep slopes with more expensive logging systems. By removing the acres that cannot practically be treated with GS, 4,389 acres remain. This translates into 25, 250 and 500 acres at the various harvest intervals described above.

In order to move the existing condition toward the desired condition, under-stocked areas need to be regenerated, the youngest age classes need to grow and most of the current size 4 needs to grow into size 5 to make up the deficit there. Harvesting areas that currently in size class 4 or 5 increases the percentage of size 1 and reduces the percentage of size 4 and 5, delaying the time to full regulation. Harvesting groups of larger trees, other than those that take advantage of pockets of health problems, would delay the time needed to achieve an uneven-aged condition. Stands that were planned for mechanical harvest were evaluated in the field for possible group selection opportunities that would improve forest health. 175 acres were identified for group selection as a result. Groups will be monitored for natural regeneration. If this is not successful and/or the species composition is not what is desired, groups will be planted.

3.3.6.2 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 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. 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 3,968 acres by mechanical removal (aspen PAC thinning, helicopter ITS, mechanical thin, mechanical thin in aspen). Of these, 1,780 acres are in DFPZ or DFPZ/WUI and will be treated to the 40% CC prescription (including the eagle selection prescription which is designed to develop eagle habitat). Table 3.16 displays the amount of each CWHR type grouping that is being treated by each prescription in alternative 1.

Of the 54 acres being hand thinned in this alternative, 44 acres in types EPN4M/D, RFR5D, SMC3D/4D/5D/6D-RFR3D, SMC4M-MHC3S/4M/5M, and WFR4D/3D will not meet the desired condition of 40 or 50% CC (DFPZ or area thin) . In other words, hand thinning is not an effective treatment to reduce canopy cover. Similarly, of the 787 acres of grapple pile/mastication/thin to 11” dbh treatment, 569 acres will not meet the desired condition, due to the diameter limit. These treatments are proposed due to slope, watershed effects, lack of access, or other concerns.

Table 3.16 Acres of CWHR type by treatment in Alternative 1.

CWHR Strata	40 % Thin	50% Thin	Hand Thin	Grapple	Aspen Mechanical Thin	Aspen PAC	Total Acres
Aspen	1	0	0	1	193	11	207
EPN4M/D +							
(EPN/PPN/JPN)	415	359	27	104	58	0	962
LPN3D/4M/4D/5D+	117	92	0	18	3	10	239
RFR5D	129	0	4	88	0	0	221
SMC3M/WFR3M/S/P							
WFR2S/ SMC2P/S							
RFR2S/3M/P	32	107	1	188	34	0	362
SMC3D/4D/5D/6D							
RFR3D	250	123	1	196	55	2	626
SMC4M+							
MHC3S/4M/5M	217	426	0	0	121	1	765
SMC4P/S/5P/S							
RFR4S	40	14	0	21	9	0	83
WFR4D/3D	53	108	10	42	26	0	239
WFR4M/RFR4M	131	261	0	72	27	0	491
WFR4P/5P/4S	4	262	9	9	5	0	290
WFR5M/SMC5M	38	40	0	21	1	0	100
MISC.*	67	38	2	27	45	0	178

*small acreages of miscellaneous types were included in this category

This alternative has variable width extended treatment zones around the aspen stands in which all conifers <30” dbh would be removed. These zones amount to approximately 400 acres (as mapped using an average 75’ width) of conifer forest that would be cut to allow sunlight into the aspen stand. They would gradually fill in with forest vegetation over time as the aspen clone expands and/or natural conifer regeneration takes place. These 400 acres would be changed to the early seral (0-2) CWHR class from size class 4 (Table 3.15), along with the 175 acres in groups.

Based on calculations from FVS harvest stand tables, borax would be applied to approximately 1,254 acres (does not include mechanical thin in fir types). A total of approximately 176 pounds of borax would be applied across the project area.

Alternative 3

This alternative treats 3,718 acres by mechanical removal. Table 3.17 displays the amount of each CWHR type grouping that is being treated by each prescription in this alternative.

There are no extended treatment zones on the aspen stands, so the only change from size class 4 to 0-2 is due to groups.

Of the 52 acres being hand thinned in this alternative, 42 acres in types EPN4M/D, RFR5D, SMC3D/4D/5D/6D, RFR3D, WFR4D/3D, and WFR4M/RFR4M will not meet the desired condition of 40 or 50% CC (DFPZ or area thin) . Similarly, of the 939 acres of grapple pile/mastication/thin to 11” dbh treatment, 768 acres will not meet the desired condition, due to the diameter limit.

Table 3.17 Acres of CWHR type by treatment in Alternative 3.

CWHR Strata	40 % Thin	50% Thin	Hand Thin	Grapple	Aspen Mechanical Thin	Aspen PAC	Total Acres
Aspen	6	0	0	1	220	11	238
EPN4M/D +							
(EPN/PPN/JPN)	450	367	27	107	0	0	950
LPN3D/4M/4D/5D+	117	92	0	18	0	0	227
RFR5D	129	0	4	88	0	0	221
SMC3M/WFR3M/S/P							
WFR2S/ SMC2P/S							
RFR2S/3M/P	31	106	1	138	0	0	277
SMC3D/4D/5D/6D							
RFR3D	263	126	1	184	0	0	574
SMC4M							
MHC3S/4M/5M	273	444	0	214	0	0	932
SMC4P/S/5P/S							
RFR4S	44	14	0	24	0	0	83
WFR4D/3D	56	110	10	35	0	0	212
WFR4M/RFR4M	131	261	0	72	0	0	465
WFR4P/5P/4S	8	263	9	9	0	0	290
WFR5M/SMC5M	38	40	0	21	0	0	99
MISC.*	70	37	0	28	1	0	136

*small acreages of miscellaneous types were included in this category

Based on calculations from FVS harvest stand tables, borax would be applied to approximately 1,333 acres (does not include mechanical thin in fir types). A total of approximately 187 pounds of borax would be applied across the project area.

Alternative 4 (Preferred Alternative)

This alternative also has no aspen extended treatment zones, but changes treatment on many acres from grapple pile or mastication to mechanical thinning. It is likely that most of these areas are pre-commercial, that is, do not have enough value in the products removed to cover the cost of removal. The advantage of mechanical thinning is that a product is removed, including any small logs that do have commercial value, the fuel is removed from the site and is used for the generation of power, and there are no piles left to burn. 4,508 acres will be treated mechanically under this alternative. Table 3.18 displays the amount of each CWHR type grouping that is being treated by each prescription in this alternative.

Table 3.18 Acres of CWHR type by treatment in alternative 4.

CWHR Type	40 % Thin	50% Thin	Hand Thin	Grapple	Aspen MT	Aspen PAC	Total Acres
Aspen	4	0	0	3	220	11	238
EPN4M/D + (EPN/PPN/JPN)	505	430	27	43	0	0	1005
LPN3D/4M/4D/5D+	123	92	0	13	0	0	229
RFR5D	228	0	4	0	0	0	232
SMC3M/WFR3M/S/P WFR2S/ SMC2P/S RFR2S/3M/P	106	68	0	106	0	0	280
SMC3D/4D/5D/6D RFR3D	268	333	1	1	0	0	603
SMC4M MHC3S/4M/5M	336	498	0	56	0	0	890
SMC4P/S/5P/S RFR4S	47	36	0	0	0	0	83
WFR4D/3D	103	110	0	6	0	0	219
WFR4M/RFR4M	176	262	0	29	0	0	467
WFR4P/5P/4S	17	296	9	0	0	0	321
WFR5M/SMC5M	57	40	0	0	0	0	97
MISC.*	70	40	2	22	1	0	135

*small acreages of miscellaneous types were included in this category

Of the 43 acres being hand thinned in this alternative, 34 acres in types EPN4M/D, RFR5D, SMC3D/4D/5D/6D, RFR3D, WFR4D/3D, and WFR4M/RFR4M will not meet the desired condition of 40 or 50% CC (DFPZ or area thin) . Similarly, of the 279 acres of grapple pile/mastication/thin to 11” dbh treatment, 173 acres will not meet the desired condition, due to the diameter limit. This alternative achieves the desired condition on significantly more acres than the others.

Based on calculations from FVS harvest stand tables, borax would be applied to approximately 1,837 acres (does not include mechanical thin in fir types). A total of approximately 220 pounds of borax would be applied across the project.

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. For a list of past actions that effect forest vegetation see Appendix E.

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 un-even 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 un-even aged management, the thinning activities will benefit either end by improving growth and reducing the risk of epidemic insect and disease outbreaks.

DFPZ Maintenance

In July of 2003, a Record of Decision was signed for the *Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLG FRA) Final Supplemental Environmental Impact Statement.* It documented the results of an environmental analysis of effects of alternative management strategies for maintenance of DFPZs within the HFQLG *Pilot Project Area*. The Final Supplement and this Record of Decision, in combination with the original HFQLG Act FEIS and ROD, provide the programmatic guidance for DFPZ construction and maintenance in the HFQLG Pilot Project Area.

Table 3.19 shows the acres by treatment type under Alternative 1 that would occur if the DFPZ were to be maintained exactly as projected in the programmatic SEIS. The vegetative maintenance prescriptions used in the tables were developed from land allocations, slope breaks, and vegetative characteristics consistent with the programmatic projections in the FSEIS. These models make projections of future conditions under a given set of assumptions and not actual predictions of future schedules and their environmental consequences. The effects of these projected treatments are discussed in the HFQLG SEIS.

The future maintenance for the Proposed Action is projected to include 1,594 acres of prescribed fire, 419 acres of hand treatment, 1,618 acres of mechanical treatment, and 16 acres of herbicides. Alternative 3 was not analyzed separately due to the fact that it has only 22 fewer acres of treatment than Alternative 4. Alternative 4 (Table 3.20) is projected to include 1,576 acres of prescribed fire, 411 acres of hand treatment, 1,615 acres of mechanical treatment, and 15 acres of herbicides. The herbicide treatment shows up due isolated small acreages of shrubs within units. Based on site-specific analysis of the vegetation types and slopes in the project area, reviews of other projects completed within similar types and slopes, and current direction to avoid use of herbicides, the foreseeable maintenance would consist of prescribed fire, hand treatments, and some mechanical treatments. Herbicide use is not planned as part of the reasonably foreseeable DFPZ maintenance.

The DFPZ is designed to be effective for a period of 10-years. The earliest maintenance treatment to maintain effectiveness is expected to be approximately 10 years from completion of the initial DFPZ, based on a review of similar projects completed since the mid 1990's. The direct, indirect, and cumulative effects of the foreseeable maintenance (hand, mechanical, and prescribed fire treatments) would be similar to those described in the HFQLG FSEIS (pages 47 – 305).

Prior to implementing DFPZ maintenance, a site-specific project environmental analysis would be completed. The project would be designed to comply with forest plan standards. Surveys would be completed to insure that TE&S plants and cultural resources would be protected through flagging and avoidance.

Table 3.19 HFQLG SEIS projected DFPZ maintenance treatments under Alternative 1.

Allocations	Mixed Forest Types						Eastside Pine Type			Red-fir			Brush	None	Total
	MX-A	MX-B	MX-C	MX-D	BO-E	MX-E	EP-A	EP-B	EP-C	RF-A	RF-B	RF-C	BR-A	NV	
Slopes <=30%															
Amphibian Buffers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAT Perennial Streams	4	108	3	0	0	0	4	416	23	0	4	0	307	78	947
Owl/Goshawk Nest Stands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wild and Scenic Rivers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Forest Emphasis Areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Critical Aquatic Refuge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Land Allocations	80	1084	213	0	0	0	40	617	41	0	0	0	201	20	2296
Subtotal-Slopes <=30%	84	1192	216	0	0	0	44	1033	64	0	0	0	508	98	3243
Slopes >30%															
Amphibian Buffers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAT Perennial Streams	1	8	5	0	0	0	0	0	0	0	0	0	1	0	15
Owl/Goshawk Nest Stands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wild and Scenic Rivers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Allocations	Mixed Forest Types						Eastside Pine Type			Red-fir			Brush	None	Total

	MX-A	MX-B	MX-C	MX-D	BO-E	MX-E	EP-A	EP-B	EP-C	RF-A	RF-B	RF-C	BR-A	NV	
Old Forest Emphasis Areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Critical Aquatic Refuge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Land Allocations	27	263	59	0	0	0	1	23	0	0	0	0	16	0	0
															389
Subtotal-Slopes >30%	28	271	64				1	23	0		0	0	17	0	404

Table 3.20 HFQLG SEIS projected DFPZ maintenance treatments under Alternative 4 (Preferred Alternative).

	Mixed Forest Types						Eastside Pine Type			Red-fir/Alpine Types			Brush	None	
Allocations	**MX-A**	**MX-B**	**MX-C**	**MX-D**	**BO-E**	**MX-E**	**EP-A**	**EP-B**	**EP-C**	**RF-A**	**RF-B**	**RF-C**	**BR-A**	**NV**	**Total**
Slopes <=30%															
Amphibian Buffers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAT Perennial Streams	4	104	3	0	0	0	4	408	23	0	0	0	300	77	923
Owl/Goshawk Nest Stands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wild and Scenic Rivers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Forest Emphasis Areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Critical Aquatic Refuge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Land Allocations	80	1080	213	0	0	0	39	617	41	0	4	0	199	20	2293
Subtotal-Slopes <=30%	84	1184	216				43	1025	64		4	0	499	97	3216
Slopes >30%															

	Mixed Forest Types						Eastside Pine Type			Red-fir/Alpine Types			Brush	None	
Allocations	MX-A	MX-B	MX-C	MX-D	BO-E	MX-E	EP-A	EP-B	EP-C	RF-A	RF-B	RF-C	BR-A	NV	Total
Amphibian Buffers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAT Perennial Streams	1	7	5	0	0	0	0	0	0	0	0	0	0	0	13
Owl/Goshawk Nest Stands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wild and Scenic Rivers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Forest Emphasis Areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Critical Aquatic Refuge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Land Allocations	28	257	59	0	0	0	1	23	0	0	0	0	15	5	388
Subtotal- Slopes >30%	29	264	64				1	23	0		0	0	15	5	401

3.3.6.3 Alternative 2 (No-action)

Direct and Indirect Effects

Defensible Fuel Profile Zones

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% CC or below would only occur in the SMC4P/S and WFR4/5P types (Table 3.21). In twenty years none of the types will have canopy cover at or below 40%. No diseased trees would be removed under the No-action alternative.

Table 3.21 Attribute changes between 2006 and 2026 for the No-action Alternative for sampled CWHR types in the Freeman DFPZ/GS Project (FVS modeled).

CWHR Strata	Year 2006 Basal Area (ft^2/acre)	Year 2006 % 'Normal' Basal Area	Year 2006 ave dbh (in)	Year 2006 CC (%)	Year 2026 Basal Area (ft^2/ acre)	Year 2026 % 'Normal' Basal Area	Year 2026 ave dbh (in)	Year 2026 CC (%)
SMC4P/S	99	31	7	32	143	44	8	44
WFR4/5P	104	26	6	35	144	36	8	47
SMC/WFR3S/M	154	60	6	57	218	85	8	65
WFR/SMC5M	202	55	11	48	212	57	12	50
WFR4D	240	60	8	65	275	69	9	66
LPN4M/3/4/5D	156	74	9	47	172	81	10	50
EPN4M/D	226	107	10	64	239	113	11	64
WFR/RFR4M	170	43	8	44	203	51	9	52
SMC4M	178	55	8	53	218	68	9	59
SMC3/4D	200	79	9	58	230	71	10	60

*Quadratic mean diameter of all trees, not the same as overstory tree diameter. Types are typically mapped from aerial photos, so the type label reflects overstory tree diameter.

According to FVS, the SMC3/4D, LPN4M/3/4/5D, and EPN4M/D types currently have stocking over 70% of normal. 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 SMC/WFRS/M type 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. Pine stands with stocking in excess of 150 square feet of basal area will be at high risk of epidemic bark beetle mortality (Fiddler, et al. 1989). Mistletoe will continue to develop in affected stands, slowing growth and increasing risk of loss to fire. 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 EPN4M/D type, which currently has an average diameter of 10” will only develop an average diameter of 11” in 20 years.

Under-stocked stands (generally those below 55% of ‘normal’), within types SMC4P/S, WFR4/5P, and WFR/RFR4M will remain so, often with 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”. In twenty years, those same types remain below 55% of normal.

Group Selection and Area Thinning

The imbalance in age class structure will continue. 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.

3.4 Special Habitat and Biodiversity Area Effects

3.4.1 Introduction

The following assessment is summarized from the botany report for special interest plant species and other botanical resources for the Freeman Project, incorporated here by reference (USFS PNF BRD 2006c). The purpose of this Botany Report is to describe the effects of the proposed project on plant species of the Plumas National Forest Special Interest list, Special Habitats, Management Indicator Species (MIS) species, and other botanical resources. Notes about revegetation with native species are included in the Management Recommendations section.

3.4.2 Summary of the Effects

3.4.2.1 Action Alternatives

The special habitats in the Freeman Project area are seeps, springs, aspen and willow-alder communities.

There are seven seeps and ten springs known in the project area. Each of these sites has been surveyed for sensitive and special interest plants. A total of 11 springs and seeps occur in or near treatment units (within 100 feet). Nine control areas will be designated to protect these 11 springs and seeps. Some control areas will have more than one seep or spring, and five of them will also contain occurrences of the sensitive plant species *Botrychium minganense*. These control areas will be flagged and avoided. The protection measures for the special habitats in the project area are summarized in Chapter 2, under Specific Design Features and Mitigations. These protections are consistent with the SOP's for RHCA's (Appendix D).

There are 300 acres of aspen stands delineated within the Freeman Project area, each of which exhibits a varying degree of conifer encroachment.

3.4.2.2 Alternative 2 (No-action)

There would be no direct effects from the No-action Alternative other than those associated with current ongoing actions. The general discussion of the indirect and cumulative effects of Alternative 2 would be similar to those in the Freeman Project BE with the exception of the special habitat, aspen communities. The effects to aspen communities are discussed below.

Thus, as conifer encroachment increases, under the No-action Alternative, wildlife forage and habitat are adversely impacted, both on-site and across the immediate landscape. Under the No-action Alternative, conifer encroachment would continue and competition for resources would increase. Over time the percentage of aspen stands at highest risk of loss can be expected to increase. The likelihood of a stand-replacing fire occurring within the aspen stands would also increase over time, further increasing the risk of losing the stand.

With fire permanently excluded from some areas wildlife habitat, ecological diversity and hydrologic function will be lost.

3.4.3 Scope of the Analysis

Geographic Analysis Area: The geographic boundary for analyzing cumulative effects to special habitats is the project boundary. The Freeman project will not cause effects on 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 habitats. The effects of past activities are built in to this analysis in that they are largely responsible for the existing landscape.

3.4.4 Analysis Method

The Freeman 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 special habitats were surveyed at a high level of intensity (complete survey). Special habitat location data were recorded using Global Positioning Systems, and the data were then entered into a Geographic Information System (GIS). Treatment units were added to the GIS to analyze proximity to special habitats and identify potential detrimental treatments. A stand loss risk analysis for aspen communities was done according to US Forest Service Region 5 protocols (USFS 2002).

3.4.5 Affected Environment

Special habitats in the Freeman project area include aspen communities, seeps, springs, and willow/alder communities.

3.4.5.1 Springs and Seeps

Groundwater seeps, springs, wet meadows, and other wetlands were documented at numerous sites within the project area (Moore and Jennings 2004). 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 Plumas NF sensitive and special interest plants species (Hanson 1999, 2003a, 2003b). Buffer zones will be established and maintained around seeps, springs, and associated meadows according to the SOP for RHCA which can be found in the Freeman project record.

3.4.5.2 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 Freeman Project is riparian willow and alder shrub stands. These areas will be protected by enacting current SOP’s regarding RHCA’s.

3.4.5.3 Aspen Communities

Quaking aspen (*Populus tremuloides*) is a hardwood tree species that reproduces vegetatively by sprouting suckers in response to fire and other disturbances. It can form large colonies of clonal trees. Aspen communities support biodiversity, provide wildlife forage and habitat, create the conditions required by a variety of plant assemblages, and conserve riparian soil moisture (Jones et al. 2005).

Many stands of quaking aspen throughout the forest and across the region are not successfully regenerating. The lack of successful regeneration is attributable to the combination of many factors including, but not limited to: past fire activity; conifer encroachment; stand microclimate changes; and grazing pressures. These factors in combination with other alterations have lead to an overall concern for the productivity and health of aspen stands. In comparison with pine and other native conifer communities quaking aspen stands are of limited extent on the PNF landscape. Limited occurrence on the landscape, as well as the distinctive ecological niches and processes that occur within aspen communities, create unique and diverse habitats that are often absent elsewhere.

Aspen stands are also a valuable aesthetic resource. The Plumas Visitors Bureau of Commerce promotes aspen as a visitor attraction, and advertises in local and regional publications and their tourism web site every autumn.

Fire suppression on the PNF has allowed for an increase in the occurrence of dense patches of early, mid and late-seral stage conifer within aspen. There is a general lack of pure aspen stands across the District, except where recent fires have occurred. The lack of pure stands displays a fundamental point that is applicable to many stands within the region; when large-scale disturbances, such as fire, are removed from disturbance-dependent ecosystems like aspen communities, the communities will successionally convert.

A lack of fire enables conifers to establish within aspen groves while preventing stimulation of new aspen sprouts. Conifers exhibit numerous competitive advantages over aspen including a more developed root system, longer annual photosynthetic duration period, and a greater tolerance to shaded growth conditions. Another substantial disadvantage aspen clones must endure is the hindrance that grazing and browsing exerts upon sprout regeneration. Over-browsing and over-grazing by ungulates, often leads to repetitive incremental disturbances that may yield substantial adverse effects to stand regeneration over time.

Due to greater shade tolerance and other various ecological advantages, conifers have begun to adversely influence aspen community stability. Conversion of aspen stands to conifer also leads directly to changes in vegetative understory composition and diversity. Aspen are very shade intolerant, and are generally not found to successfully root sprout under a moderate to closed canopy. In fact, root sprouting requires warm soil temperatures, typically around 74°F. Thus, shaded soil surfaces, or areas where duff is considerably deep, are less likely to provide favorable sprouting conditions. Furthermore, both patches and individual conifer trees limit the amount of sunlight received by aspen foliage, thus lowering photosynthetic production and further hindering aspen stand productivity.

Conditions for seed induced sprouting of aspens are rare. The majority of clones observed on today's landscape are perpetuated through effective root sprouting. By extrapolating the conifer encroachment trend and the associated impacts of the encroachment upon aspen root sprouting, as well as the impacts of competition upon mature stands, one can foresee the gradual decline of aspen communities. With fire permanently excluded from some areas (such as in the wildland urban interface), and suppressed in other areas, any elimination of aspen communities from the forested landscape is likely to be permanent. Other resources lost beyond reduced landscape diversity are often manifested in wildlife habitat, ecological diversity and hydrologic function (including sediment storage, water yield alterations, and changes within riparian understory composition and diversity).

A stand loss risk analysis was done by PNF personnel in 2005 and 59% of the stands in the Freeman Project area were found to have a high or highest risk of loss. The analysis was done according to US Forest Service Region 5 protocols (USFS 2002). Table 3.22 summarizes the acres of aspen stands to be treated and their associated risk of loss. Degree of risk ranges from none to highest.

Table 3.22 Acres of aspen risk loss factors in the Freeman Project area.

	Alternative 1 (Proposed Action)	**Alternative 2 (No-action)**	**Alternative 3**	**Alternative 4 (Preferred Alternative)**
Highest	26	27	25	25
High	87	107	80	80
Moderate	74	86	71	71
Low	56	70	56	56
Total	243	300	232	232

Some aspen stands are not included in any of the action alternatives because they were found after the alternatives had been developed or they are within protected areas. They are included in Alternative 2, the No-action Alternative. The degrees of risk are defined below.

Risk of Stand Loss Analysis

Highest: The clone is being lost from above *AND* is not being replaced from below.

- Conifer crowns have overtopped the aspen crowns, (primary risk factor), and
- Conifer species comprise at least half the canopy (primary risk factor), and
- Regeneration absent or unsuccessful due to excessive browsing or other factors (primary risk factor)

(If both primary risk factors are indicated on field form, them the ranking = highest)

High: The clone is being lost from above OR is not being replaced from below.

(If at least one of the primary risk factors affecting crown and regeneration is indicated on field form, then the ranking = high)

Moderate: One or more risk factors below is present, but clone not in immediate danger. May include one or more of the factors below:

- Conifer closure > 25%, but < 50% [if > 50%, ranking is High or Highest]
- Aspen cover < 40%
- Dominant aspen are decadent
- Aspen regeneration 5 – 15 ‘ tall is < 500 stems per acre
- Regeneration being excessively shaded by conifers
- Browsing is limiting extent and numbers of successful (> 5’ tall) regeneration

(If one or more of these risk factors is indicated on field form then ranking = moderate)
Low: Clone essentially healthy, mature trees and /or regeneration for the most part healthy and vigorous, no obvious signs that the clone has receded, < 15% of the clone affected by risk factors.
None: None of the above risk factors present, mature trees vigorous, regeneration 5–15’ tall ≥ 500 stems.

3.4.6 Environmental Consequences

3.4.6.1 Action Alternatives

Springs and Seeps

Groundwater seeps, springs, wet meadows, and other wetlands were documented at numerous sites within the project area (Moore and Jennings 2004). 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 Plumas NF sensitive and special interest plants species (Hanson 1999, 2003a, 2003b). Buffer zones should be established and maintained around seeps, springs, and associated meadows according to the SOP for RHCA which can be found in the Freeman project record.

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 Freeman Project is riparian willow and alder shrub stands. These areas will be protected by enacting current SOP’s regarding RHCA’s.

3.4.6.2 Difference in Effects of the Action Alternatives

Alternative 1 (Proposed Action)

Aspen Communities

There are 300 acres of aspen stands delineated within the Freeman Project area, each of which exhibits a varying degree of conifer encroachment. Under the Proposed Action, aspen will be released from conifer competition in 40 units, ranging in size between 1 and 85 acres. This treatment would occur on a total of approximately 645 acres. The aspen treatment units in the Proposed Action include the area within an extended treatment zone around the aspen stands. The extended treatment zone extends an average of 75 feet from the aspen stands and will not exceed 150 feet from the aspen stand. The 75-foot average extension was added to the mapped area of aspen stands to form a perimeter of aspen treatment areas, yielding the total of 645 acres.

Of the total 645 acres of aspen treatment units, 350 acres are within RHCA's. Under the Proposed Action, within RHCA's only hand treatment will occur on slopes greater than 15%. Adding the slope restriction to these 350 acres reduces the total aspen treatment acres by 50 acres. These 50 acres will be treated by hand thinning, removing trees up to 8" in diameter. Depending on the size and number of conifers remaining, this treatment would most likely be less effective at promoting aspen regeneration.

Conifers up to 29.9" dbh will be removed, but specified trees in stream corridors that provide bank stability will be left.

Removal of conifers in the 150-foot extended treatment zone would create suitable habitat for the aspen stand to increase in size and productivity. Allowing sunlight to reach the ground provides favorable conditions for new stems. The treatment within the aspen stands would provide mild disturbance, which stimulates suckering. Treatment in the extended treatment zone would also reduce the risk of stand-replacing fires within aspen groves.

A no-equipment buffer zone (25' wide) will be established along each side of the stream channels to ensure no disturbance to bank stability. Equipment may be positioned outside of the buffer and harvest/gather material via an extendable harvest arm attachment. Crossing of the stream channel will be allowed in the case of special circumstances only, and requires permission from the Sale Administrator and Hydrologist. If a crossing were deemed necessary for effective harvest and fuel reduction, reconstruction of channel banks by the contractor will be required.

Skid trails and landings will be pre-designated. Skid trails will be spaced approximately every 120', generally perpendicular to streams, and skidders would be allowed to enter the outer RHCA on these skid trails. Landings will be located outside of the aspen stand perimeter and RHCA buffer zones to minimize disturbance to the aspen communities as well as the RHCA buffer zones. Skid trail and landing layout is critical, thus, the appropriate resource specialist, in combination with the timber sale administer would be consulted.

Compaction from equipment is likely to occur. Erosion from disturbed areas is unlikely to be extensive, as residual understory vegetation is anticipated to remain abundant. Only low ground pressure equipment (under 8.0 psi) would be would be allowed to enter an RHCA; it would not be allowed within the no-equipment buffer zone.

Unless deemed necessary by resource specialists following post-harvest review, aspen units would not be underburned or subsoiled.

The proper placement of hand piles is a critical component of aspen stand protection. Due to the proximity of most aspen roots to the soil surface, (95% within 4"), and due to the susceptibility of the cambium layer to heat exposure, pile burning within the established communities is highly discouraged. Pile burning within aspen stands often leaves small areas of bare soil, causes root mortality due to the length of heat exposure, may leave mature trees susceptible to fungal or insect infestation, and may kill sub-adult and mature trees through heat exposure.

It is expected that small short-term impacts within each treated aspen stand may occur, but as natural recovery mechanisms are reinvigorated through an effective stand release, these impacts are expected to be of short duration.

Very similar aspen treatments have been done successfully in the Lassen National Forest. A five-year study, including control groups, was done to test the hypothesis that conifer removal, along with control of grazing, would enhance recruitment of new aspen stems. The study is published in a peer-reviewed scientific journal. Treatment consisted of removing conifers up to 26" dbh. Commercial and nonmerchantable trees were removed by hand felling with chain saws, and transported to landings by grapple skidders. Trees less than 10" dbh were hand piled and burned within the aspen stands.

Jones et al. (2005) report the effectiveness of conifer removal in the regeneration of aspen stands. Growth results were measured annually for four years following treatment. A reduction in density of some size classes was seen in the first two years after treatment. After four years an increase in aspen density, as compared to control stands, was observed for all size classes. The increase can be attributed to hormonal stimulation as a result of the disturbance and/or the increased available sunlight. Several other factors can also affect the results: amount of rainfall, annual fluctuations of seasonal temperatures, grazing pressures. The study mentioned above made use of control groups to account for these variables. The authors cite several other published articles with similar results that support their findings.

In conclusion, over the long-term, it is expected that implementation of the Proposed Action would be beneficial to both landscape and on-site resource diversity.

Alternative 2 (No-action)

Aspen Communities

The degree of conifer encroachment in aspen communities is directly related to a decrease in understory production (Mueggler 1985). Thus, as conifer encroachment increases, under the No-action Alternative, wildlife forage and habitat are adversely impacted, both on-site and across the immediate landscape. Currently, 59% of the aspen stands in the Freeman Project area are considered to be at highest risk of loss. Under the No-action Alternative, conifer encroachment would continue and competition for resources would increase. Over time the percentage aspen stands at highest risk of loss can be expected to increase. The likelihood of a stand-replacing fire occurring within the aspen stands would also increase over time, further increasing the risk of losing the stand.

With fire permanently excluded from some areas (such as in the wildland urban interface), and suppressed in other areas, any elimination of aspen communities from the forested landscape is likely to be permanent. Other resources lost, beyond reduced landscape diversity, are often manifested in wildlife habitat, ecological diversity and hydrologic function (including sediment storage, water yield alterations, and changes within riparian understory composition and diversity).

Alternative 3 and 4

Aspen Communities

The aspen treatments areas would be defined by the extent of riparian vegetation and only aspen stands within that vegetation would be treated. This amounts to a total of 233 acres, in units ranging from 1 to 31 acres in area. Additionally, Alternative 3 would evaluate the upper diameter limit of conifer retention, based on whether the conifers were present previous to the aspen stand. These changes would result in a greater number of conifers left within some aspen stands, and greater canopy cover around some aspen stands.

All of the 233 acres of aspen treatment units are within RHCA's. Under Alternative 3, the slope restriction will change from the 15% in the Proposed Action to 35%. Only hand treatment will occur on slopes greater than 35% within RHCA's. This change will allow a greater number of acres to be treated. Although this change will increase the short-term risk of sediment reaching the stream, the risk is outweighed by the long term benefits to be gained by treating the aspen communities (Barbara Drake personal communication). Standards for ground cover, found in the Land and Resource Management Plant (USFS PNF 1988) will be adhered to and will reduce sedimentation.

The effects of Alternative 1, as discussed above, would apply to this alternative with the following exceptions. The positive effects discussed in Alternative 1 would be realized, but to a lesser degree.

Under this alternative some areas around treated aspen stands would remain untreated. Those stands would be less likely to expand in area due to the existing conifers. At the perimeter of those aspen stands competition for resources would continue and would likely increase. The aspens would be likely to respond favorably to the treatment done within the stand, but they would have less chance of expanding into the surrounding area where greater canopy cover remains.

The risk of a stand replacing fire would be less than that of the No-action Alternative but greater than that of Alternative 1. If the area around the aspen is densely forested and left untreated the likelihood of high-intensity fire reaching the aspen would be higher than if the area had been treated.

Cumulative Effects

The effects of past activities are built into this analysis in that they are largely responsible for the existing landscape. Management activities that have cumulatively impacted aspen communities on the forest include: historic grazing, timber harvest, fire suppression, prescribed fire, road construction, and any activity that caused a change in water flow.

Grazing has occurred in the Beckwourth Ranger District for at least the previous 150 years. Grazing in the Grizzly Valley Allotment will continue to impact aspen communities. Cattle can damage new aspen suckers, degrade aspen habitats, and spread noxious weeds. Grazing can prevent suckers from reaching maturity. In areas where cattle cause impacts to streams, water flow may be significantly altered. Normally moist riparian areas may dry out due to these changes, thereby decreasing aspen productivity due to lack of water. Cattle can transport noxious weeds and provide the disturbance that favors their establishment. Competition from noxious weeds can impede aspen growth. Freeman project activities would not add to the adverse effects of grazing on aspen communities for the following reasons: the project would not alter grazing regimes, aspen surveys and risk-loss analysis has been done for the project area, treatments are designed to benefit aspen communities.

The Lake Davis Pike Eradication project may affect aspen communities by altering the hydrology of nearby riparian habitat. It is possible that the proposed draw down of Lake Davis would cause some riparian areas to be drained at an unnatural time of year. Lack of water in early summer may adversely affect aspen productivity. These potential effects will be analyzed in the environmental document for that project and will be mitigated appropriately. Freeman project activities would not add adverse effects on aspen communities for the following reasons: the project would not alter hydrologic regimes, aspen surveys and risk-loss analysis has been done for the project area, treatments are designed to benefit aspen communities.

The Lake Davis Pike Eradication project may affect the spread of noxious weeds. There are known populations of Canada thistle (*Cirsium arvense*) and tall whitetop (*Lepidium latifolium*) on the shore of the lake. Both of these weeds can become dominant in riparian areas. Competition from these weeds can adversely impact aspen communities. Standard weed precautions will be followed during implementation of both the Freeman and Lake Davis Pike Eradication projects and will minimize the risk of noxious weed infestation. These known weed sites will not be disturbed by project activities. Details of noxious weed sites, risks, and treatments can be found in Appendix B, (the Noxious Weed Risk Assessment) of the Biological Evaluation for Threatened, Endangered, and Sensitive Plant Species.

Watershed restoration projects have occurred in the Freeman project area over the past several years. Changes in hydrology can affect aspen habitats. These projects were designed to restore the natural hydrological regime. Overall, aspen habitat should increase as a result of the restoration. Standard weed precautions were followed during implementation.

It is also likely that future management actions would include recreation, some prescribed fire, and timber management activities. Standards and guidelines apply to all foreseeable future actions and would reduce cumulative effects on aspen communities. Standards and guidelines can be found in the HFQLG SEIS ROD (2003).

3.5 Wildlife Effects

3.5.1 Introduction

The following assessment is summarized from the biological assessment/biological evaluation (BA/BE) for terrestrial and aquatic wildlife report for the Freeman Project, which is incorporated here by reference (USFS PNF BRD 2006k). 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 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).

Five categories of species are considered in the BA/BE; threatened, endangered, proposed, candidate and Forest Service sensitive species. Species federally listed as endangered by the Department of the Interior Fish and Wildlife Service (USFWS) are species currently in danger of extinction throughout all or a significant portion of their range. Species listed as threatened are likely to become endangered within the foreseeable future throughout all or a significant portion of their range. A proposed species is any species that is proposed in the Federal Register to be listed as a threatened or endangered species under the ESA (50 CFR 402.03). A candidate species is a species for which the USFWS has on file enough information to warrant or propose listing as endangered or threatened. Sensitive species are designated by the Regional Forester and are species that have known or suspected viability problems due to (1) significant current or predicted downward trends in population numbers or density, and/or (2) significant current or predicted downward trends in habitat quantity or quality for these species. The Forest Service considers the long-term conservation needs of sensitive species in order to avoid future population declines and the need for federal listing.

The BA/BE document consists of both a Biological Assessment for federally listed wildlife species potentially occurring on the Plumas National Forest ("Federal Endangered and Threatened Species that may be affected by projects on the Plumas National Forest" updated February 14, 2006 (USFWS database, Appendix A)), and a Biological Evaluation for Region 5 Sensitive Species (updated June 8, 1998, appended 6 March, 2001 and 7 May 2003, and updated April 26, 2004, with a subsequent correction memo dated May 12, 2004, and supplemented with an additional direction letter dated August 4, 2004). None of the new sensitive terrestrial invertebrates, aquatic invertebrates or amphibians added to the Regional list with the 2004 updates are reported as occurring on the Plumas National Forest. Table 3.23 contains a list of TES species that potentially occur on the Plumas National Forest and may be addressed in the BA/BE. Brief habitat accounts are attached as Appendix G. No critical habitat as designated by the Fish and Wildlife Service is present within or near the project area (Federal Register, March 13, 2000).

Table 3.23 Threatened, Endangered, Proposed and Sensitive Animal Species that Potentially Occur on the Plumas National Forest.

Species	Category
INVERTEBRATES	
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	Threatened
FISH	
Hardhead minnow (Mylopharodon conocephalus)	Sensitive
AMPHIBIANS	
California red-legged frog (*Rana aurora draytonii*)	Threatened
Foothill yellow-legged frog (*Rana boylii*)	Sensitive
Mountain yellow-legged frog (*Rana muscosa*)*	Sensitive
Northern leopard frog (*Rana pipiens*)	Sensitive
REPTILES	
Northwestern pond turtle (*Clemmys marmorata marmorata*)	Sensitive
BIRDS	
Bald eagle (*Haliaeetus leucocephalus*)	Threatened
American peregrine falcon (*Falco peregrinus anatum*)	De-listed
Northern goshawk (*Accipiter gentilis*)	Sensitive
California spotted owl (*Strix occidentalis occidentalis*)	Sensitive
Great gray owl (*Strix nebulosa*)	Sensitive
Willow flycatcher (*Empidonax trailii brewsteri*)	Sensitive
Greater sandhill crane (*Grus canadensis tabida*)	Sensitive
Swainson's hawk (*Buteo swainsoni*)	Sensitive
MAMMALS	
Sierra Nevada red fox (*Vulpes vulpes necator*)	Sensitive
American marten (*Martes americana*)	Sensitive
Pacific fisher (*Martes pennanti pacifica*)	Sensitive
California wolverine (*Gulo gulo luteus*)	Sensitive
Pallid bat (*Antrozous pallidus*)	Sensitive
Townsend’s big-eared bat (*Corynorhinus townsendii*)	Sensitive
Western red bat (*Lasiurus blossevillii*)	Sensitive

*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 highetr priority.

Several 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 February 14, 2006, accessed via USFWS county list web page (http://www.fws.gov/sacramento/es/spp_lists/NFActionPage.cfm), have been eliminated from further analysis, based on past analysis and concurrence from the US Fish & Wildlife Service (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 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 (currently Proposed)

In addition, there is no known habitat, have been no observations and the wildlife analysis area is above the elevational range for the following threatened or endangered species: Valley elderberry longhorn beetle and California red-legged frog. Therefore, these two species will not be discussed further in this document. There is also no suitable habitat and have been no observations for the following sensitive species: hardhead minnow, Northern leopard frog and Swainson's hawk within the wildlife analysis area. Therefore, these four species will not be discussed further in this document.

3.5.2 Summary of the Alternatives

3.5.2.1 Alternative 1 (Proposed Action)

California Spotted Owl

- A potential decrease in spotted owl foraging habitat by about 2,760 acres, and a decrease in nesting habitat by about 246 acres, leaving 85.2% of the existing suitable foraging habitat and 96.1% of the existing suitable nesting habitat within the wildlife analysis area.
- Within 3 HRCAs, a total of approximately 612 acres of suitable habitat would become unsuitable, with the average reduction of 204 acres/HRCA.
- Placement of groups in proposed densities and aspen ETZs could result in up to 390 acres of matrix forest supporting more edge habitat than forest interior habitat, creating more risk and uncertainty associated with habitat suitability than all action alternatives.
- Because of the three items above, 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 4.
- 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 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 six PACs immediately adjacent to, and upslope, of fuels treatments.

Northern Goshawk

- Potential decrease in goshawk nesting habitat by about 3,006 acres, leaving 88.0% of the existing suitable nesting habitat within the wildlife analysis area.

- Two Goshawk PACs would be entered with area thinning for aspen to maintain habitat diversity with no loss of suitable habitat.
- 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 Alternative 4.
- 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 eight PACs immediately adjacent to, and upslope, of fuels treatments.

Great Gray Owl

- Potential decrease in great gray owl nesting habitat by about 1,817 acres, leaving 79.0% of the existing suitable nesting habitat within the wildlife analysis area.
- Approximately 52 acres (18 acres of hand and 34 acres of mechanical thinning) of the 1,836 acres of preliminary PACs will be treated for aspen enhancement and forest health. No reduction in suitable habitat is expected with these treatments.
- 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 Alternative 4.
- 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 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 three PACs immediately adjacent to, and upslope, of fuels treatments.

Bald Eagle

- Potential increase in future bald eagle nesting habitat with the release of approximately 912 acres within the Bald Eagle Habitat Management Area (BEHMA) in the wildlife analysis area.
- Potential decrease in future bald eagle nesting habitat by about 89 acres, leaving 97.5% of the existing potentially suitable nesting habitat within the BEHMA in the wildlife analysis area.
- 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 bald

eagle nesting habitat as a result of high intensity wildfire. This alternative would decrease the risk of primary use area loss due to wildfire for a minimum of three primary use areas immediately adjacent to fuels treatments.

Mesocarnivores

- Potential decrease in fisher and marten denning habitat by about 1,261 acres, leaving 86.1% of the existing suitable denning habitat within the wildlife analysis area.
- Approximately 10,923 acres of the 275,000 acre draft forest carnivore network is present within the wildlife analysis area. Of the 10,923 acres approximately 7,365 acres may be considered suitable habitat. Based on the 7,365 acres of suitable habitat there is a potential decrease of approximately 721 acres or 9.8%.
- 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 Alternative 4.
- 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 fisher and marten habitat as a result of high intensity wildfire.

3.5.2.2 Alternative 2 (No-action)

California Spotted Owl

- No short-term reduction in owl habitat, no treatment within HRCAs, and no change in forest interior habitat.
- No fuels treatment would leave habitat vulnerable to high intensity wildfire, increasing the risk of large scale habitat fragmentation, loss of PACs and loss of owl habitat.
- Implementation of Alternative 2 involves little to no risk to owl habitat in the short term and thus future owl activity would be less uncertain.

Northern Goshawk

- No short-term reduction in goshawk habitat.
- No fuels treatment would leave habitat vulnerable to high intensity wildfire, increasing the risk of large scale habitat fragmentation, loss of PACs and loss of goshawk habitat.
- Implementation of Alternative 2 involves little to no risk to goshawk habitat in the short term and thus future goshawk activity would be less uncertain.

Great Gray Owl

- No short-term reduction in great gray owl habitat.

- No fuels treatment would leave habitat vulnerable to high intensity wildfire, increasing the risk of large scale habitat fragmentation, loss of PACs and loss of great gray owl habitat.
- Implementation of Alternative 2 involves little to no risk to great gray owl habitat in the short term and thus future great gray owl activity would be less uncertain.

Bald Eagle

- No short-term reduction in bald eagle habitat.
- No fuels treatment would leave habitat vulnerable to high intensity wildfire, increasing the risk of large scale habitat fragmentation, loss of primary and secondary use areas and loss of bald eagle nesting habitat.

Mesocarnivores

- No short-term reduction in fisher and marten habitat.
- No fuels treatment would leave habitat vulnerable to high intensity wildfire, increasing the risk of large scale habitat fragmentation and loss of fisher and marten habitat.
- Implementation of Alternative 2 involves little to no risk to fisher and marten habitat in the short term and thus possible future fisher and marten activity would be less uncertain.

3.5.2.3 Alternative 3

California Spotted Owl

- A potential decrease in spotted owl foraging habitat by about 2,610 acres, and a decrease in nesting habitat by about 243 acres, leaving 86.0% of the existing suitable foraging habitat and 96.1% of the existing suitable nesting habitat within the wildlife analysis area.
- Within 3 HRCAs, approximately 596 acres of suitable habitat would become unsuitable, with the average reduction of 198 acres/HRCA.
- Placement of groups in proposed densities could result in up to 136 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 alternatives 1 & 4 due to lower group density providing for larger forested blocks between groups.
- Because of the three items above, implementation of Alternative 3 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 & 4.
- 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 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 six PACs immediately adjacent to, and upslope, of fuels treatments.

Northern Goshawk

- Potential decrease in goshawk nesting habitat by about 2,853 acres, leaving 88.6% of the existing suitable nesting habitat within the wildlife analysis area.
- Two Goshawk PACs would be entered with area thinning for aspen to maintain habitat diversity with no loss of suitable habitat.
- Implementation of Alternative 3 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 1 & 4.
- 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 eight PACs immediately adjacent to, and upslope, of fuels treatments.

Great Gray Owl

- Potential decrease in great gray owl nesting habitat by about 1,697 acres, leaving 80.4% of the existing suitable nesting habitat within the wildlife analysis area.
- Approximately 52 acres (18 acres of hand and 34 acres of mechanical thinning) of the 1,836 acres of preliminary PACs will be treated for aspen enhancement and forest health. No reduction in suitable habitat is expected with these treatments.
- Implementation of Alternative 3 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 1 & 4.

Bald Eagle

- Potential increase in future bald eagle nesting habitat with the release of approximately 977 acres within the BEHMA in the wildlife analysis area.
- Potential decrease in future bald eagle nesting habitat by about 27 acres, leaving 99.2% of the existing potentially suitable nesting habitat within the BEHMA in the wildlife analysis area.

Mesocarnivores

- Potential decrease in fisher and marten denning habitat by about 1,201 acres, leaving 86.8% of the existing suitable denning habitat within the wildlife analysis area.

- Approximately 10,923 acres of the 275,000 acre draft forest carnivore network is present within the wildlife analysis area. Of the 10,923 acres approximately 7,365 acres may be considered suitable habitat. Based on the 7,365 acres of suitable habitat there is a potential decrease of approximately 692 acres or 9.4%.
- Implementation of Alternative 3 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 either Alternatives 1 & 4.

3.5.2.4 Alternative 4 (Preferred Alternative)

California Spotted Owl

- A potential decrease in spotted owl foraging habitat by about 3,037 acres, and a decrease in nesting habitat by about 379 acres, leaving 83.7% of the existing suitable foraging habitat and 94.0% of the existing suitable nesting habitat within the wildlife analysis area.
- Within 3 HRCAs, approximately 630 acres of suitable habitat would become unsuitable, with the average reduction of 210 acres/HRCA.
- Placement of groups in proposed densities could result in up to 147 acres of matrix forest supporting more edge habitat than forest interior habitat, creating additional risk and uncertainty associated with habitat suitability.
- Because of the three items above, implementation of Alternative 4 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 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 six PACs immediately adjacent to, and upslope, of fuels treatments.

Northern Goshawk

- Potential decrease in goshawk nesting habitat by about 3,416 acres, leaving 86.3% of the existing suitable nesting habitat within the wildlife analysis area.
- Two Goshawk PACs would be entered with area thinning for aspen to maintain habitat diversity with no loss of suitable habitat.
- Implementation of Alternative 4 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 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 eight PACs immediately adjacent to, and upslope, of fuels treatments.

Great Gray Owl

- Potential decrease in great gray owl nesting habitat by about 1,882 acres, leaving 78.3% of the existing suitable nesting habitat within the wildlife analysis area.
- Approximately 52 acres (18 acres of hand and 34 acres of mechanical thinning) of the 1,836 acres of preliminary PACs will be treated for aspen enhancement and forest health. No reduction in suitable habitat is expected with these treatments.
- Implementation of Alternative 4 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.

Bald Eagle

- Potential increase in future bald eagle nesting habitat with the release of approximately 1,116 acres within the BEHMA in the wildlife analysis area.
- Potential decrease in future bald eagle nesting habitat by about 23 acres, leaving 99.3% of the existing potentially suitable nesting habitat within the BEHMA in the wildlife analysis area.

Mesocarnivores

- Potential decrease in fisher and marten denning habitat by about 1,549 acres, leaving 82.9% of the existing suitable denning habitat within the wildlife analysis area.
- Approximately 10,923 acres of the 275,000 acre draft forest carnivore network is present within the wildlife analysis area. Of the 10,923 acres approximately 7,365 acres may be considered suitable habitat. Based on the 7,365 acres of suitable habitat there is a potential decrease of approximately 897 acres or 12.2%.
- Implementation of Alternative 4 involves a level of risk to fisher and marten habitat in the short term and greatest uncertainty about possible future fisher and marten activity.

3.5.3 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 area to be treated with fuels treatment, including DFPZs, approximately 3,066 acres, as well as up to 175 acres of group selections and access roads to the groups, and the 2,727 acres available to Area Thinning. 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 14,950 acres. This project area is located at elevations ranging from 5,600 feet at Humbug Creek to 7,693 feet at Smith Peak. For the purpose of this BA/BE, the wildlife analysis area is defined as the project area (which termined by potential direct, indirect & cumulative effects on California spotted owl 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 46,039 acres (Figure 3.1) of which 41,388 acres are National Forest Lands. This wildlife analysis area is also being used for all other wildlife species analyzed in this BE/BA since the effects of the project to those species will not extend beyond the analysis area boundary for the California spotted owl. All direct, indirect and cumulative effects discussed, occur within this 46,039 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 and TES habitat. The wildlife analysis area developed for the Freeman Project overlaps the Happy Jack wildlife analysis area developed for the Happy Jack project (FY06 project) by about 2006 acres near Happy Valley. No Happy Jack treatments (DFPZ, area thinning or group selection units) occur within the Freeman wildlife analysis area; no Freeman treatments occur within the Happy Jack wildlife analysis area.

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 Freeman 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.

3.5.4 Analysis Methodology

The Freeman project was reviewed using aerial photographs, digital ortho quads (DOQs), GIS vegetation layers, GIS species specific coverages 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” (USFS 2000)
- “Survey Protocol for the Great Gray Owl in the Sierra Nevada of California, May 2000” (USDA FS 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)

Species nest sites and locations were recorded using Global Positioning System (GPS) and entered into GIS. For the analysis of effects, changes to suitable habitat and impacts to PACs/territories were determined by using a GIS vegetation layer combined with type of treatments (i.e. mechanical thinning, grapple piling, hand thinning, etc.) and the CWHR system.

3.5.5 Affected Environment

The proposed treatment area is located in predominately Sierra mixed conifer forest habitat. The treatment area is defined as the area to be treated with fuels treatment, including DFPZs, approximately 3,066 acres, as well as up to 175 acres of group selections and access roads to the groups, and the 2,727 acres available to Area Thinning. The project area is defined as the treatment area plus an additional larger land base which encompasses all of the treatment area. This project area is located at elevations ranging from 5,600 feet at Humbug Creek to 7,693 feet at Smith Peak. For the purpose of this BA/BE, the wildlife analysis area is defined as the project area and treatment area plus an additional larger land base. The additional larger land base was determined by potential direct, indirect & 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 46,039 acres (Figure 3.1) of which 41,388 acres are National Forest Lands.

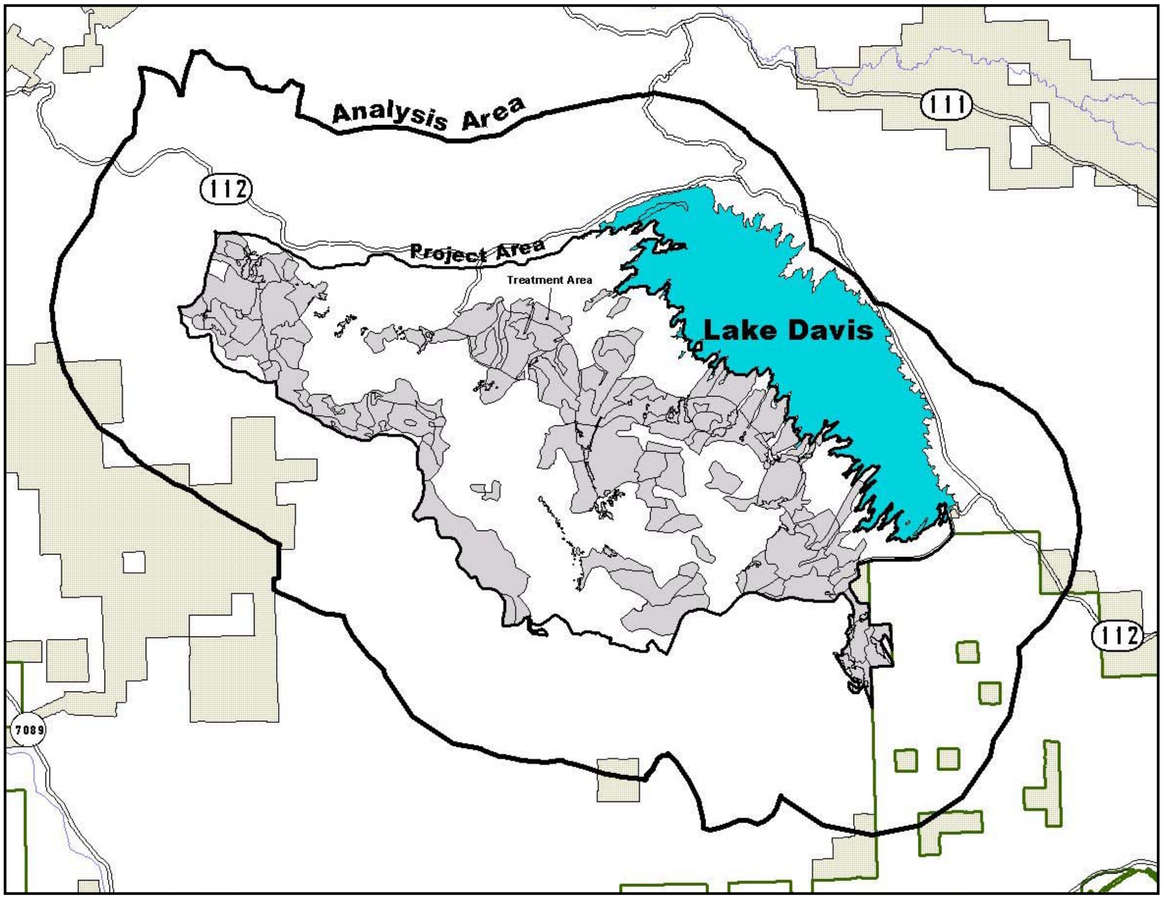

Figure 3.1 Freeman Wildlife Analysis Area, Project Area and Treatment Area (solid color).

The wildlife analysis area developed for the Freeman Project overlaps the Happy Jack wildlife analysis area developed for the Happy Jack project (FY06 project) by about 2006 acres near Happy Valley. No Happy Jack treatments (DFPZ, area thinning or group selection units) occur within the Freeman wildlife analysis area; no Freeman treatments occur within the Happy Jack wildlife analysis area.

Table 3.23 describes all TES species that could potentially occur within the project area. Species that have been located within the project area and/or suitable habitat is present in the project area and/or the project area is within the range of the species, will be analyzed further for potential impacts, even if surveys did not locate individuals.

Table 3.24 Potential Occurrence of Threatened, Endangered, Proposed or USFS Region 5 Sensitive Species and their Habitats in the Wildlife Analysis Area

Species Name Species Status	Elev. Range (feet)	Habitat	Potential Threats	Suitable Habitat w/in Project	Detection w/in Project	Analysis synopsis
Amphibians						
Rana boylii **Foothill yellow-legged frog** Forest Service R5 Sensitive Federal Species of Concern	< 6400	Sierran foothills. Breed in shallow, slow flowing water with at least some pebble and cobble substrate. Found in riffles and pools with some shading (>20%) in riparian habitats, and moderately vegetated backwaters, isolated pools, and slow moving rivers with mud substrate. Rarely found far from permanent water.	Altered stream flow regimes and introduced exotic predators (fish & bullfrogs), grazing, mining, recreation, chitrid fungus	Yes, but low potential due to Northern pike	No	Analyzed in text. Recent surveys have not located any individuals.
Rana muscosa **Mountain yellow-legged frog** Forest Service R5 Sensitive Federal Candidate	4500 – 12000	Plumas to Tulare Co. Found in ponds, tarns (glacial lakes), lakes and streams with sufficient depth and adequate refuge for over wintering.	Fish stocking, UV radiation, deposition of airborne pollutants, recreation., grazing, chitrid fungus	Yes, but low potential due to Northern pike	No	Analyzed in text. Recent surveys have not located any individuals.

Species Name Species Status	Elev. Range (feet)	Habitat	Potential Threats	Suitable Habitat w/in Project	Detection w/in Project	Analysis synopsis
Reptiles						
Clemmys marmorata marmorata **Northwestern pond turtle** Forest Service R5 Sensitive Federal Species of Concern	< 4700	Aquatic habitat in spring and summer. Adjacent upland habitat fall and winter. In rivers, needs slow flowing areas with deep underwater refugia and emergent basking sites. Migration, hibernation, and nesting occur on land up to 330 feet from riparian area.	Non-native fauna, non-native turtles through competition and disease, bullfrogs and predatory fish, vehicles, timber harvest, mining, fire, grazing, water alteration and diversion, fishing.	Yes	No	Analyzed in text. Recent surveys have not located any individuals.
Birds						
Haliaeetus leucocephalus **Bald eagle** Threatened	Sea level – 7000	Throughout northern and central CA. Wintering and nesting habitat associated with lakes, reservoirs, rivers or large streams. Needs large, old trees near water for nesting.	Removal of nesting habitat, high recreation use on lakes, DDT in eggshells, disturbance near nest sites.	Yes	Yes	Analyzed in text. Present in project area.
Accipiter gentilis **Northern goshawk** Forest Service R5 Sensitive Federal Species of Concern	2500 – 10000	Throughout northern CA and Sierra Nevada; Dense mature conifer and deciduous forests interspersed with meadows, other openings and riparian areas. Found in Mixed Conifer to Lodgepole Pine	Logging, catastrophic (stand replacing) fire	Yes	Yes	Analyzed in text. Present in project area.

Species Name Species Status	Elev. Range (feet)	Habitat	Potential Threats	Suitable Habitat w/in Project	Detection w/in Project	Analysis synopsis
Empidonax trailii brewsteri **Willow flycatcher** Forest Service R5 Sensitive Federal Species of Concern	2000 – 8000	Western Sierra Nevada. Found in, willow-dominated riparian areas, including moist meadows with perennial streams and smaller spring-fed or boggy areas.	Grazing, adjacent land use, brown-headed cowbird parasitism, reduction in nesting habitat	Yes	No	Analyzed in text. Recent surveys have not located any individuals.
Falco peregrinus anatum **American peregrine falcon** Delisted from Threatened Federal Species of Concern	Sea level – 7500	Western Sierra Nevada. Requires protected cliffs and ledges for cover.	Predators on young are golden eagles, great horned owls, raccoons and other animals. Ravens as nest competitors.	No	No	Analyzed in text. No known records in wildlife analysis area but historic prairie falcon eyrie present. Nearest eyrie is approx. 7 miles from project area.
Strix occidentalis occidentalis **California spotted owl** Forest Service R5 Sensitive Federal Species of Concern	1000 – 7440	Sierra Nevada province in CA. Needs at least 40% canopy closure and an average dbh of 30 inches for nesting.	Timber harvest, fire suppression, excessive build-up of fuels, decline in snag density.	Yes	Yes	Analyzed in text. Present in project area.

Species Name Species Status	Elev. Range (feet)	Habitat	Potential Threats	Suitable Habitat w/in Project	Detection w/in Project	Analysis synopsis
Strix nebulosa **Great gray owl** Forest Service R5 Sensitive	2500 – 9000	Western Sierra Nevada's with 60% in Mariposa and Tuolumne Co. Breeds in Yosemite NP area. Found in montane meadows surrounded by dense forest of medium to large mixed conifer and red fir.	Grazing, logging of suitable nest trees and buffer.	Yes	Yes	Analyzed in text. Present in project area.
Grus canadensis labida **Greater sandhill crane** Forest Service R5 Sensitive	–	Breeds in Siskiyou, Modoc, Lassen, Sierra Valley, Plumas and Sierra counties and winters primarily in the Central Valley; found in wet meadow, shallow lacustrine, and fresh emergent wetland habitats	Loss of extensive wetland habitat required for breeding; human disturbance; grazing	Yes	Yes	Analyzed in text. Present in project area.
Mammals						
Antrozous pallidus **Pallid bat** Forest Service R5 Sensitive	< 6000	Uses a variety of habitats. Depends on oak woodlands for foraging. Roosts in mines, snags, and in crevices in oaks	Roost disturbance, loss of oak habitat, pesticide use and grazing, loss of suitable nesting & roosting snags.	Yes	No	Analyzed in text. Nearest sighting is approx. 1 mile from project area.
Corynorhinus townsendii **Townsend's big-eared bat** Forest Service R5 Sensitive	< 10000	Found throughout the Sierra Nevada. Inhabits isolated areas with low human disturbance.	Human disturbance in caves, mines and historical buildings.	Yes	No	Analyzed in text. Nearest sighting is approx. 15 miles from project area.

Species Name Species Status	Elev. Range (feet)	Habitat	Potential Threats	Suitable Habitat w/in Project	Detection w/in Project	Analysis synopsis
Lasiurus blossevillii **Western red bat** Forest Service R5 Sensitive	< 3000	Dependent on edge habitats adjacent to riparian areas. Roosts in foliage.	Removal of riparian habitat, pesticides, water impoundments, fire. Loss of roosting trees, such as cottonwood/aspen.	Yes	No	Analyzed in text. Nearest sighting is approx. 5 miles from project area.
Gulo gulo luteus **California wolverine** Forest Service R5 Sensitive Federal Species of Concern	6400 – 10800	Use a variety of habitats. Dens include snow-covered roots, standing or down logs with large cavities, holes under coarse woody debris, old beaver lodges, bear dens or rocky areas.	Recreation, vehicles, decrease in wild areas, logging, fires, mining, decrease in deer population.	Yes	No	Analyzed in text. No confirmed historical sightings on forest.
Martes pennanti pacifica **Pacific fisher** Forest Service R5 Sensitive Federal Species of Concern	4900 – 7900	Forests with high canopy closure and structural elements of late successional old-growth forest. Closely associated with water or riparian habitats (328 ft). Rest sites include large standing conifers or hardwoods. Dens occur in cavities of standing large diameter conifers or hardwoods (snags or live trees).	Forest fragmentation, logging, fire, climate, land use patterns, metapopulation (a group of spatially separated populations) dynamics	Yes	No	Analyzed in text. No known records in wildlife analysis area.

Species Name Species Status	Elev. Range (feet)	Habitat	Potential Threats	Suitable Habitat w/in Project	Detection w/in Project	Analysis synopsis
Martes Americana **American marten** Forest Service R5 Sensitive Federal Species of Concern	>6000	Found in mesic, late successional coniferous forests. Dens are in trees, snags, downed logs and rocks in structurally complex old forests.	Forest fragmentation, logging, fire, climate, land use patterns, metapopulation dynamics	Yes	No	Analyzed in text. No known records in wildlife analysis area but possible in red fir along Grizzly Ridge
Vulpes vulpes necator **Sierra Nevada red fox** Forest Service R5 Sensitive Federal Species of Concern	5000 – 12000	Red fir and Lodgepole pine in subalpine and alpine fell-fields of the Sierra Nevada. Similar to marten and fisher. Dens seem to be in rock/talus slides or earthen excavations/holes.	Conversion of late serial stage forest to early serial stage forest, which favors competitors such as coyote and non-native red fox.	Yes	No	Analyzed in text. No historical sightings on the BCK RD.

Primary Sources: California's Wildlife, Volumes I, II and III. CWHR. Zeiner et al. 1988, 1990a, 1990b. Jennings and Hayes 1994 BA/BE Reference Document, HFQLGFRA FEIS 2000, USDA 1993

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 at 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. The Proposed Action alternatives would change existing conditions to trend the treatment area toward the desired condition for a DFPZ (which is an increased height to live crown, reduced surface fuels and greater spacing between tree crowns).

Appendix E displays all pre-treatment and estimated proposed post treatment vegetation information currently available within the wildlife analysis area. All vegetation information is displayed using the CWHR vegetation codes (see Glossary) and serves as the baseline acres for analysis. The vegetation layer is a composite of remotely sensed data and local project specific vegetation data all based on aerial photo interpretation. This vegetation data was then updated with the FIA plot data collected in 2005. 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 Wildlife Analysis Area from Vegetation Layer (all acres are approximate and all are National Forest System Lands)

CWHR Type*	Wildlife Analysis Area
EPN4D	940
EPN4M	3,011
EPN5D	129
EPN5M	783
JPN4M	18
LPN4D	284
LPN4M	702
LPN5D	144
MHC4M	100
PPN4M	64
RFR4D	190
RFR4M	292
RFR5D	521
RFR5M	44
SMC4D	2,844
SMC4M	7,497
SMC5D**	2,512
SMC5M	1,382
WFR4D	1,319
WFR4M	1,423
WFR5D	194
WFR5M	597
Total	**24,990**

*4=small 11-24"dbh, 5=medium/large >24"dbh. D= Dense Canopy Cover > 60%, M= Moderate Canopy 40-59%, EPN=Eastside Pine, JPN=Jeffrey Pine, LPN=Lodgepole Pine, MHC=Montane Hardwood-Conifer, 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.
** CWHR type 6 incorporated into 5D

3.5.5.1 Species Accounts—Threatened and Endangered Species

Bald eagle

There are currently 21 bald eagle nesting territories on the Plumas NF. Not all of which are active every year.

In California, bald eagles are not known to nest further than two miles from an open water body, (Lehman 1979, USFWS 1986). All nesting bald eagles on the Plumas National Forest are associated with reservoirs or lakes. The only water body within the wildlife analysis area which supports two nesting pairs is Lake Davis. There is no other open water body within the wildlife analysis area suitable for supporting nesting eagles. Bald eagle nest sites are present in the wildlife analysis area and treatment area. Table 3.26 provides some information on nest site occupancy for territories within the wildlife analysis area. All monitoring of nest sites has been conducted by the Forest Service biologist on the district and California Department of Fish and Game biologists.

Table 3.26 Bald Eagle Nesting History in the Wildlife Analysis Area

Year	Cow Creek	Mosquito Slough
1977	Discovered, status unknown	
1978	Occupied, 0 young	
1979	Occupied, 0 young	
1980	Not occupied	
1981	Occupied, 0 young	
1982*	Occupied, 2 young	
1983*	Occupied, 0 young	
1984	Occupied, 2 young	
1985	Occupied, 1 young	
1986	Occupied, 2 young	
1987	Occupied, 0 young	
1988	Occupied, 0 young	
1989	Occupied, 1 young	Discovered, 1 young
1990	Occupied, 2 young	Occupied, 2 young
1991	Occupied, 0 young	Occupied, 1 young
1992	Occupied, 1 young	Not occupied
1993	Occupied, 0 young	Occupied, 1 young
1994	Occupied, 2 young	Occupied, 0 young
1995	Occupied, 2 young	Not occupied
1996	Occupied, 0 young	Occupied, 0 young
1997	Status unknown	Occupied, 2 young
1998	Occupied, 0 young (Pike Eradication Effort – Rotenone)	Occupied, 0 young (Pike Eradication Effort – Rotenone)
1999	Occupied, 2 young	Occupied, 1 young
2000	Not occupied	Occupied, 2 young
2001	Not occupied	Occupied, 2 young
2002	Occupied, 1 young	Occupied, 1 young
2003	Occupied, 0 young (Pike Eradication Effort – Detonation Cord)	Occupied, 0 young (Pike Eradication Effort – Detonation Cord)
2004	Occupied, 0 young	Occupied, 2 young
2005	Occupied, 2 young	Occupied, 0 young

*Cow Creek bald eagles utilized an alternate nest near Bagley Pass

Trees selected for nesting are characteristically one of the largest in the stand or at least co-dominant with the overstory, and usually have stout upper branches and large openings in the canopy that permit nest access (USFWS 1986). Nest trees usually provide an unobstructed view of the associated water body and are often prominently located on the topography (Ibid). A survey of nest trees used in California found that about 71 percent were ponderosa pine (*Pinus ponderosa*), 16 percent were sugar pine (*Pinus lambertiana*), and 5 percent were incense cedar (*Librocedrus decurrens*), with the remaining 8 percent distributed among five other coniferous species (Lehman 1979). See Table 3.27 for acres of suitable bald eagle nesting habitat within the BEHMA in the wildlife analysis area. Primary use areas provide current nesting, roosting, and/or foraging habitat and protect historic/current nesting and roosting sites. Secondary use areas are managed for future nesting sites, roosting sites, foraging sites and population expansion. A total of three bald eagle territories (primary use areas with associated secondary use areas) are in the wildlife analysis area (Figure 3.2) equaling approximately 5,823 acres of a total 6,256 acres in the BEHMA. There is also a winter roost within the wildlife analysis area (Figure 3.2). Two bald eagle territories and a winter roost located within the project area could potentially incur direct habitat impacts.

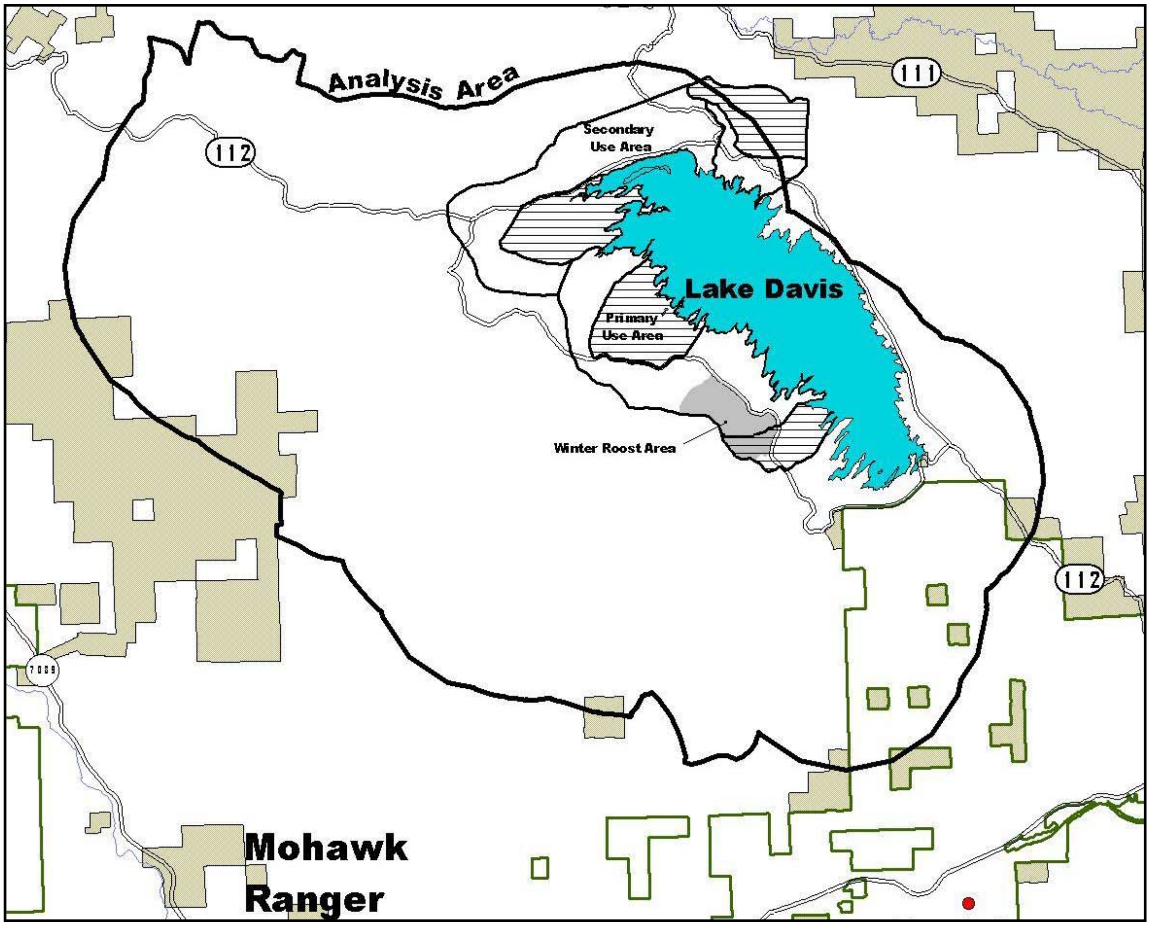

Figure 3.2 Freeman Wildlife Analysis Area with Bald Eagle Primary Use Areas (horizontal stripping), Secondary Use Areas (black outline) and Winter Roost Area (solid color). Species Accounts: Sensitive Species.

Table 3.27 Suitable Bald Eagle Nesting Habitat within the Bald Eagle Habitat Management Area in the Wildlife Analysis Area

Suitable Nesting Habitat	
CWHR Strata	**Acres**
EPN5D	13
EPN5M	166
EPN5P	15
SMC5D	21
SMC5M	6
SMC5P	4
Total	**225 (4% of Land Base)**
Potentially Suitable Nesting Habitat in 25 - 100 years	
CWHR Strata	Acres
EPN4D	703
EPN4M	1514
EPN4P	290
PPN4M	9
SMC4D	400
SMC4M	500
SMC4P	79
WFR4M	1
WFR4P	41
Total	**3,537 (61% of Land Base)**
Potentially Suitable Nesting Habitat in >100 years	
CWHR Strata	Acres
EPN3M	1
EPN3P	21
EPN4S	8
PPN4S	59
SMC3D	17
SMC3P	13
WFR2S	72
Total	**191 (3% of Land Base)**

Unsuitable Nesting Habitat	
CWHR Strata	**Acres**
AGS (Annual Grassland)	122
ASP (Aspen)	67
LPN (Lodgepole Pine)	492
MCP (Montane Chaparral)	48
PGS (Perennial Grassland)	1,054
SGB (Sagebrush)	40
WTM (Wet Meadow)	22
Water	25
Total	**1,870 (32% of Land Base)**
Total Land Base	**5,823 acres**

Mountain yellow-legged frog

The mountain yellow-legged frog historically inhabited ponds, tarns, lakes and streams from 4,500 to over 12,000 ft (Stebbins 1985 in SNFPA 2001). Adults are highly aquatic and are typically associated with near-shore areas of lakes for reproduction, cover, foraging, and over-wintering and in low gradient (up to 4%) perennial streams with irregular shores and rocks (SNFPA 2001). Streams in this category generally have the potential for deep pools (12-20”) and undercut banks that provide suitable breeding and overwintering habitat. They prefer well illuminated, sloping banks of meadow streams, riverbanks, isolated pools with vegetation that is continuous to the waters edge (Martin 1993, Zeiner et al 1988). This species is seldom far from water. On the Plumas National Forest, this species is found in a few small lakes in the Bucks Lake Wilderness, Lakes Basin and in several streams throughout the Forest.

There are no historical records of mountain yellow-legged frogs within the wildlife analysis area identified in the Forest database. In 2002, the Humbug Project, including the southeastern portion of the Freeman wildlife analysis area was surveyed to protocol standards (“Standardized Protocol for Surveying Aquatic Amphibians” (Fellers and Freel 1995)), by contractors EcoSystems West Consulting Group. In 2003, the Happy Jack Project, including the southwestern portion of the Freeman wildlife analysis area was surveyed to protocol standards (“Standardized Protocol for Surveying Aquatic Amphibians” (Fellers and Freel 1995)), by contractors Mathews and Associates. In addition to the past ten years of surveys, site-specific amphibian surveys covering the remainder of the Freeman wildlife analysis area, using established survey protocols (Fellers & Freel 1995) were conducted in all perennial streams, intermittent streams, springs and ponds that had potential amphibian habitat in 2004, specifically for the project area (WWC, 2005). No mountain yellow-legged frogs were found during any of the surveys conducted in the wildlife analysis area. The closest known population is located about 11 miles south in Wade Lake, at the headwaters of Little Jamison Creek, downstream from the wildlife analysis area.

A three-year MYLF telemetry study began in July 2003 with six frogs tagged with radio transmitters in Bean Creek and six in Lone Rock Creek, both on Mt. Hough Ranger District (Matthews 2003, personal com.). The objective of the study is to determine the dispersal behavior of the MYLF in relation to steams and adjacent terrestrial habitat. From this telemetry study, current findings include that the frogs are only associated directly within the drainage or immediately adjacent; in the summer months each adult frog has been located very close to the same pool/territory; and in the fall, as temperatures decline, female frogs have been found to be moving downstream within the stream channel towards male frogs (Vance 2004, personal com.).

While direct habitat degradation has not been cited as a cause of declines of this species, key management activities that the Forest Service can influence include: exotic fish stocking, pack stock use and access, recreation, and locally applied chemical toxins (pesticides and herbicides) (SNFPA 2001). None of these activities are planned, or would be affected by the four alternatives.

Foothill yellow-legged frog

The foothill yellow-legged frog historically occurred in foothill and mountain streams to 6000 feet (SNFPA 2001). Adults use both in-stream and riparian environments, though use of riparian areas and adjacent uplands is poorly understood (Ibid). This species is found in or near rocky perennial streams and rivers in a variety of habitats, including riparian, mixed conifer and wet meadow types. It inhabits areas with moving water but tends to avoid areas with steep gradients (Zweifel 1955). These frogs prefer partial shade, shallow riffles, and cobble sized or greater substrate (Hayes and Jennings 1988). On the Plumas National Forest, this species is found in a few of the larger riverine systems, such as lower portions of the South Fork, Middle Fork and North Fork Feather River (NFFR), and Spanish Creek, but has also been found in smaller tributary streams of these larger systems.

There are no historical records of foothill yellow-legged frogs within the wildlife analysis area identified in the Forest database In 2002, the Humbug Project, including the southeastern portion of the Freeman wildlife analysis area was surveyed to protocol standards (“Standardized Protocol for Surveying Aquatic Amphibians” (Fellers and Freel 1995)), by contractors EcoSystems West Consulting Group. In 2003, the Happy Jack Project, including the southwestern portion of the Freeman wildlife analysis area was surveyed to protocol standards (“Standardized Protocol for Surveying Aquatic Amphibians” (Fellers and Freel 1995)), by contractors Mathews and Associates. In addition to the past ten years of surveys, site-specific amphibian surveys covering the remainder of the Freeman wildlife analysis area, using established survey protocols (Fellers & Freel 1995) were conducted in all perennial streams, intermittent streams, springs and ponds that had potential amphibian habitat in 2004, specifically for the project area (WWC, 2005). No foothill yellow-legged frogs were found during any of the surveys conducted in the wildlife analysis area. The closest known population is located about 18 miles west on Spanish Creek, downstream from the wildlife analysis area.

Key management activities which the Forest Service can influence are: dams and diversions, mining, livestock grazing, recreation, vegetation management and mechanical fuel treatment, roads, and locally applied chemical toxins (pesticides and herbicides); fire can directly affect amphibians (SNFPA 2001). The three Proposed Action alternatives for the Freeman project include vegetation treatment, mechanical fuels treatment, roadwork and use of prescribed fire.

Northwestern pond turtle

On the Plumas National Forest, occupied Northwestern pond turtle habitat exists primarily on the westside (Feather River Ranger District) and central (Mt. Hough Ranger District) areas of the Forest, although a sighting was recorded in Sierra Valley. The Plumas NF database contains 32 records for pond turtles. There are no records for this species within the wildlife analysis area. In 2003, the Happy Jack Project, including the southwestern portion of the Freeman wildlife analysis area was surveyed to standards ("Western Pond Turtle Survey Methods" (Reese 1993)), by contractors Mathews and Associates. In addition to the past ten years of surveys, site-specific northwestern pond turtle surveys, covering the remainder of the Freeman wildlife analysis area using established standards (Reese 1993) was conducted in all perennial streams, intermittent streams, springs and ponds that had potential northwestern pond turtle habitat in 2004, specifically for the project area (WWC, 2005). No northwestern pond turtles were found during any of the surveys conducted in the wildlife analysis area. The closest known population is located about 11 miles west in American Valley associated with Greenhorn Creek and the Quincy sewer ponds, downstream from the wildlife analysis area.

American peregrine falcon

This species has been delisted from Threatened status and is now considered a Species of Concern by the USFWS, populations to be monitored for 5 years post delisting. This species requires open habitats including savannahs, seacoasts, open forests and urban areas where tall buildings occur. There are no known peregrine territories within the wildlife analysis area and no records of peregrine sightings within the wildlife analysis area. The closest known peregrine eyrie is approximately 7 air miles southeast of the project area. Within the wildlife analysis area, there is one rock outcrop and/or cliff-like habitat that appears to be suitable nesting habitat. However, this suitable nest habitat is a historically documented prairie falcon eyrie. The one prairie falcon site within the wildlife analysis area is approximately a half mile outside of the project area. No nesting activity has been observed at this sight in the last three years. There is no known nesting activity within the wildlife analysis area.

California spotted owl

On October 12, 2000, the U.S. Fish and Wildlife Service announced a 90-day finding on the petition to list the California spotted owl as threatened or endangered (Federal Register, Vol. 65, No. 198, 60605-60607). The USFWS found that the petition presents substantial information indicating that listing the species may be warranted. The USFWS 12-Month Findings for a

Petition to List the California Spotted Owl (*Strix occidentalis occidentalis*) (FR Volume 68, No. 31, 7580-7608) stated: After the USFWS reviewed the best available science and commercial information available; the USFWS found that the petitioned action was not warranted. The Finding statement leaned heavily on the fact that the original SNFPA FEIS and ROD (2001) and its associated California Spotted Owl strategy set management direction to be implemented across the Sierra Nevada. The Findings did recognize two factors, "The first is a management review of the SNFPA (USFS 2002) and the second is planning for implementation of an Administrative Study on the Lassen and Plumas National Forest that would evaluate the effects of extensive fuels treatment on the California spotted owl (67 FR 72136)… "We will monitor the development of management direction, offer scientific assistance, and review the effects at a later date, if necessary." (FWS 68 FR 7604).

A second petition to protect the spotted owl as an endangered species under the Endangered Species Act was filed with the USFWS on September 1, 2004. This resulted in a 90 day finding that listing the California spotted owl may be warranted (Federal Register/Vol. 70, No. 118, June 21, 2005/Proposed Rules), and initiated a 12-month status review to determine if listing the species is warranted. Substantial changes in information justifying further detailed study by the USFWS include: 1) revisions to the 2001 SNFPA in the 2004 SNFPA, 2) revisions to the California State Forest Practices Code, 3) possible changes to the draft meta-analysis of the population dynamics of spotted owl in the final, published meta-analysis, 4) impacts of recent fires and anticipated future fires in spotted owl habitat; and 5) further range expansion of the barred owl threatening site occupancy, reproduction, and survival of California spotted owls.

Changes to the 2001 SNFPA spotted owl strategy were brought about by the 2004 SNFPA ROD. The 2004 SNFPA owl strategy includes the 5-year HFQLG pilot project, as implemented and directed on pages 66 – 69 of the 2004 ROD. Per that direction, the HFQLG Forests will consider owl PACs, SOHAs, Offbase/Deferred, LSOG 4 and 5, and CWHR classes 5M, 5D, and 6 in project design and implementation of HFQLG vegetation projects. SNFPA standards and guidelines for HRCAs do not apply to the Pilot Project Area and vegetation projects.

The comprehensive adaptive management strategy to investigate the effect of fuels treatments and group selection silvicultural on California spotted owls, referred to as the "Plumas /Lassen Administrative Study", is still part of the owl strategy within the pilot project area. No portions of the Freeman wildlife analysis area occur within the administrative study area.

The latest published information regarding the California spotted owl, in terms of population status, distribution, population and habitat trends, and species requirements can be found within the above mentioned Federal Register (Vol 70, No 118/June 21, 2005/Proposed Rules). Based on this updated information, a total of 1,865 spotted owl territories are known within the Sierra Nevada Range, including 1,399 territories on the Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sierra, and Sequoia National Forests, 129 territories in national parks, 14 territories on BLM lands in the Sierra Nevada and additional 134 owl sites reported on private land.

Five demography studies have been investigating the population trend of the California spotted owl within theSierra Nevada range. These studies provide evidence that suggests that populations may be declining in some parts of the owl's range in the Sierra Nevada. On the Lassen National Forest, data suggests a 7.7% annual rate of population decline from 1990-1998 (Blakesley & Noon 1999). The population change from 1987-2000 on the Sierra NF shows a declining rate in spotted owl population of approximately 10% - 11%; population change on the Sequoia/Kings Canyon National Park study indicate a decline from 1988-2000 of 3% (Steger et al. 2000). These demographic studies suggest population declines in owls. These declines seem sufficient to warrant concern, even in light of uncertainties in the magnitude of the declines (SNFPA). These changes may be resulting from shifts in prey abundance, changes in regional weather patterns, or broad-scale land management practices (Steger et al. 1998).

The USDA Forest Service Pacific Southwest Research Station has released a “meta-analysis” of current California spotted owl population data (Franklin et al, 2003). This analysis re-examined all the demographic data for the owl since 1992 in an effort to assess population status and trends, as well as provide some insight into the methodology for estimating rates of population change. A meta-analysis is an analytical tool that combines information from several studies and provides additional information on status and trends. The final report for the study identifies a number of key points, as summarized by the Regional (R5) office memo dated 5/22/03:

- The population trend data is inconclusive, identifies a great deal of uncertainty regarding range-wide population trends (SNFPA SEIS 2004), and statistical trends may or may not indicate a decline in overall California spotted owl population.
- Reproduction varied significantly from year to year and is likely attributable to annual fluctuations in weather and owl prey availability.
- Risk factors for California spotted owl populations revolve around four main points: habitat abundance and distribution, habitat quality, influence of climate and wildfire.
- Although the study results are inconclusive, caution is advised in managing habitats until additional data is available.

The authors of the meta-analysis (Franklin et al. 2003) concluded that current evidence suggests that California spotted owls are marginally stable or in a slow decline, that strong inferences about population decline could not be made because estimates of lambda (rate of population change) did not differ significantly from a stationary population. Thus the empirical information on spotted owl population trends is uncertain, with the uncertainty in whether populations are in fact declining or remaining stable, not whether they are increasing. If owl populations are declining, activities that further remove their habitat are likely to further contribute to their decline; if populations are in reality stable, activities that remove their habitat may or may not push the population from stable to declining, depending on the magnitude of habitat loss and how close to declining the population currently is (Dunk, 2005). Thus another recommendation from the authors of the meta-analysis is that management actions that may compromise owl populations be initiated slowly and closely monitored.

Prior to 2002, the Plumas NF supported 262 spotted owl PAC's on National Forest, with an additional 20 located primarily on Private land. Owl surveys conducted across the Plumas in 2002 resulted in the addition of 8 owl PACs, resulting in a new total of 270 PACs (Table 5). This is approximately 20% of the total within the Sierra Nevada.

Table 3.28 Existing number of California Spotted Owl PACs on Plumas NF

TOTAL PAC's PNF land	PAC's on Private land	Total
274	20	294

Surveys conducted in 2003 resulted in information that could potentially create an additional 2 PACs on Mt. Hough RD; additional surveys are ongoing to gather more information for PAC establishment. Surveys conducted in 2004 resulted in the addition of one PAC (PL352) on the Mt. Hough RD. Three new PACs were established on Feather River RD in 2003/2004.

There are no reliable total population estimates for the California spotted owl (70 Federal Register 35609). The number of spotted owl territories has been used as an index to indicate the range of the species and where they occur. "This number is actually a cumulative total of all sites known to be historically or currently occupied by at least one spotted owl. This total increases over time as owls move to new territories and as researchers survey new areas, even though many territories with sufficient suitable habitat are not occupied at the present and some territories no longer have sufficient suitable habitat to support spotted owls. … Thus, the number of territories should not be viewed as a population estimate for the taxon "(70 Federal Register 35609).

Habitat requirements for this species (described below) can be found in the CASPO Technical Report (Verner, et al 1992), within the SNFPA FEIS and 70 Federal Register of June 21, 2005. Standards & Guidelines for owl habitat management, within the HFQLG Pilot Project Area, are found in SNFPA ROD (2004) Table 2.

Spotted owls preferentially use areas with at least 70 percent canopy cover, use habitats with 40 to 69 percent canopy cover in proportion to their availability, and spend less time in areas with less than 40 percent canopy cover than expected if habitat were selected randomly (70 Federal Register 35610).

Suitable nesting habitat on the west side of the Sierra Nevada is found in foothill riparian/hardwood forest (1.6% of known sites), ponderosa pine/hardwood forest (6.7% of known sites), mixed-conifer forest (81.5% of known sites) and red fir forest (9.7% of known sites). In general, stands typically have two or more canopy layers, dominant and co-dominant trees in the canopy averaging at least 24 inches in dbh, at least 70% canopy closure, and higher than average levels of very large, old trees, and higher than average levels of snags and downed woody material (70 Federal Register 35610). Owls consistently use stands with significantly greater canopy closure, total live tree basal area, basal area of hardwoods and conifers, snag basal area, and dead-and-downed wood when compared with random locations within forests (Verner et al, 1992) (Table 3.27). Nests and roosts within the Sierra Nevada occur within the following CWHR classes (SNFPA, 2001): 32% in CWHR 6, 18% in structural class 5M, 14% as 4D, 11% as 4M, 9% as 5D, 7% as 5P, and 5% as 4P, with 2% or less of the 5S, 4S, 3D, 3M, and 3P classes (SNFPA 2001). Owl nests were consistently located in sites with 75% canopy cover, 300 stems/ha, and 40,000 cubic meters/ha of foliage volume.

Table 3.29 Range of mean values of some attributes in suitable habitat for spotted owls in Sierra Nevada mixed-conifer forests (from Verner et al. 1992:96 and SNFPA FEIS (2001))

Attribute	Nesting & Roosting Habitat	Foraging Stands
Percent Canopy Cover[1]	70-95	50-90
Total live tree basal area[2]	185-350	180-220
Total snag basal area[3]	30-55	15-30
Basal area of large snags[2, 3]	20-30	7-17
Downed woody debris[4]	10-15	10-15

[1] Mostly in canopy >30 feet high, including hardwoods;
[2] Square feet per acre;
[3] Dead trees >15 inches dbh and >20 feet tall;
[4] Tons per acre

The four nest types used regularly by the spotted owl are:

10. cavity nests placed in natural cavities resulting from decay;
11. broken-topped trees and snags;
12. platform nests placed on remnant platforms built by other species, or on debris accumulations; and
13. dwarf mistletoe brooms.

Data analyzed from 124 nest sites within the Sierra indicated that nest trees averaged 45 inches dbh, and more than 70% of all nest trees surveyed were larger than 30 inches dbh (Verner et al. 1992). Sixty-three percent of nests were in live trees, and 37% were in snags.

For purposes of this analysis, the following affected CWHR types provide high nesting habitat capability: Eastside Pine, Jeffrey Pine, Lodgepole Pine, Montane Hardwood-Conifer, Ponderosa Pine, Red Fir, Sierran Mixed Conifer and White Fir (6, 5D, 5M). These CWHR types have the highest probability of providing stand structures associated with preferred nesting, roosting and foraging. The threshold between canopy cover values that contribute to or detract from occurrence and productivity is a value near 50% (SNFPA 2001, Hunsaker et al. 2002). For the Freeman Project, all 5M is considered owl nesting habitat.

Suitable foraging habitat is found in the same forest types listed above for nesting habitat (CWHR 6, 5D, 5M) as well as 4D, and 4M. Stands considered to be suitable for foraging have at least two canopy layers, dominant and co-dominant trees in the canopy averaging at least 12 inches in dbh, at least 40% canopy closure, and higher than average levels of snags and downed woody material (70 Federal Register, June 21, 2005). Although canopy covers down to 40% are suitable for foraging, they appear to be only marginally so (based on owl occurrence and productivity threshold at around 50% canopy cover, Ibid). In the red fir type, stands with 30% or greater canopy cover should be considered suitable for foraging (SNFPA 2001). For the Freeman Project, all 4M is considered owl foraging habitat.

The most common prey species for spotted owls are northern flying squirrel (*Glaucomys sabrinus*) and dusky-footed woodrat (*Neotoma fuscipes*). The common foods of northern flying squirrels (primarily fruiting bodies of underground fungi and arboreal lichens) are usually found in mature and older forests. The abundance of underground fungi is known to be strongly associated with the presence of well-developed soil organic layers and a large volume of decaying logs. In addition, higher snag densities may be important to flying squirrel densities, since flying squirrels often use old woodpecker cavities as den sites.

Woodrats are typically associated with brush fields, early successional habitats with a mixed conifer/oak component, and in stands with a mix of overstory trees and brush. Brush is usually dominated by thick leaved evergreen species. Woodrats sometimes move from brush fields into the edges of forest where spotted owls forage (USDA Forest Service 1993).

Areas of Concern

The CASPO Technical Report (Verner et. al 1992) identified Areas of Concern (AOC) within the range and distribution of the California spotted owl. These AOC’s are identified simply to indicate potential areas where future problems may limit owl populations and where future problems may be greatest if the owl's status were to deteriorate. Two AOC's identified in the CASPO Report are adjacent to the Plumas National Forest (page 46-49 of CASPO Report):

- Area of Concern 1: In Lassen County, within the Lassen National Forest and adjacent to the Plumas National Forest. The reason for the concern is that the habitat in this area is discontinuous, naturally fragmented, and poor in quality due to drier conditions and lava-based soils.
- Area of Concern 2: In Northern Plumas County, within the Lassen National Forest. The reason for the concern is a gap in known distribution, mainly on private lands, which extends east to west in a band almost fully across the width of the owl's range.

The Freeman project is not located within these AOC’s; AOC 1 is approximately 28 miles to the north and AOC 2 is approximately 20 miles to the northwest. The factors identified for the 2 AOC’s above are not applicable to the Freeman project area.

Wildlife Analysis Area

Spotted owl surveys have occurred within the wildlife analysis area. In 2002 and 2003, the Humbug Project, including the southeastern portion of the Freeman wildlife analysis area, was surveyed to the two-year protocol standards (“Protocol for Surveying for Spotted Owls in Proposed Management Activity Areas and Habitat Conservation areas”, 1991, revised 1993), by contractors Williams Wildland Consulting, Inc. In 2004 and 2005, the Happy Jack Project, including the southwestern portion of the Freeman wildlife analysis area, was surveyed to the two-year protocol standards (“Protocol for Surveying for Spotted Owls in Proposed Management Activity Areas and Habitat Conservation areas”, 1991, revised 1993), by contractors Silva Environmental. The remainder of the Freeman wildlife analysis area was surveyed to protocol in 2004 and 2005 by contractors MGW Biological, specifically for the project area. Approximately 149 stations were surveyed three times in 2004 and 2005. No new PACs were developed based on these survey efforts.

PACs were established for owl activity centers based on criteria described in the CASPO Technical Report (Verner et al 1992) and CASPO IG EA (USDA, 1993), as well as within the SNFPA (2001). Home range cores were delineated for each of these PACs in March-April 2001 based on criteria from the SNFPA. A total of six PACs with associated HRCAs are in the wildlife analysis area (Figure 3.3). Three spotted owl PACs are located within the project area that could potentially incur direct habitat impacts to the associated HRCAs. These PACs and HRCAs include an additional three PACs outside the project area (not directly affected by habitat change as a result of project implementation) supporting owls that could be indirectly affected by the Proposed Actions. There is one 1000-acre base SOHA located within the wildlife analysis area (Figure 3.3). PACs and HRCAs have been delineated for this SOHA and are included in the total of six PACs and HRCAs in the wildlife analysis area. Table 3.30 shows the PAC histories of the PACs in the wildlife analysis area.

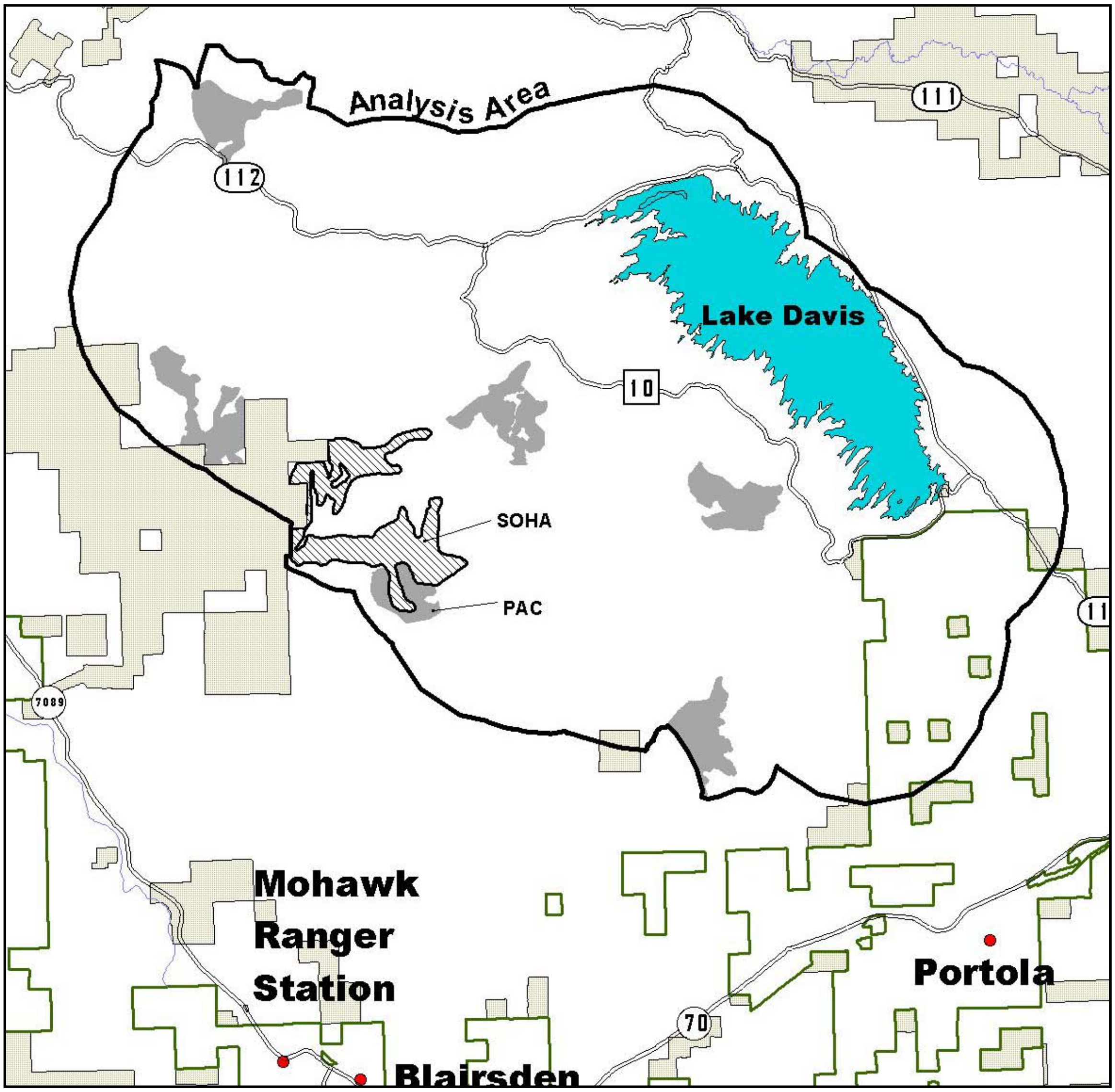

Figure 3.3 Freeman Wildlife Analysis Area with California Spotted Owl Protected Activity Centers (PACs) (solid color) and Spotted Owl Habitat Areas (SOHAs) (diagonal stripping).

Table 3.30 California Spotted Owl PAC History in the Wildlife Analysis Area.

Year	PL080 SOHA H2	PL203^	PL204^	PL205	PL242	PL274
1981	Discovered - Detection					
1982 - 1983	Not Surveyed					
1984	Vocal Detection					
1985 - 1986	Not Surveyed					
1987	Vocal/Visual Detection – Adult Pair					
1988	Vocal/Visual Detection – Adult Pair, Found Nest				Discovered - Detection	
1989	Vocal/Visual Detection – Adult Pair				Detection – Male	
1990	Detection				Vocal Detection – Male	
1991	Vocal/Visual Detection – Adult Pair	Discovered – Vocal Detection – Adult Pair	Discovered – Vocal/Visual Detection – Adult Pair	Discovered – Vocal Detection – Adult	Not Surveyed	
1992	Vocal Detection	Not Surveyed	Vocal/Visual Detection – Adult Pair	Vocal Detection	Not Surveyed	Discovered - Detection
1993	Not Surveyed	Not Surveyed	Vocal/Visual Detection – Adult Pair	Not Surveyed	Not Surveyed	Surveyed – No Detections
1994	Historic Visits – No Detections	Not Surveyed	Historic Visits – No Detections	Not Surveyed	Not Surveyed	Not Surveyed
1995	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed
1996	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed
1997	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed
1998	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed
1999	Not Surveyed	Surveyed – No Detections	Vocal/Visual Detection – Adult Female	Surveyed – No Detections	Detection – Adult Male	Not Surveyed
2000	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed
2001	Not Surveyed	Not Surveyed	Surveyed – No Detections	Vocal Detection – Male	Surveyed – No Detections	Not Surveyed
2002	Vocal/Visual Detection* – Adult Male, Cavity Roost	Not Surveyed	Surveyed – No Detections	Surveyed – No Detections	Not Surveyed	Not Surveyed
2003	Vocal/Visual Detection* – Adult Pair	Not Surveyed	Vocal/Visual Detection* – Adult Pair	Vocal/Visual Detection* – Adult Male	Vocal/Visual Detection – Adult Pair	Not Surveyed

Year	PL080 SOHA H2	PL203^	PL204^	PL205	PL242	PL274
2004	Vocal/Visual Detection* – Adult Pair	Surveyed – No Detections	Vocal Detection*** – Adult Female	Not Surveyed	Vocal Detection* – Adult Male	Vocal/Visual Detection** – Adult Male
2005	Vocal/Visual Detection* – Adult Pair	Vocal Detection*** – Adult Male	Vocal Detection*** – Adult Female	Not Surveyed	Vocal Detection – Adult Female	Vocal Detection** – Adult Male

^PACs in Project Area
*Detections in HRCA associated with the PAC,
** Detections on Private Land immediately adjacent to HRCA associated with the PAC,
*** Detections outside of PAC/HRCA assumed associated to nearest PAC/HRCA.

Table 3.31 shows high capability suitable California spotted owl habitat in the wildlife analysis area (41,388 National Forest acres). Within the wildlife analysis area there is approximately 24,990 acres of suitable spotted owl nesting/foraging habitat (CWHR 5D, 5M, 4D, and 4M).

Table 3.31 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	13,107
4D	Foraging	5,577
5M	Nesting	2,806
5D	Nesting	3,500
Total	**Suitable**	**24,990**

*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.

As mentioned earlier, CWHR habitat typing as depicted in the vegetation layer was derived from aerial photo interpretation. Forest Inventory Analysis (FIA) plot data gathered in the treatment area indicated that the Quadratic Mean diameter (QMD) for all trees (>1.0”) ranged from 6” to 11”, indicating a dominance of small trees in the inventory areas. The vegetation data was gathered utilizing aerial photo interpretation to estimate crown diameter as a proxy for dbh, which is used to determine CWHR size class, while stand inventory data utilizes QMD to estimate size class making it difficult to crosswalk between the vegetation data and the plot data because of different methods for quantifying size class. Stand Inventory considers stocking and diameter of smaller, subordinate canopy trees, thus providing a more conservative estimate of CWHR size class. This difference between the current CWHR classification and the stand exam plots represents uncertainty in the accuracy of the amount of each CWHR habitat type in the wildlife analysis area. The FIA plot data was run through the Forest Vegetation Simulator model (FVS), and for the most part, all vegetation layer CWHR size classes matched the appropriate size class based on the QMD for all trees >10” dbh. But it is acknowledged that there are some disparities and that the acres reflected in Table 6 could be inexact estimates of habitat availability. The CWHR classification continues to be used as the habitat baseline for wildlife habitat analysis during the life of the HFQLG project as it maintains consistency for monitoring changes in species habitat over the life of the HFQLG Pilot Project. This includes the requirement to not cumulatively reduce old forest dependent species habitat (5M, 5D, & 6) more than 10% below 1999 levels (HFQLG FEIS, 1999).

Northern goshawk

The latest published information regarding the goshawk, in terms of population status, distribution, population and habitat trends, and species requirements can be found within SNFPA EIS (Chapter 3, Part 4.4.2.2), and in Chapter 3.2.2.4 of the SNFPA SFEIS 2004. A total of 588 northern goshawk-breeding territories have been reported from Sierra Nevada National Forests. The Plumas NF supports approximately 110 goshawk territories (Table 3.30). This is approximately 15% of the total within the Sierra Nevada. These numbers represent goshawks that have been found as a result of both individual project inventories to standardized protocols, as well as nest locations found by other incidental methods. The 1988 PNF LRMP calls for a network of 60 nesting territories to provide for the viability of the goshawk. It is uncertain as to whether this figure is accurate; the Forest has been developing territories (pre-SNFPA) and now 200 acre PACs (SNFPA, 2004) for all newly discovered goshawk-breeding sites. So it is believed that the current density of goshawk territories is contributing to goshawk viability within the Plumas National Forest.

Table 3.32 Existing Northern Goshawk Nest Territories or PACs, Plumas NF

Total Nesting Territories as per SNFPA (2000)	Nesting Territories Found 2001 - 2003	Nesting Territories Found 2004	Total Goshawk Nesting Territories
75	27	8	110

Population trends of northern goshawks in the Sierra Nevada are unknown, although numbers are suspected to be declining due to habitat reductions and loss of territories to timber harvest (Bloom et al. 1986 in SNFPA). Based on several studies (Bloom et al., 1986) Reynolds et al. 1992, Kennedy 1997, Squires and Reynolds 1997, Smallwood 1998, DeStefano 1998, all in SNFPA EIS) there is concern that goshawk populations and reproduction may be declining in North America and California due to changes in the amount and distribution of habitat or reductions in habitat quality. Monitoring of nest sites on the Mt. Hough RD from 1998 to 2002 indicates that over the last 5 years nesting activity occurred at approximately 36% of monitored sites annually.

Northern goshawk surveys have occurred within the wildlife analysis area. In 2002 and 2003, the Humbug Project, including the southeastern portion of the Freeman wildlife analysis area, was surveyed to the two-year protocol standards (“Survey Methodology for Northern Goshawks in the Pacific Southwest Region” (USFS 2000)), by contractors North State Resources, Inc. In 2004 and 2005, the Happy Jack Project, including the southwestern portion of the Freeman wildlife analysis area, was surveyed to the two-year protocol standards (“Survey Methodology for Northern Goshawks in the Pacific Southwest Region” (USFS 2000)), by contractors Williams Wildland Consulting, Inc. The remainder of the Freeman wildlife analysis area was surveyed to protocol in 2004 and 2005 by contractors Williams Wildland Consulting, specifically for the project area. Three new goshawk-nesting sites were located resulting in three new PACs with this effort (WWC 2005). A total of eight PACs are in the wildlife analysis area (Figure 3.4). Table 3.33 provides PAC history for Northern goshawks within the wildlife analysis area.

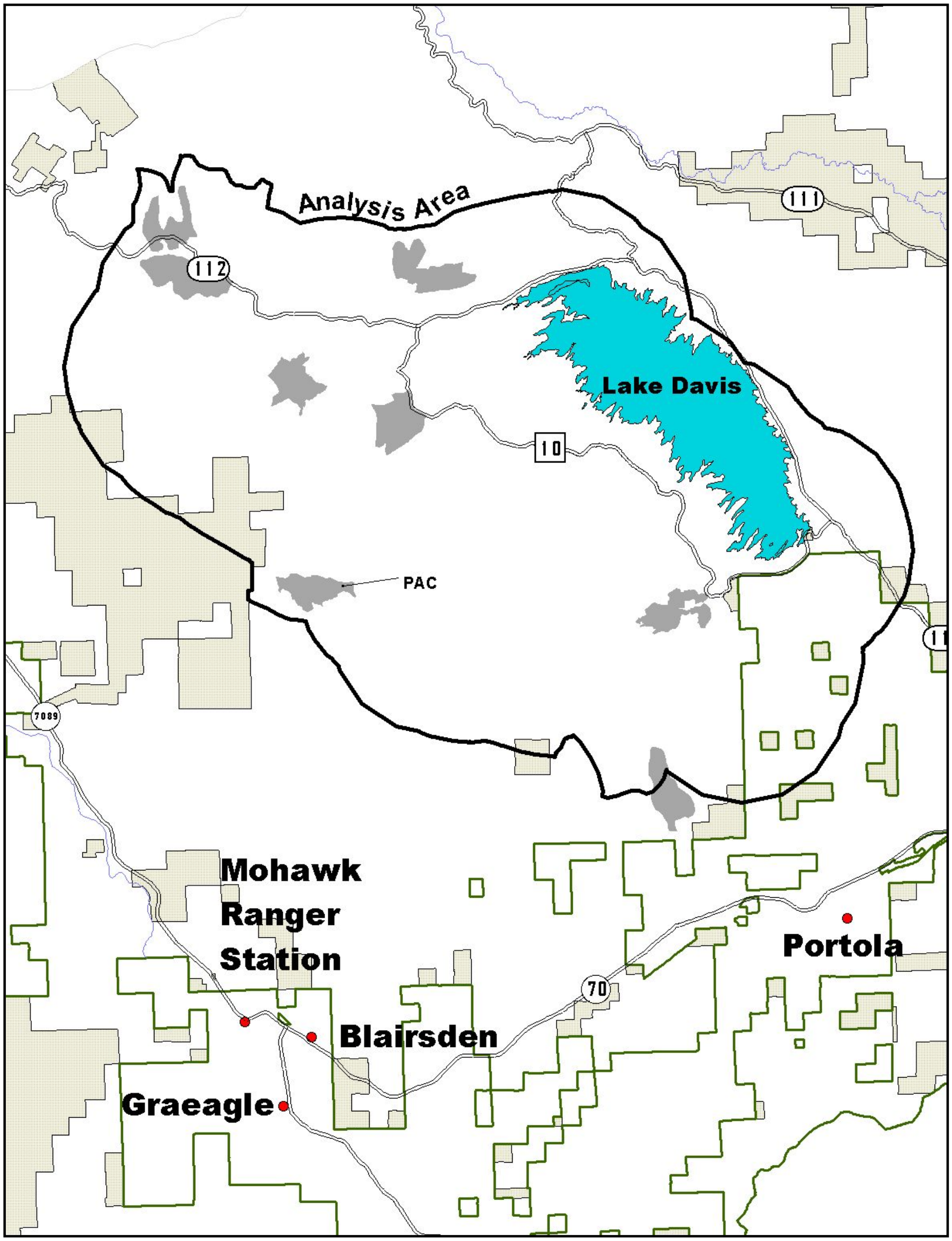

Figure 3.4 Freeman Wildlife Analysis Area with Northern Goshawk Protected Activity Centers (PACs) (solid color).

Table 3.33 PAC History for Northern Goshawks within Wildlife Analysis Area.

Year	Lovejoy	Oldhouse	West Humbug	Little Summit	Happy Valley	Smith^ Peak	Midway^ House	Freeman^ Creek
1985	Discovered – Nest Site 3 young							
1986	Surveyed – No Detections							
1987	Not Surveyed							
1988	Surveyed – No Detections		Discovered – Nest Site 2 young					
1989	Not Surveyed		Detection – Nest Site 1 young					
1990	Detection – Nest Site 1 young	Discovered – Nest Site 2 young	Surveyed – No Detections					
1991	Not Surveyed	Detection – Nest Site 1 young	Surveyed – No Detections					
1992	Surveyed – No Detections	Surveyed – No Detections	Detection – Nest Site 1 young					
1993	Not Surveyed	Not Surveyed	Surveyed – No Detections					
1994	Not Surveyed	Surveyed – No Detections	Surveyed – No Detections					
1995	Not Surveyed	Not Surveyed	Detection – Nest Site 0 young					
1996	Surveyed – No Detections	Detection – Nest Site 2 young	Surveyed – No Detections					
1997	Not Surveyed	Surveyed – No Detections	Not Surveyed					
1998	Not Surveyed	Not Surveyed	Not Surveyed	Discovered – Nest Site 3 young				
1999	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed				
2000	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed				
2001	Not Surveyed	Not Surveyed	Not Surveyed	Not Surveyed				
2002	Not Surveyed	Not Surveyed	*Visual Detection – Adult	Not Surveyed	Discovered – **No Nest Site 2 young			

Year	Lovejoy	Oldhouse	West Humbug	Little Summit	Happy Valley	Smith^ Peak	Midway^ House	Freeman^ Creek
2003	Not Surveyed	Not Surveyed	Surveyed – No Detections	Not Surveyed	Surveyed – No Detections	Discovered – **Nest Site 2 young		
2004	Not Surveyed	Not Surveyed	Not Surveyed	Surveyed – No Detections	Detection – Nest Site 2 young	Detection – Nest Site 2 young	Discovered – Nest Site 3 young	Discovered – Nest Site 3 young
2005	Surveyed – No Detections	Not Surveyed	Not Surveyed	Surveyed – No Detections	Detection – Nest Site 3 young	Detection – Nest Site 2 young	Detection – Nest Site 2 young	Detection – Nest Site 2 young

^PACs in Project Area
*Detection outside of PAC
**Discovery by Humbug Project Spotted Owl Surveyors

Data sets from studies in the western US (Woodbridge and Detrich 1994, DeStefano et al. 1994, Reynolds et al. 1994, Reynolds and Joy 1998) establish a range of crude densities from 1 territory/2,123 acres to 1 territory/4,003 acres; territory centers are roughly 1.9 to 2.3 miles apart. These crude densities include both suitable and unsuitable habitat within the study areas. The crude densities for goshawk territories in the Freeman wildlife analysis area, based on PACs identified in Table 3.33, are much lower than these figures: 1 territory/5,755 acres in the entire wildlife analysis area, 1 territory/5,174 acres on national forest acres in the wildlife analysis area, or 1 territory/3,123 acres based on total suitable nesting habitat on national forest lands in the wildlife analysis area. Territory centers range from dense (0.75 to 1.5 mile apart in the Little Summit Lake area) to scattered (3-6 miles apart). Based on the density and spacing of known goshawk territories, it appears that the crude density of goshawk territories within the Freeman project may be less than what has been reported in the literature. The large blocks of unsuitable habitat created by past activities and the extensive meadow network may contribute to lower densities and increased spacing.

Northern goshawks are currently being managed under the Plumas LRMP as amended by the SNFPA SFEIS ROD (2004), pages 66-67 and Table 2. Habitat requirements for this species can be found within the SNFPA EIS and summarized below.

The northern goshawk requires mature conifer and deciduous forest with large trees, snags, and downed logs, dense canopy closure for nesting and forests with moderately open overstories, open understories interspersed with meadows, brush patches, or other natural or artificial openings and riparian areas for foraging. Recent studies indicate that goshawks typically select for canopy closures greater than 60% for nesting (Hall 1984, Richter and Callas 1996, Keane 1997). The following affected CWHR types provide high nesting habitat capability: Sierran Mixed Conifer, White Fir, Montane Hardwood-Conifer, and Montane Riparian (6, 5D, 5M, 4D, 4M), Ponderosa Pine, Jeffrey Pine, and Lodgepole Pine (5D, 5M, 4D, 4M) and Red Fir (5D, 5M). The following CWHR types are rated as providing moderate nesting habitat capability: Aspen (6, 5D, 5M, 4D, 4M), Eastside Pine (5D, 5M, 4D, 4M, 3D, 3M), Red fir (4D, 4M), and Lodgepole Pine (3D, 3M) (SNFPA FEIS Vol3, Chap.3, part 4.4 pg 116).

Within the wildlife analysis area there are approximately 19,645 acres of habitat providing high nesting habitat capability (Table 3.34).

Table 3.34 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	9,804
4D	High nesting	4,447
5M	High nesting	2,023
5D	High nesting	3,371
Total	**High nesting**	**19,645**
3M	Moderate nesting	105
3D	Moderate nesting	29
4M	Moderate nesting	3,303
4D	Moderate nesting	1,130
5M	Moderate nesting	783
5D	Moderate nesting	129
Total	**Moderate nesting**	**5,479**
Total All	**All nesting**	**25,124**

*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.

As explained above under Table 8 for spotted owl, it is acknowledged that the acres reflected in Table 3.31 could be inexact estimates of habitat availability.

Great gray owl

Historic sightings are recorded for all counties in the Cascade Range in California and the Sierra Nevada as far south as Tulare Co. The present known population is centered in Yosemite National Park. It includes nesting activity on the Stanislaus National Forest at five distinct locations, and several recent sightings on the Sierra National Forest, including a successful nest site in 2002 (Cougoulat, personal com. 2002). Recent sightings of great gray owls have also occurred in or near the Modoc, Lassen, Tahoe, Eldorado, and Toiyabe. Recent great gray owl sightings on the Plumas include two adults found on the Feather River Ranger District of the Plumas (8/97), although subsequent site visits and surveys have not relocated these birds (Roberts, personal comm. 2002).

Potentially suitable habitat for the great gray owl is scattered across the Forest. The great gray owl requires the following for nesting and foraging (USDA FS 2000):

1. Mid- or late-succession conifer forests containing large, broken-top snags (> 24 in. dbh, particularly red and white firs) in the forest matrix in sufficient numbers (5-6 snags/acre) to provide nest sites. Old and decadent black oaks have been used for nesting at lower elevations.
2. Suitable nest sites located < 300 yards from montane meadows or grass-forb forage types between 2,000 and 8,000 feet in elevation.

3. Canopy closure greater than 60% in at least portions of the forest stands adjacent to meadows or other openings.
4. Meadows or openings that have sufficient herbaceous cover to support pocket gophers and microtine rodents. There should be a minimum of 5-10 inches of residual cover at the end of the summer to maintain suitability. Meadows with standing water remaining at mid-summer are not suitable.

Within the wildlife analysis area there are approximately 19,645 acres of habitat providing nesting habitat capability and approximately 19,645 acres of habitat providing foraging habitat capability (Table 3.33).

Table 3.35 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	
Meadows (AGS, PGS & WTM)	Foraging (optimal)	
Total	**Foraging**	**24,990**
4M	Nesting	3,372
4D	Nesting	2,346
5M	Nesting (optimal)	991
5D	Nesting (optimal)	829
Total	**Nesting**	**8,553**

*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.

As explained above under Table 3.31 for spotted owl, it is acknowledged that the acres reflected in Table 3.35 could be inexact estimates of habitat availability.

Surveys for great gray owls were conducted in portions of the wildlife analysis area in 2004 and 2005 to the two year protocol (“Survey Protocol for the Great Gray Owl in the Sierra Nevada of California, May 2000” (USDA FS 2000)) by Klamath Wildlife Resources. Thirteen vocal and/or visual detections of great gray owls (adults and juveniles) were reported by KWR during the 2004 season. An additional 20 vocal and/or visual detections of great gray owls (adults) were reported by KWR during the 2005 season with three of these detections confirmed by Forest Service Wildlife Biologist Russell Nickerson. An additional confirmation of presence (vocal detection) came from the California Department of Fish and Game (Stermer, CDF&G, personal comm. 2005). None of the detections or confirmations has provided any hard proof photos, feathers, or nest sites). Based on these detections and confirmations, three large preliminary PACs have been established for the Freeman project (Figure 3.5). These preliminary PACs encompass the majority of the detection made in 2004 and 2005. Further survey efforts outside of the Freeman project will need to be made in order to better define these preliminary PACs which range from 338 acres to 1,053 acres in size.

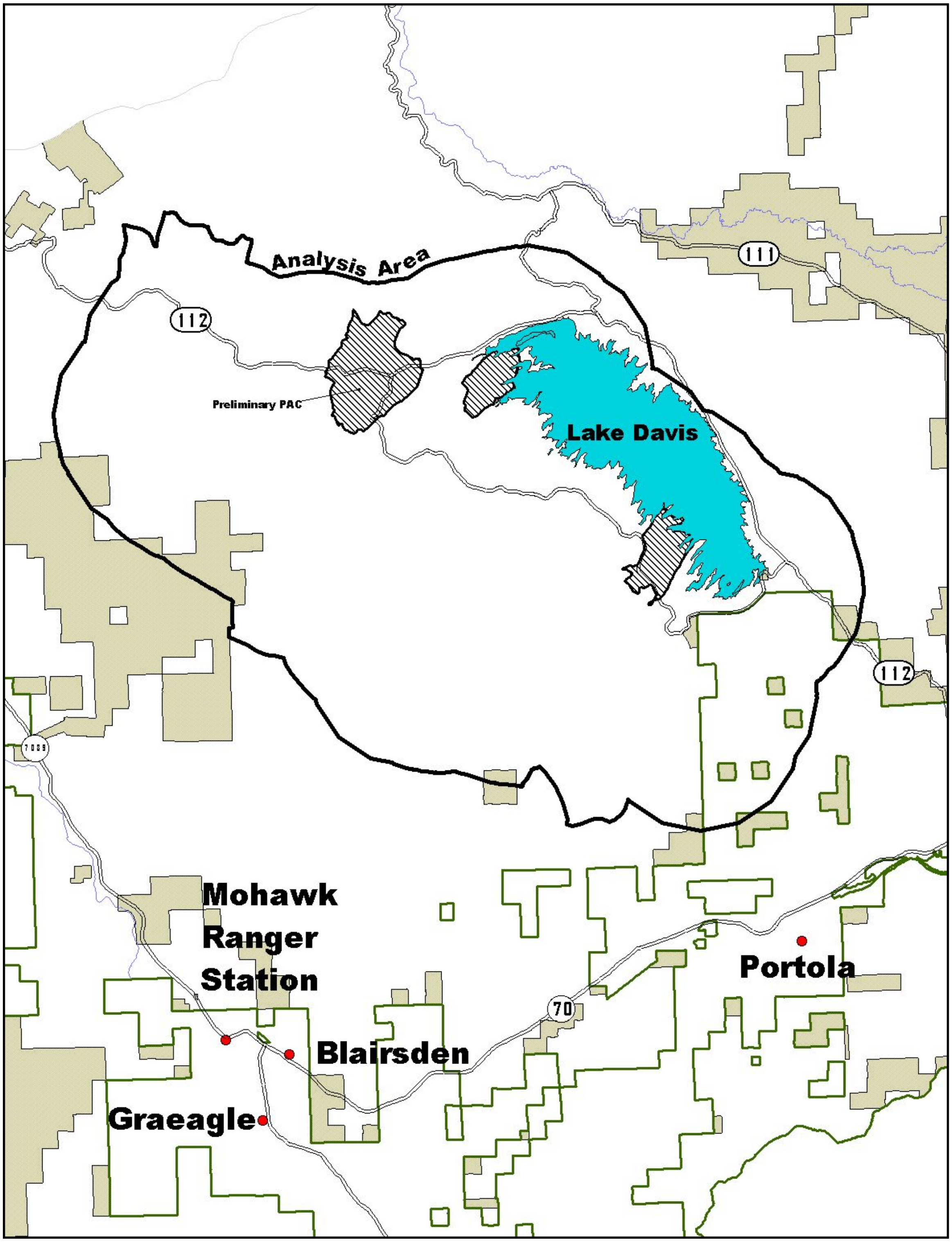

Figure 3.5 Freeman Wildlife Analysis Area with Preliminary Great Gray Owl Protected Activity Centers (PACs) (solid color).

Willow Flycatcher

The willow flycatcher (WIFL) (*Empidonax traillii*) is a Neotropical migrant that breeds in riparian and mesic upland thickets in the United States and southern Canada (AOU 1983). In California, it is a rare to locally uncommon summer resident in wet meadow and montane riparian habitats at 2,000 to 8,000 feet and a common spring (mid-May to early June) and fall (mid-August to early September) migrant at lower elevations, primarily in riparian habitats, throughout the State exclusive of the North Coast (Zeiner et al. 1990a). Most (88% of known sites) Sierra Nevada meadows used by breeding willow flycatchers occur between 4,000 to 8,000 feet (Green et al, 2003).

The southwestern WIFL (*E. t. extimus*) is a federally endangered species that occurs in southern California, north to the south fork of the Kern River. This sub-species does not occur in Plumas County. The other two subspecies that could occur within the project area are E. t. brewsteri, which breeds from Fresno County north, from the coast to the Sierra Nevada crest, and *E. t. adastus* which breeds east of the Sierra/Cascade axis, from Oregon into Modoc County and possibly to northern Inyo County.

Wet meadows and willow shrubs appear to be the most common habitat, but riparian deciduous shrubs along streams are also used. Habitat typically includes moist meadows with perennial streams and smaller spring fed or boggy areas with willow (*Salix spp.*) or alders (*Alnus spp.*). The presence of water during the breeding season appears to be an important habitat component (Fowler et al. 1991). All known breeding territories have water present in one of the following forms: running water, standing pools, or saturated soils (Harris et al. 1988, Sanders and Flett 1989, Green et al, 2003). Water is not necessarily present during the later stages of the breeding cycle, but is always available during the early stages of breeding and pair formation. The minimum size meadow useable for willow flycatchers is assumed to be 0.62 acres (Fowler et al. 1991). Two Statewide surveys found most (more than 80%) willow flycatchers on meadows greater than 19.8 acres in size (Serena 1982, Harris et al. 1988). More than 95% of the breeding meadows are greater than 10 acres and most successful meadows (>1 territory fledged young) are greater than 15 acres (Green et al, 2003). Willow flycatchers have also been found in riparian habitats of various types and sizes ranging from small lakes or ponds surrounded by willows with a fringe of meadow or grassland, to willow lined streams, grasslands, or boggy areas. The breeding season begins in late May to early June with adults and fledglings generally staying in the breeding areas through August. Nests are open cupped, usually 3.7 to 8.3 feet above the ground and mostly near the edge of deciduous, riparian shrub clumps (Sanders and Flett 1989, Valentine et al. 1988, Harris 1991).

Willow flycatchers forage by either aerially gleaning insects from trees, shrubs, and herbaceous vegetation, or they hawk larger insects by waiting on exposed forage perches and capturing them in flight (Ettinger and King 1980, Sanders and Flett 1989). In Perazzo Meadow (Tahoe NF), willow flycatchers usually flew less than 3.3 feet from a perch when hawking insects, but occasionally flew as far as 33 feet (Sanders and Flett 1989). The selection of nest sites near water appears to be related to increased densities of aerial insects. Willow flycatcher nests are frequently parasitized by brown-headed cowbirds, although within the Sierra Nevada brood parasitism rates are low relative to other areas of the west (SNFPA EIS, 2001). Neither nest disruption by livestock or brood parasitism by cowbirds appears to be a prevalent impact in the Sierra Nevada population of willow flycatchers (Green et al, 2003).

Most of the known breeding populations of these two subspecies in California occur in isolated mountain meadows of the Sierra Nevada (up to 8,000 foot elevation) (Serena 1982, Harris et al. 1988). Current estimates of the willow flycatcher population within the SNFPA FEIS planning area range from 300-400 individuals. Records compiled from National Forests, researchers, scientific literature, and museum collections dating from 1910 to 2000 document 135 known locations within the SNFPA planning area boundary (SNFPA EIS, 2001).

A few willow flycatcher territories occur in meadow and willow associated habitat areas scattered across the Plumas National Forest. Most consist of single individuals or a pair. Up to 4 territorial males were identified in Mabie along the Middle Fork of the Feather River (MFFR) near Delleker in 2002. Nesting has been documented in Plumas-Eureka State Park and Mabie. Additional sightings of singing males on the Beckwourth RD include: Chase(1999, 2005), Delleker (1990, 2001, 2002, 2003), Doyle Crossing (1998, 1999), West Doyle Crossing (2005), Mabie (2002, 2003, 2005), East Mabie (2002, 2003, 2005), East Portola (1998), Ramelli Ranch (1995), East Ramelli Ranch (2002, 2005), Grass Lake (1993, 2002, 2005), Gray Eagle Lodge (1994, 1997, 2002, 2003), McRae Meadow (1982, 1986, 1993, 1994, 2003), East Nelson Creek (2005), and Rocky Point (1998). Within the wildlife analysis area there are approximately 574acres of riparian habitat that could potential provide nesting habitat capability for willow flycatchers.

No willow flycatchers have been documented within the wildlife analysis area. The closest documented sightings occur one mile north of the wildlife analysis area at Chase in Red Clover Valley and one and a half miles south at Delleker. Surveys for willow flycatchers were conducted in portions of the wildlife analysis area in 2005 to the protocol (“A Willow Flycatcher Survey Protocol for California, May 29, 2003” (Bombay, et. al.)) by Klamath Wildlife Resources. No willow flycatchers were detected during this survey effort (KWR 2005).Greater Sandhill Crane This species requires marshes or grain fields near a shallow body of water used as a communal roost site; irrigated pastures, used as loaf sites, are suitable habitat. The California Central Valley population nests from British Columbia to northeastern California and winters in the Central Valley. A total of 276 greater sandhill cranes at 60 sites were recorded in California during a 1988 breeding pair survey, all in six counties in northeastern California and mostly within Modoc and Lassen Counties; 7 of the sites were in Plumas County. Of these 276 pairs, 5% were on lands administered by the National Forest System (Littlefield and Ivey, 1994). Current estimates are approximately 30-50 breeding pairs could occur on the Lassen and Modoc National Forests. The data from the 4 National Forests with greater sandhill crane shows that there were only 5 successful nesting attempts in 1997 and 6 in 1998 (SNFPA EIS, 2001).

In Plumas County, nesting cranes have been documented at several locations on private land in American Valley around Quincy, Indian Valley, and Sierra Valley. Cranes have also been documented in Red Clover Valley and around Lake Davis (within the Forest Boundary). But no nesting attempts on Plumas National Forest lands have been documented. The majority of sightings within Plumas County consist of migrating flocks flying overhead in the spring and fall. The greater sandhill crane occurs on the Plumas National Forest during the summer breeding season and during migration. It is found in medium to large wetlands and short grass valley bottoms. The eastside of the Plumas has numerous meadows with suitable habitat and several sightings, but no documented nesting success. Sandhill cranes have been observed foraging within the wildlife analysis area (Nickerson, pers. obs.).

Mesocarnivores

The PNF has mapped a forest carnivore network that consists of scattered known marten sightings, large habitat management areas, and wide dispersal or connecting corridors. The management 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 network is comprised of four components: 1) the riparian zone; 2) old-forest habitat, including spotted owl PACs and SOHAs, goshawk territories, 3) connectors, such as Special Interest Areas, Bucks Lake Wilderness, Wild & Scenic River and 4) known marten sightings. Much of the forest carnivore network is in areas reserved from harvest for other reasons (e.g., Lakes Basin, Bucks Lake Wilderness). However, there is concern for corridors between these reserves that allow immigration and emigration to maintain healthy populations. Approximately 10,923 acres of the forest carnivore network (4.0%) is within the wildlife analysis area (Figure 3.6).

The SNFPA standards and guidelines for mesocarnivore habitat do not speak to carnivore networks, allowing each Forest to decide on the management need for the network. The Plumas NF network is not incorporated into its LRMP as a land allocation with standards & guidelines; it is a plan to project analysis tool designed to maintain future options. The network is used as a tool to evaluate impacts of specific projects on habitat connectivity.

The Sierra Nevada Ecosystem Project (SNEP Report) (Davis: University of California Centers for Water and Wildland Resources, 1996) ranked areas for their contribution to late seral/old growth function (LS/OG), with 0 contributing the least and 5 contributing the greatest. There are no areas with high (4 and 5s) LSOG ranking within the proposed project area.

Approximately 50% of the PNF has been systematically surveyed, by the Pacific Southwest Research Station (PSW), District Biologists/Wildlife Technicians and Contractors, to protocol using track plates and camera stations (PNF GIS database). To date, there have been no fisher, Sierra Nevada red fox, or California wolverine detections associated with these surveys. On the PNF, all but about 5 sightings of marten occur within the Lakes Basin-Haskell Peak area, or around Little Grass Valley Reservoir. All of these 5 sightings are unverified reports (verified report consists of photograph, tracks, hair sample, sighting by reputable biologist).

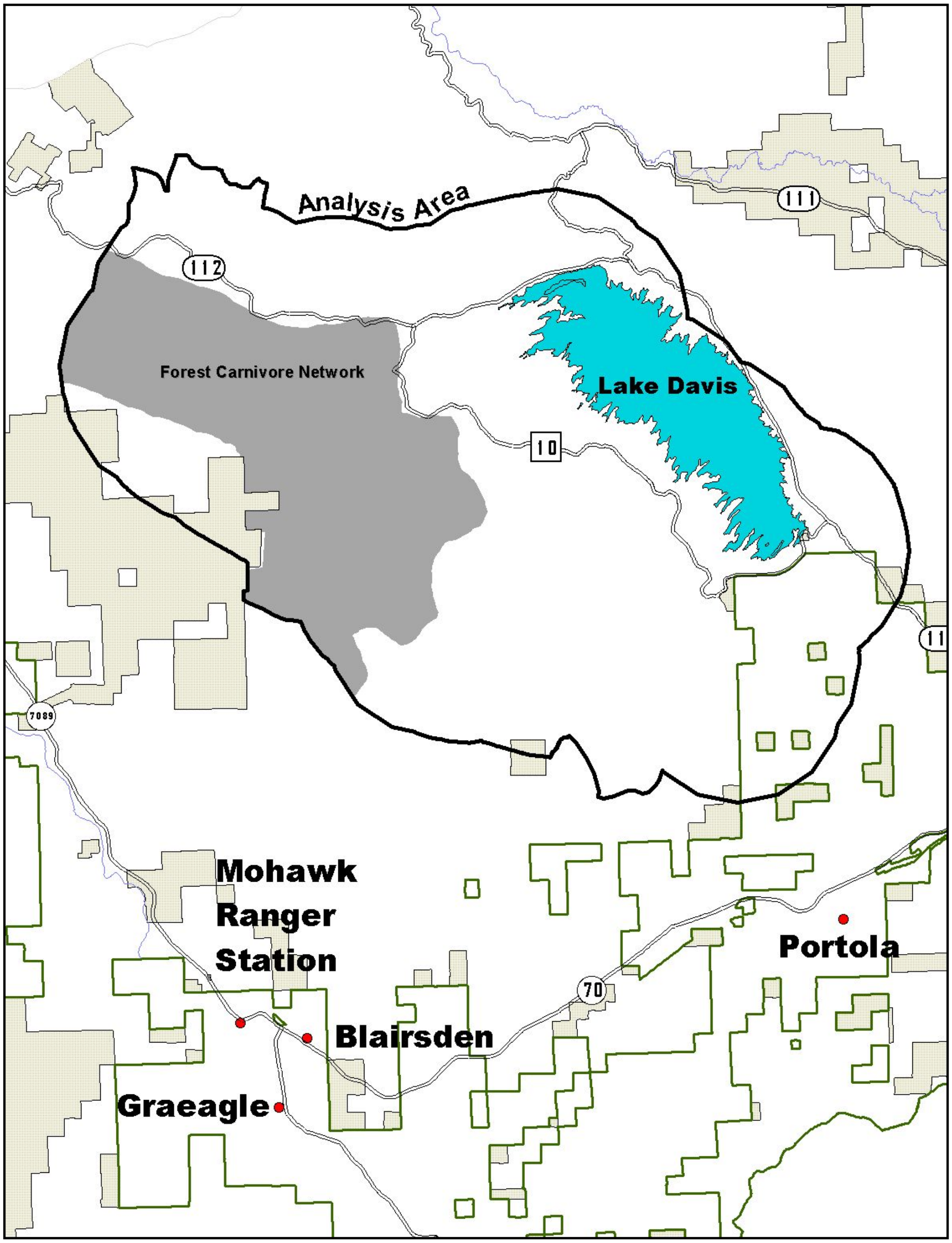

Figure 3.6 Freeman Wildlife Analysis Area with Forest Carnivore Network (solid color).

The Freeman wildlife analysis area has been surveyed several times over the years for mesocarnivores using both camera stations and track plates as detailed in Zielinski & Kucera (1995). This includes survey efforts by USFS crews in 1994, contractor surveyors Garcia and

Associates in 2002, and contractor surveyors Arroyo Chico Resources in 2004. To date no target mesocarnivores have been detected in the wildlife analysis area using these methods. The Freeman wildlife analysis area was surveyed to protocol ("American Marten, Fisher, Lynx and Wolverine: Survey Methods for Their Detection" (Zielinski and Kucera 1995)) using baited photo stations, from January 18th to March 7th, 2005 by contractor Mathews and Associates. Thirty-two camera stations were monitored for a total of 1,309 survey days. No target mesocarnivores were found (Mathews 2005).

The road density within the wildlife analysis area is approximately 2.9 miles of open road per square mile. Open roads and improperly closed roads adversely affect mesocarnivores. Roads 1) allow access to areas and cause disturbance to these animals from human intrusion and removal of snags and downed logs through wood gathering activities; 2) increase vehicle/animal encounters resulting in roadkill; 3) can fragment habitat and affect the ability of animals to use otherwise suitable habitat on opposing sides of the road (Duncan Furbearer Interagency Workgroup 1989). There may be a threshold value for road density (miles of open road per square mile) above which the habitat cannot sustain certain wildlife species but studies specifically addressing these effects on marten or fisher have not yet been addressed (SNFPA, 2001). Early habitat models (Freel, 1991) indicated that to provide high habitat capability for marten, open road densities should be less than 1mile/square mile, while 1-2 miles/square mile provided moderate habitat capability; more than 2 miles was providing low-no habitat capability. Models indicate that open road densities should be less for fisher. The action alternatives call for the decommissioning of 7.9 miles of existing system road and 1.9 miles of non-system road, as well as closing 1.1 miles of existing system roads. The action alternatives also call for the relocation of 0.3 miles of existing system road, and 0.7 miles of existing system road reduced to single track. Two miles of new temporary road would be constructed, all of which would be closed at project completion and 15 miles of existing road would be reconstructed.

One of the objectives of the Proposed Action is to reduce fuel loadings. High densities of snags and down logs are unfavorable for fuels management. However, snags and logs are important habitat elements for forest carnivores and their prey. Larger snags and logs provide more habitats per piece and last longer (Ruggiero et al 1994). Forest carnivores use snags and down wood for cover and denning as well as foraging. The SNFPA ROD provides for retention of snags over 15"dbh and maintaining 10-15 tons of large downed woody material per acre.

Habitat requirements for forest carnivores can be found in California WHR (Zeiner et al, 1990), habitat capability models (Freel, 1991) and in Ruggerio et al (1994). Habitat requirements and risks are further described within the SNFPA.

Pacific fisher

The USFWS completed an initial 90-day review of a petition submitted by 20 groups seeking to list the pacific fisher as endangered in Washington, Oregon and California. After reviewing the best available scientific information, the USFWS found that substantial information indicated that listing the pacific fisher as endangered in its West Coast range may be warranted (USFWS news release July 10, 2003). After a 12-month status review, the West Coast population of the fisher is designated as a candidate species by USFWS (Federal Register April 8, 2004 Volume 69, #68), but listing under the Endangered species Act is precluded by other, higher priority listing actions.

In the Pacific States, fishers were historically more likely to be found in low to mid-elevation forests up to 8,200 feet (Ibid). In the southern Sierra Nevada pacific fisher most often occur at elevations between 4000-8000 feet (Freel 1991, SNFPA SFEIS 2004).

The current distribution of fisher within California suggests that the once continuous distribution is now apparently fragmented into two areas separated by a distance that greatly exceeds reported fisher dispersal ability. Methodologies used to detect fisher in numerous survey efforts have failed to detect this species in an area between Mt. Shasta and Yosemite National Park (Zielinski et al, 1995). These authors strongly suggest that the absence of fisher detections within this large 240-mile area is because they do not occur in the areas surveyed. This gap in distribution may be effectively isolating the southern Sierra Nevada population from the rest of the fisher range in Northern California. Since 1990 there have generally been no detections or confirmed sightings of fisher within this 240 mile gap of the Sierra Nevada (Note: gap is identified as 240 miles in SNFPA 2001, 260 miles in Fed. Register 2004). The Freeman project area is located within this "gap".

Reintroduction of fisher to the central and northern Sierra has been proposed and has strong support in the scientific and research community. The Pacific Southwest Region, Forest Service supports reintroduction and will actively pursue partnerships in this effort as a feature of the SNFPA management strategy (SNFPA FSEIS).

The loss of structurally complex forest and the loss and fragmentation of suitable habitat by roads and residential development has likely played a significant role in both the loss of fishers from the central and northern Sierra Nevada and its failure to recolonize these areas (SNFPA 2001). Elimination of late-successional forest from large portions of the Sierra Nevada and Pacific Northwest has probably significantly diminished the fisher’s historical range on the west coast (Fed Register, 2004). Additional factors identified in the range reduction of fisher include a combination of legal trapping in the first half of the 20th century and occasional incidental trapping since 1954, timber harvest and associated road building, development of trans-Sierran highways, increased recreational use of the Sierra Nevada and porcupine poisoning campaigns conducted during the 1950’s and 1960s (Lamberson, et al. unpublished report 2000).

The only two verified (verified = trapped animal, photo, track, or sighting by reliable observer) fisher observations on the PNF are from 1940's trapping records. One was from the central portion of the Forest, and the other on the eastside. Four unconfirmed reports of fisher were located within the central portion of the forest (Rotta 1999). A 1995 fisher detection in Plumas County is identified in The Federal Register (2004).

There have been no good population estimates for fisher in California, Oregon, and Washington, so it is unknown precisely how many fishers exist but indications are that the likely extant fisher populations are small (Ibid). Lamberson et al (unpublished report 2000) states that the Sierra Nevada fisher population is "likely to be no less than 100 and probably no more than 500 individuals".

The 2004 SNFPA ROD identifies large trees, large snags, large down wood and higher than average canopy closure as habitat attributes important to fisher. CWHR types 4M, 4D, 5M, 5D and 6 are identified as being important to fisher. A vegetated understory and large woody debris appear important for their prey species. 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 higher elevation forests are less suitable for fishers because of deep snowpacks (in Fed. Register 2004). Table 3.36 displays the acres of suitable fisher habitat present in the wildlife analysis area.

Table 3.36 Acres of Suitable Fisher Habitat on National Forest Land within Wildlife Analysis Area

Species	CWHR Type*	Wildlife Analysis Area (Acres)
Fisher	4D, 5D, 6	9,077
	4M, 5M	15,913
Total		**24,990**

*4=small 11-24"dbh, 5=medium/large >24"dbh. D= Dense Canopy Cover > 60%, M= Moderate Canopy 40-59%, EPN=Eastside Pine, JPN=Jeffrey Pine, LPN=Lodgepole Pine, MHC=Montane Hardwood-Conifer, 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.

The physical structure of the forest and prey associated with forest structures are thought to be the critical features that explain fisher habitat use. Powell (in Fed. Register 2004) states that forest type is probably not as important to fishers as the vegetative and structural aspects, and fishers may select forests that have low and closed canopies. Numerous studies, as referenced in the 2004 SNFPA SFEIS, indicate that canopy closure over 60% is important, and fishers preferentially select home ranges to include high proportions of dense forested habitat. The fisher's need for overhead cover is very well documented in the April 8, 2004 Federal Register. Fishers select stands with continuous canopy cover to provide security cover from predators, dense canopy increases snow interception, lowers the energetic costs of traveling between foraging sites, and preferred prey species may be more abundant and vulnerable in areas of higher canopy closure (Ibid). A number of studies have shown that the fisher avoids areas with little forest cover or significant human disturbance and prefers large areas of contiguous interior forest (Ibid).

Rest site structures used by fishers include: cavities in live trees, snags, hollow logs, fallen trees, canopies of live trees, broken top trees, platforms formed by mistletoe or large and deformed branches. Trees used for resting were among the largest diameter trees available, including conifers, snags and hardwoods. Standing trees (live and dead) were the most common resting structures, with black oak the most frequent species used in a Sierra study (Zielinski, et al, 2004). Most den sites are found in live trees. Of 19 tree den sites documented in California, the average diameter was 45-inch dbh for conifers and 25-inch dbh for hardwoods (April 8, 2004 Federal Register).

Fishers in the Pacific States appear to be dietary generalists and may be flexible in their requirements for foraging habitat (Ibid). Stands supporting a complex of down woody material including large down logs and multi-layered vegetative cover are important in foraging habitat as this high structural diversity is associated with prey species richness and abundance. Shrubs also provide food for prey and for fishers in the forms of fruits and berries. Fishers can be found where the shrub cover is 40-60%, but fishers can also avoid areas with too much low shrub cover because it may adversely affect the hunting success of fishers (Ibid).

Habitat fragmentation has contributed to the decline of fisher populations because they have limited dispersal distances and are reluctant to cross open areas to re-colonize historical habitat (Ibid). There is no evidence that fishers are successfully dispersing outside known population areas in California and Oregon. This is possibly due to the extent of habitat fragmentation, developed or disturbed landscapes, and highways/interstate corridors (Ibid). Based on studies of home range sizes referenced in the above-mentioned Federal Register, estimates of potentially suitable and contiguous habitat that must be present before an area can sustain a population of fishers range from 31,600 acres in California, 39,780 acres in the northeastern United States, and 64,000 acres in British Columbia (Ibid). These same studies also showed a positive association between fisher presence and forest stand area, detecting fishers more frequently in stands over 247 acres and 126 to 247 acres than in smaller stands (Ibid).

Numerous and heavily traveled roads are not desirable in order to avoid habitat disruption and/or animal mortality. Roads may decrease prey and food availability for fisher (Allen 1987) due to decreases in prey populations resulting from road kills and/or behavioral barriers to movement. The access provided to forested areas by roads leads to increased human disturbances from resource use and extractive activities. These disturbances result in an overall degradation of habitat.

American Marten

In the Sierra Nevada, marten are most often found above 7,200 feet, but the species core elevation range is from 5,500 to 10,000 feet (SNFPA 2001).

Martens prefer coniferous forest habitat with large diameter trees and snags, large down logs, moderate-to-high canopy closure, and in interspersion of riparian areas and meadows (SNFPA 2001). Martens generally avoid habitats that lack overhead cover; they select stands with 40% canopy closure for both resting and foraging and usually avoid stands with less than 30% canopy closure (Ibid). Foraging areas are generally in close proximity to both dense riparian corridors (used as travel ways), forest meadow edges, and include an interspersion of small (<1 acre) openings with good ground cover used for foraging (Ibid).

Important forest types include mature mesic forests of red fir, Sierran mixed conifer-fir, lodgepole pine, Jeffrey pine and eastside pine (SNFPA 2001). CWHR types 4M, 4D, 5M, 5D and

6 are identified as moderately to highly important for the marten (Ibid). The red fir zone forms the core of marten occurrence in the Sierra Nevada (Ibid)). Table 3.37 displays the acres of habitat present in the wildlife analysis area.

Table 3.37 Acres of Suitable Marten Habitat on National Forest Land within Wildlife Analysis Area

Species	CWHR Types*	Wildlife Analysis Area (Acres)
Marten	4D, 5D, 6	9,077
	4M, 5M	15,749
Total		**24,826**

**4=small 11-24"dbh, 5=medium/large >24"dbh. D= Dense Canopy Cover > 60%, M= Moderate Canopy 40-59%, 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.

Small openings and regenerating stands (or plantations) are used by marten as foraging habitat (Ibid). These openings are of optimum value when they occupy a small percent of the landscape and occur adjacent to mature forest stands (CWHR 4D, 5M, 5D, and 6). Small-dispersed tree harvest units within a forested matrix may be more conducive to marten populations than large contiguous openings (Ibid).

Numerous and heavily traveled roads are not desirable in order to avoid habitat disruption and/or animal mortality. Roads may decrease prey and food availability for marten as well as fisher (Allen 1987) due to prey population decreases resulting from road kills and/or behavioral barriers to movement.

There are over 40 records of marten observations/detections on the Plumas National Forest dating back to 1975. One of these records was up on Grizzly Ridge near Brady’s Camp within 4.75 miles of the wildlife analysis area(unverified detection), but as mentioned, subsequent survey efforts on Grizzly Ridge have failed to detect the presence of marten. Numerous surveys conducted within the wildlife analysis area beginning in 1994 have not detected the presence of marten. Extensive surveys using both soot covered track plates and baited photo stations have been conducted since the early-90s across the majority of the Beckwourth District landscape with marten only having been found in the Lakes Basin area which is approximately 9.5 miles south of the wildlife analysis area (documented survey results on file). Based on surveys conducted within and adjacent to the wildlife analysis area over the last 8 years that have not detected marten, it is suspected that marten are not present in the wildlife analysis area.

Sierra Nevada Red Fox

Sierra Nevada red fox inhabit forested areas interspersed with riparian and meadow habitat, and brush fields. Preferred forest types include red fir, lodgepole pine and sub alpine fir in the higher elevations of the Sierra Nevada (Schempf and White 1977). In the northern Sierra Nevada, most records occur in fir and mixed conifer types, with a large number of sightings also in pine and lodgepole. In the southern Sierra, most sightings were in mixed conifer forests, although lodgepole pine and fir were also important (Schempf and White 1977).

Sierra Nevada red fox seems to range between 4000 and 12,000 feet in elevation but seldom seen below 5,000 feet, and most often above 7,000 feet, (SNFPA EIS 2001) inhabiting the Hudsonian and Canadian life zones (Schempf and White 1977). They move seasonally from the higher elevations in the winter to mid-elevation forests during the summer. This species historically occurred at low densities, averaging perhaps one per square mile, and it is unlikely that it was ever common (SNFPA EIS 2001).

Sierra Nevada red fox may be more tolerant of openings than either marten or fisher, as they would hunt in open areas. Predator avoidance in the open may not be a problem for this native fox (Duncan Furbearer Interagency Working Group 1989). Opportunistic hunters, their diet is omnivorous over most of the year, but meat is the most prevalent food in winter (Schempf and White 1977).

As of 1977, Sierra Nevada red fox populations were thought to be maintaining themselves at a low level or perhaps declining (Schempf and White 1977). There is little information presently available to either justify or counter that assumption. There are very few recent sightings (1980-2001) of this species within its current range. A red fox was photographed near the Bogard Station on the Eagle Lake RD of the Lassen in the early 1990's. The most recent California locations center on Lassen National Park and the Lassen NF. Almanor RD personnel followed two foxes with radio collars in 1998/1999. This revealed that these individual foxes had very large home ranges, that they stayed above 5000 feet, regardless of snow depths (up to 18 feet), and that these individuals did not cross paths often. A third fox was identified within this study area (Rickman, personal comm. 1998). A total of 5 collared foxes have been followed with this Lassen study (Williams, personal comm. 2002), but data is not yet available on findings. In addition to these detections, red foxes have been photographed during winter in recent years on the Lassen NF, primarily south of highway 44 and west of county road A-21 near the Caribou Wilderness area. All of these detections are within the historic range of the species, but there is no way to determine if these detections are actual indigenous Sierra Nevada red foxes or dispersing introduced red foxes wandering up from the Central Valley. This species has not been verified on the Plumas National Forest.

California Wolverine

The USFWS completed an initial 90-day review of a petition submitted by 6 organizations seeking to list the wolverine in the contiguous United States as threatened or endangered under the Endangered Species Act of 1973, as amended. After reviewing the best available scientific information, the USFWS found that there was not substantial scientific or commercial information indicating that listing the wolverine as endangered may be warranted (USFWS news release October 21, 2003, and Federal Register Vol. 68, No. 203, October 21, 2003). The USFWS will not be initiating any further status review in response to this petition.

The wolverine is considered a scarce resident of California. Its historic habitat is distributed from Del Norte and Trinity counties east through Siskiyou and Shasta Counties, and south through the Sierra Nevada to Tulare County (Zeiner et al. 1990). Most sightings in the North Coast mountains fall within the 1600 to 4800 ft. elevational range. In the northern Sierra Nevada, most sightings fall between 4300 to 7300 ft., and in the southern Sierra Nevada, from 6400 to 10,800 ft. (Zeiner et al. 1990).

In the North Coast region, wolverines have been observed in Douglas fir and mixed conifer habitats, and probably also use red fir, lodgepole, wet meadow, and montane riparian habitats (Schempf and White 1977, Zeiner et al. 1990). Habitats used in the northern Sierra Nevada include mixed conifer, red fir, and lodgepole pine. The species probably also uses subalpine conifer, alpine dwarf-shrub, wet meadows, and montane riparian (White and Barrett 1979, Zeiner et al. 1990). In the southern Sierra Nevada, habitat preference includes lodgepole pine, red fir, mixed conifer, subalpine conifer, alpine dwarf-shrub, barren, and probably wet meadows, montane chaparral, and Jeffrey pine (Zeiner et al. 1990).

Wolverines are wide ranging species with very large home ranges. Researchers have generally agreed that wolverine “habitat is probably best defined in terms of adequate year-round food supplies in large, sparsely inhabited wilderness areas, rather than in terms of particular types of topography or plant associations" (Ruggerio et al 1994). Wolverines are generally considered a solitary species, with adults apparently associating only during the breeding season (Butts 1992). Home ranges of opposite sexes overlap (Powell 1979, in Ruggiero 1994). However, partial overlap of home ranges of some wolverines of the same sex is common (Ruggiero et al. 1994). Studies indicate that home ranges in North America may vary from less than 38.6 square miles to over 347.5 square miles. Males have larger territories than females. Individuals may move great distances on a daily basis; 15 to 30 miles a day is common for males, and some individuals have moved 60 to 70 miles in a single day. Except for females providing for offspring, or males seeking mates, movement is generally motivated by food (Ruggiero et al. 1994). Although wolverines are primarily nocturnal, diurnal movement is often recorded. During summer, long distance movements appear to be restricted to night when temperatures are cooler (Hornocker and Hash 1981).

Forest cover may be an important habitat requirement but they "are found in a variety of habitats and do not appear to shun open areas..." (Ibid 1994). Hornocker and Hash (1981) indicated that wolverines may be reluctant to cross openings, i.e.: clearcuts, burned areas, meadows but also noted that wolverines "occasionally crossed clearcuts...usually crossed in straight lines and at a running gait...,". These researchers also noted that "...no difference in movements, habitat use, or behavior was noted between wolverines occupying the half of the area that was logged and the half that was not." Winter cover is not as critical for wolverines as for marten and fishers because they move down in elevation following prey. Wolverines are solitary animals that avoid human contact and are rarely seen. Management actions such as roads, recreational activities, mineral extractions, and other activities that decrease wild, isolated refugia, continue to threaten wolverine habitat, as well as disrupting habitat use patterns within an individual's home range.

The current wolverine range in California is unknown, largely because it has been over 50 years since verifiable evidence has been collected in California (SNFPA EIS, 2001). No quantitative data are available for California. Despite systematic attempts to detect wolverines, no empirical evidence was obtained that wolverines were present in sampled habitats. Occasional sightings by reliable observers continue to be reported on a statewide basis. Most "sightings" within the Tahoe/Plumas/Lassen NF's are unverified. The majority of sightings on the Plumas NF occur in the Lakes Basin area. Incidental sightings of wolverines have been reported on the Tahoe National Forest. Schempf and White (1977) reported three recorded sightings in the Weber Lake area of Sierra County. Sightings on the Downieville District are adjacent to or within Lakes Basin area: one in 1989 in the Haskell Peak area, one in 1990 in the Upper Sardine Lake area, one in 1993 along the Gold Lake Road and Salmon Lakes Road area, and one in 1998 near Basset's Station. All of these Downieville Ranger District sightings have the potential to be within the home range of a single individual. A sighting, which occurred in 1994 on the Sierraville Ranger District, Tahoe NF, was located in sagebrush/eastside pine habitat near Sierra Valley (Youngblood, 1994 pers. comm. w/ Wilson). A sighting of an adult male wolverine (Hopkins, 1993), which occurred in November of 1993 on the Lassen NF, was located in late seral old growth mixed conifer adjacent to a large opening.

The Freeman wildlife analysis area is well roaded, have been logged the last 50 years, has had a minimum of three stand replacing fires, receive a high degree of human use, and essentially do not provide “sparsely inhabited wilderness”. There have been no sighting reports of wolverine within or near the wildlife analysis area.

Pallid Bat

This species occurs in a wide variety of habitats, including grasslands, shrublands, and woodlands to mixed conifer forests, being most abundant below 6000 feet elevation, but have been recorded up to 10,000 feet in the Sierra Nevada (SNFPA 2001). It is most common in open, dry habitats with rocky areas for roosting. It day roosts in caves, crevices, mines, and occasionally in hollow trees/snags, crevices in oaks, and snags Ibid). It prefers rocky outcrops, cliffs, and crevices with access to open habitats for foraging. Philpott (1997) emphasizes the importance of oak woodlands for foraging. The SNFPA EIS (2001) emphasizes the protection and enhancement of both westside foothill oaks and montane oaks to provide for pallid bats. The reduction of hardwoods, both from manual removal and competition from conifers, reduces foraging habitat for pallid bats, yet hardwood and hardwood-conifer stands that contain thick understory vegetation between ground level and eight feet prevents flight and hence use of the area for foraging (Ibid).

There is no indication that there has been a change in the range or distribution of the pallid bat (SNFPA, 2001). There are currently scattered records of Pallid Bat on the Plumas N.F. Bat surveys using mist nets at selected locations on the Plumas NF were conducted in June and September 1991 and again in July and August 1992. Habitats surveyed ranged from high and low elevation mixed conifer/red fir to eastside pine and sagebrush associations. The results of these survey efforts indicated the presence of at least 12 different bat species on the Forest. Two Pallid bats were detected along the Middle Fork Feather River near Portola (approx. 3.5 miles south of project area) and another bat was captured at Lowe Flat north of Antelope Lake (approx. 22 miles north of project area), both in 1992 (Lengas & Bumpus 1992, 1993). Pallid bats were found in surveys conducted in 1998 and 1999 at Frazier Creek with its confluence with Middle Fork Feather River which is approximately 7.5 miles south of the project area (PNF database). A dead pallid bat was collected from a home in Cromberg (approx. 5 miles southwest of the project area) where individuals had been roosting within the attic of a house. Bat surveys were conducted July-September 2001 for the Crystal-Adams DFPZ Project, located approximately 15 miles east of the project area. This survey established the presence of 16 species of bat; pallid bats were detected throughout the survey area through acoustic sampling, with one capture occurring in a landscape dominated by black oak, Jeffrey pine, sage and rock formations (Ecosystems West, Feb 2002). Bat surveys were conducted July-September 2001 for the Poison and Red Clover DFPZ Projects, located approximately 2.5 miles north of the project area. This survey established the presence of 14 species of bat; pallid bats were detected throughout the survey area through acoustic sampling (Ecosystems West, Feb 2002). Bat surveys were conducted July-September 2001 for the Last Chance DFPZ Project, located approximately 12.5 miles north of the project area. This survey established the presence of 16 species of bat; pallid bats were detected throughout the survey area through acoustic sampling with one pallid bat being captured via a mist-net (Ecosystems West, Feb 2002). The Mabie project, located south and west of Portola, CA, was surveyed July - September 2002 by Steve Holmes Forestry and acoustically detected one pallid bat. Then in the summer of 2002 a survey on the Feather River Ranger District in the Watdog project located lactating females.

The bat surveys conducted July-September 2001 for the Humbug project were located north of Portola, CA. The Humbug survey effort covered the southeastern portion of the wildlife analysis area and project area with two survey points falling within Freeman treatment areas. There were two acoustic detections and one mist net capture of pallid bats in the Humbug project area (Steve Holmes Forestry 2002). Thus it is assumed that pallid bats are present in the project area. No other areas within the wildlife analysis area were surveyed for bats.

Western Red Bat

This species is usually found west of the Sierra Nevada/Cascade crest, most often below 3000-foot elevation, with migrants found outside their normal range. Roosting habitat includes forests and woodlands including mixed conifer forests. It roosts primarily in trees, less often in shrubs. Roosts are often in edge habitats adjacent to streams, fields, or urban areas. They are dependent on riparian and riparian edge and mosaic habitats. They appear to be highly associated with intact riparian habitat, particularly willows, cottonwoods, and sycamores (SNFPA, 2001). It tends to roost out on the edge of the foliage, and mostly in the largest cottonwoods (Pierson 1998 in SNFPA 2001).

There is no indication that there has been any change in the range or distribution of this species (SNFPA, 2001). There are several records of Western Red Bat on the Plumas N.F. Bat surveys using mist nets at selected locations on the Plumas NF were conducted in June and September 1991 and again in July and August 1992. A total of 11 species and 475 individuals were captured at 18 of 20 sites forest-wide (Lengas and Bumpus 1993). No Western red bats were captured near the project area. The western red bat was found along the Middle Fork Feather River near Blairsden (1 record) and at French Creek on the Feather River Ranger District (2 records) (Lengas & Bumpus 1992, 1993).

Bat surveys were conducted July-September 2001 for the Crystal-Adams DFPZ Project, located approximately 15 miles east of the project area in eastside pine habitat. Western red bats were detected throughout the survey area along the entire elevational gradient, through acoustic sampling; an acoustical detection at 7,049 ft is perhaps the highest elevational record for this species. Most of the detections were located along riparian corridors, high elevation ponds, in mature cottonwood riparian forest, but also in dry settings such as Jeffrey Pine and fir forests. One western red bat was captured in mist nets at Snow Lake (approximately 19 miles east of the project area (Ecosystems West 2002). Bat surveys were conducted July-September 2001 for the Poison and Red Clover DFPZ Projects, located approximately 2.5 miles north of the project area. This survey established the presence of 14 species of bat; western red bats were detected throughout the survey area through acoustic sampling (Ecosystems West, Feb 2002). Bat surveys were conducted July-September 2001 for the Last Chance DFPZ Project, located approximately 12.5 miles north of the project area. This survey established the presence of 16 species of bat; western red bats were detected throughout the survey area through acoustic sampling (Ecosystems West, Feb 2002). The Mabie project, located south and west of Portola, CA, was surveyed July - September 2002 by Steve Holmes Forestry and acoustically detected three western red bats. In 2002, six detections of red bat occurred between 4000 to 6000 feet along creeks, at seeps and in forest settings with mixed hardwood and conifer trees on the Feather River RD (Roberts, per. com).

The bat surveys conducted July-September 2001 for the Humbug project were located north of Portola, CA. The Humbug survey effort covered the southeastern portion of the wildlife analysis area with two survey points falling within Freeman treatment areas. There were no detections of western red bats in the Humbug project area (Steve Holmes Forestry 2002). Cottonwood riparian stringers are not abundant, but aspen stands are abundant within the project area therefore western red bats are potentially present in the project area. No other areas within the wildlife analysis area were surveyed for bats.

Townsend's Big-eared Bat

This species occupies a wide variety of habitats (older forest, desert, grasslands/plains, riparian, coastal). Roosting habitat requires caves, mines, abandoned human structures, and rock crevices; water for drinking is required. It forages in a variety of habitats, including riparian areas, old forests, and mixed hardwood-conifer forest. It feeds primarily on flying insects, specializing in moths, and it usually captures prey in flight, or by gleaning from foliage of brush or trees and feeds along habitat edges. It prefers mesic (wet) habitats. It is usually found below 6000 feet but has been found up to 10,000 feet elevation.

Townsend's big-eared bats form maternity colonies of up to several hundred females. These colonies show a high degree of roost fidelity, and, if undisturbed, colonies may occupy the same roost indefinitely (SNFPA EIS 2001). Its colonial nature places this bat at high risk with a single disturbance causing detrimental harm to potentially large populations (Philpott, 1997).

This species has suffered a substantial decline in population over the last 40 to 60 years, with approximately 52% of historical maternity roosts no longer occupied; 40% of these known sites had been destroyed or rendered unsuitable (SNFPA, 2001). They forage in a variety of open habitats as well as riparian habitat. The single most important non-structural requirement for roost sites for this species is absence of human disturbance (SNFPA 2001).

Bat surveys using mist nets at selected locations on the Plumas NF were conducted in June and September 1991 and again in July and August 1992. The Townsend's big-eared bat was not recorded (Lengas & Bumpus 1992, 1993). Bat surveys were conducted in July-September 2001 for the Crystal-Adams DFPZ Project. Townsend's bat guano was encountered in 3 suitable structures, including a pocket cave and large cave in Little Last Chance Canyon as well as a log cabin; all appeared to be night roosts (Ecosystems West, Feb 2002). Bat surveys were conducted July-September 2001 for the Poison and Red Clover DFPZ Projects, located approximately 2.5 miles north of the project area. This survey established the presence of 14 species of bat; Townsend's big-eared bats were not detected throughout the survey area (Ecosystems West, Feb 2002). Bat surveys were conducted July-September 2001 for the Last Chance DFPZ Project, located approximately 12.5 miles north of the project area. This survey established the presence of 16 species of bat; Townsend's bat guano was encountered in 1 suitable structure (Ecosystems West, Feb 2002). The Mabie project, located south and west of Portola, CA, was surveyed July - September 2002 by Steve Holmes Forestry with no detections of Townsend's big-eared bats. Surveys conducted by Heady in 2001 on the westside of the Plumas frequently found Townsend's bats in suitable structures, including tunnels and buildings; all housed solitary day-roosting sites (Roberts, personal comm.). In 2002 a male Townsend's big-eared bat was captured in a wet meadow site, there were also three acoustical detections in both forest and rocky areas on the Feather River RD (Roberts, personal com.).

The bat surveys conducted July-September 2001 for the Humbug project were located north of Portola, CA. The Humbug survey effort covered the southeastern portion of the wildlife analysis area with two survey points falling within Freeman treatment areas. There were no detections of Townsend's big-eared bats in the Humbug project area (Steve Holmes Forestry 2002). Within the wildlife analysis area there is an abundance of meadow stringers which create edge habitat, therefore Townsend's big-eared bats are potentially present in the project area. No other areas within the wildlife analysis area were surveyed for bats.

3.5.6 Environmental Consequences

Direct effects include immediate changes in habitat conditions and disturbance/ harassment to individuals, including direct mortality, during project activities. It is assumed in this analysis that all action alternatives would be implemented as stated, in compliance with all rules and regulations governing land management activities. Direct disturbance, including mortality to individual animals addressed in this document is highly unlikely, due to survey efforts for selected species, incorporation of LOP's where appropriate, and implementation of Forest standards and guidelines. Indirect effects include effects that occur later in time or beyond the action area of the project. Indirect effects can also include effects to a species prey base.

Cumulative effects analysis for ESA compliance includes "those effects of future State or Private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation". Under NEPA, cumulative effects represent the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

3.5.6.1 Action Alternatives—Terrestrial Habitat

Direct and Indirect effects

Fuels Treatment/DFPZ

Overall fuel treatments, including DFPZ construction would be accomplished through thinning from below and the reintroduction of fire into the ecosystem. Thinning from below concentrating on small diameter fuel ladders is useful in that this prescription reduces overstocking, largely the result of fire suppression (Agee 1993, USDA-Sierra Nevada Forest Plan Amendment 2001). Removal of ≤8" dbh conifers would generally result in little or often no impact on current canopy closures. What losses are incurred within the under story would be quickly regained in the over story as reduced competition for resources allows dominant and co-dominant trees to grow faster.

Thinning that involves the cutting of some dominant and co-dominant conifers remove both large structure and canopy cover. This change in canopy cover would be sufficient to result in acres changing to a lower canopy cover class immediately following treatment. Mechanical thinning to achieve the desired condition within DFPZs (action alternatives), as per Table 2 SNFPA ROD 2004, and designed as per Freeman Alternatives 1, 3 & 4 would result in the following:

1. CWHR 4M, 4D: Stands within DFPZs supporting CWHR types 4M (40-59% canopy cover) and CWHR types 4D (60-100% canopy cover) are projected to become 40% canopy cover (M).
2. CWHR 5M, 5D: Stands within DFPZs supporting CWHR types 5M (40-59% canopy cover) and CWHR types 5D (60-100% canopy cover) are projected to become 40% canopy cover (M).

3. Hand-thinning conifers ≤ 8” dbh planned within RHCA equipment exclusion zones within DFPZ units would not result in a change in the 4M, 4D, 5M, 5D.

The loss of snags important for wildlife is expected with logging and prescribed fire; however snag recruitment is also expected with retention of 30”+dbh conifers and some recruitment due to fire kill. The net result of snag loss and gain is undetermined.

With any of the three action alternatives, within the DFPZ, WUI, and Area Thinning units (excluding groups) the project is leaving up to 4 of the largest snags/acre in the treatment area, primarily within the RCHA equipment exclusion zones. However, based on past projects and discussions with sale administration experience with OSHA safety officer representatives, it is anticipated that the majority of snags would be felled and very few snags would be left. As shown in the 1999 HFQLGFRA FEIS, DFPZ integrity and firefighter safety can be compromised by the amount and distribution of snags within the DFPZ, but that 4 per acre, located strategically within the DFPZ can provide an effective DFPZ.

Alternative 1 treats approximately 240 more acres than Alternative 3, while Alternative 4 treats about 46 acres less than Alternative 3. Assuming equal distribution and density of snags across the wildlife analysis area, Alternative 4 maintains more snags than all the other alternatives.

Thinning activities and underburning may prevent and/or can allow for the control of catastrophic wildfires by reducing fuel loading and ladder fuels. Fuel reduction activities may also cause a loss in the availability of Large Woody Debris (LWD). The effects of the losses in LWD would be compensated for by the retention of logs as described in the SNFPA standards & guidelines. These retention standards were designed to meet the needs of wildlife. There is also a potential for future recruitment of LWD due to snag falling within DFPZs. The three action alternatives call for the retention of LWD at SNFPA Standards (10-15 tons/acre ≥12 inches diameter).

Sporax (borax) would be applied to pine stumps ≥14 inches dbh in mechanically harvested units in both DFPZs and Area Thinning treatment areas. Use rates would be one pound to 50 square feet of stump surface. Based on the Pesticide Fact Sheet prepared by Information Ventures, Inc (1995), this rate is considered non-toxic to vertebrate species. The potential for borax leaching into ground-water or surface water contamination is low; it is practically nontoxic to fish, aquatic invertebrate animals, birds and mammals. Borax does not build up (bioaccumulate) in fish, inferring no build up in other vertebrate species. Thus sporax applied to stumps should not impact TES species or their prey base.

Because of the way that CWHR size class is calculated, some treated areas have the potential to change to a larger size class, due to the removal of small diameter trees, which increases the mean diameter of the remaining forest stand. This potential change was not considered for this analysis of effects, as treated stands may not reflect attributes of suitable habitat associated with CWHR class, due to reduction in structural diversity at the stand level as a result of fuels treatments that remove canopy and structure.

Group Selection (Alternatives 1, 3, 4)

Historically, Sierran mixed conifer forest landscapes probably consisted of a complex array of mostly small, even-aged aggregations and/or stands representing a wide range of age and size classes (Verner et al. 1993, page 253). Lightning fires that affected small areas (ranging in size from a single tree to groups of trees to several acres) probably were relatively common and an important influence on stand structure (Ibid, page 247). Patches of fire-induced openings (and other stand disturbance elements such as bark-beetle kill) produced a variable, irregular patchwork of even-aged groups, most from less than an acre to several acres in size. Consequently a relatively fine-grained pattern of variability, modified by topography existed at a landscape scale (Ibid, page 247). Group Selection harvest methods could create gaps and openings in the forested stands ½ to 2 acres in size that could approximate pre-settlement stand structure (Ibid, page 271).

The group selection treatments would result in the creation of forest openings and gaps that would have 1) all conifers below 30 inch dbh removed (except desirable regeneration and oaks/hardwoods are retained as described in Proposed Action), and 2) project generated fuels treated with prescribed fire, but 10-15 tons per acre of the largest down logs greater than 12 inches diameter would be retained where it exists.Where ½ to 2 acre groups are implemented, the CWHR 4M, 4D, 5M, 5D is replaced in each small group unit with a small opening supporting brush/seedling/sapling type habitat (CWHR 1), while the surrounding matrix (conifer stands between the groups), are expected to have linear openings created for skid trails that remove sawlogs from the groups to designated landings. The amount of this disturbance is not quantified. Area thinning harvest could also occur within this matrix.

It appears as if placement of groups can increase the edge to interior ratio; that is the stand provides less continuous forest cover and interior habitat and becomes a stand of multiple edges, beneficial to species that prefer edges to the detriment of forest interior species (Harris, 1984; Forest Fragmentation website). Remaining forested patches between the groups (often referred to as the “matrix”) appear to be nothing more than corridors between the gaps, as interspersion and juxtaposition of groups increases the contrast of the created edges. Edge effects of these induced ecotones on both the microclimate and on wildlife can extend into the forested patches beyond what is actually created by the group (Harris, 1984; Hunter, 1990; Forest Fragmentation website). Furthermore, these remnant corridors are then subjected to skid trails and Area thinning with biomass removal, further reducing the amount of continuous forest cover. The combination of group openings, along with Area thinning with biomass removal, skid trails and landings, would create a mosaic of forest that may not be suitable for forest interior habitat species (defined as species that require large patches of a relatively homogenous habitat type, that may be negatively affected by management practices that fragment larger patches of habitat into smaller patches with numerous edges (Harris, 1984; Scalet, et al, 1996). Sensitive species considered forest interior species include spotted owl and fisher (Hunter 1990) goshawk, and marten (Luman & Neitro, 1979?).

It is unknown at what threshold the amount of edge to interior habitat results in use, marginal use or non-use by old forest species. Alternative 1 creates 175 acres of groups across approximately 3,966 available acres of mechanical harvest treatment area equaling a group density of approximately 4.4%. Alternative 3 creates 175 acres of groups across 3,723 acres of mechanical harvest treatment area equaling a group density of approximately 4.7%, while Alternatives 4 creates fewer acres of groups (174 acres) across 4,514 acres of mechanical harvest treatment area equaling a group density of approximately 3.9%. Thus groups are more dispersed across the landscape with Alternatives 4 than with Alternatives 1 & 3, with groups more clumped in the landscape with Alternative 3.

Area Thinning

Overall area thinning would be accomplished through thinning from below and the reintroduction of fire into the ecosystem. Thinning from below concentrating on small diameter fuel ladders is useful in that this prescription reduces overstocking, largely the result of fire suppression (Agee 1993, USDA-Sierra Nevada Forest Plan Amendment 2001). Removal of ≤8" dbh conifers would generally result in little or often no impact on current canopy closures. What losses are incurred within the under story would be quickly regained in the over story as reduced competition for resources allows dominant and co-dominant trees to grow faster.

Thinning that involves the cutting of some dominant and co-dominant conifers remove both large structure and canopy cover. This change in canopy cover would be sufficient to result in acres changing to a lower canopy cover class immediately following treatment. Mechanical thinning to achieve the desired condition within AT with biomass removal (action alternatives), as per Table 2 SNFPA ROD 2004, and designed as per Freeman Alternatives 1, 3 & 4 would result in the following:

1. CWHR 4M, 4D: Stands within AT supporting CWHR types 4M (40-59% canopy cover) and CWHR types 4D (60-100% canopy cover) are projected to become 50% canopy cover (M).
2. CWHR 5M, 5D: Stands within AT supporting CWHR types 5M (40-59% canopy cover) and CWHR types 5D (60-100% canopy cover) are projected to become 50% canopy cover (M).
3. Hand-thinning conifers ≤ 8" dbh planned within RHCA equipment exclusion zones within DFPZ units would not result in a change in the 4M, 4D, 5M, 5D.

AT with biomass, simplifies the complexity and structure of the stand, opening up the stand by treating the lower and mid-level vegetative layers, removing more structures that provide the vegetative layering, deformities, snags and future decadence, reducing the closed nature of the stand which provides diverse microclimates spotted owls seek to control exposure and changes in ambient temperature for roosting. Biomass removal can degrade/remove hiding cover in the lower and mid canopy often used by young of the year spotted owlets. Feller-bunchers used to remove biomass also create open paths, and disrupts down woody material, through crushing, moving, etc. Thus biomass in suitable habitat would result in habitat degradation, and would be analyzed as a direct reduction in suitable habitat. Snags and LWD would be similar as described for DFPZ.

Aspen Treatments

Aspen treatments that involve the cutting of all the conifers (Alternative 1) or most of the conifers (Alternatives 3 and 4) remove both large structure and canopy cover. This change in canopy cover would be sufficient to result in acres changing to a lower canopy cover class immediately following treatment. Mechanical thinning to achieve the desired condition within Aspen Stands (action alternatives) and designed as per Freeman Alternatives 1, 3 & 4 would result in the following:

1. CWHR M: Aspen stands supporting CWHR types M (40-59% canopy cover) are projected to become 25% canopy cover (P).
2. CWHR D: Aspen stands supporting CWHR types D (60-100% canopy cover) are projected to become 25% canopy cover (P).
3. Hand-thinning conifers ≤ 8” dbh is planned within RHCA equipment exclusion zones (25’) within aspen stands would not result in a change in canopy cover.

The aspen extended treatment zones (ETZs) in Alternative 1 would result in the creation of forest openings and gaps that would have 1) all conifers below 30 inch dbh removed (except hardwoods are retained as described in Proposed Action), and 2) project generated fuels treated with prescribed fire, but 10-15 tons per acre of the largest down logs greater than 12 inches diameter would be retained where it exists. No ETZs would be implemented under Alternative 3 & 4.

Where ETZs are implemented, the CWHR 4M, 4D, 5M, 5D is replaced in each unit with a small opening supporting brush/seedling/sapling type habitat (CWHR 1), while the surrounding matrix (conifer stands between the ETZs), are expected to have linear openings created for skid trails that remove sawlogs from the ETZs to designated landings. The amount of this disturbance is not quantified.

Impacts of actions on CWHR Habitat Types (4M, 4D, 5M, 5D)

Fuels Treatments (Alternatives 1, 3, 4)

Within the forested habitat types with the implementation of the action alternatives, the major direct effect to habitat is 1) removing the lower layers of vegetation (fuel ladder) composed of small trees, 2) reducing the ground fuels, 3) reducing the amount of snags, and 4) opening up all stands with the removal of trees providing canopy cover, resulting in a post treatment canopy cover provided by conifers between 40-45%. All 4M, 4D, would become 4M and 5M, 5D would become 5M (Table 3.38).

Table 3.38 Changes in Freeman Fuels Treatment (DFPZ) Pre and Post Action Alternatives in 4M, 4D, 5M, 5D with Action Alternatives 1, 3 & 4.

CWHR Type	Acres within Wildlife Analysis Area (NF Lands)	Alt. 1 Acres in DFPZ* changed to "M"	%Change in Wildlife Analysis Area-Alt.1	Alt. 3 Acres in DFPZ* changed to "M"	%Change in Wildlife Analysis Area-Alt.3	Alt. 4 Acres in DFPZ* changed to "M"	%Change in Wildlife Analysis Area-Alt.4
4M	13,107	0	0	0	0	0	0
4D	5,577	-543	-9.7	-581	-10.4	-630	-11.3
Total 4M/4D	**18,684**	**-543**	**-2.9**	**-581**	**-3.1**	**-630**	**-3.4**
5M	2,806	0	0	0	0	0	0
5D	3,500	-151	-4.3	-151	-4.3	-252	-7.2
Total 5M/5D	**6,306**	**-151**	**-2.4**	**-151**	**-2.4**	**-252**	**-4.0**
Total All	**24,990**	**-694**	**-2.8**	**-732**	**-2.9**	**-882**	**-3.5**

* DFPZ acres changed include all DFPZ, DFPZ/WUI, and WUI acres.

Thus with Alternatives 1, 3 & 4 approximately 694 to 882 acres of 4M/4D/5M/5D habitat is modified to "M" with implementation of DFPZ while maintaining 40% canopy cover.

Group Selection and Aspen Extended Treatment Zone

With the implementation of up to 175 acres of group selection harvesting (Action Alternatives) and approximately 400 acres of aspen extended treatment zones (Alternative 1), the major direct effect to habitat is creating gaps or openings within forested stands. Although not considered an action that result in a change in CWHR type for the stand as a whole, removing a portion of the stand and leaving a dissimilar habitat in its place created these gaps. For the first few years after implementation, these gaps or openings result in early seral herb/grass and seedling shrub types, replaced through planting or natural seed establishment into seedling tree stages; these created openings would occur within the following CWHR types: (Note: changes in habitat as a result of implementing Group Selection and Aspen ETZ's around aspen stands are estimates based on the proportion of each CWHR type present within each unit and the amount of planned treatment within that unit)(Table 3.39).

Thus with the action alternatives, approximately 0.5 up to 0.6% of the total 4M, 4D, 5M, 5D habitat within the wildlife analysis area would be converted to small gaps (average size 1.5 acres) of CWHR 1. An additional 1.1% of the total 4M, 4D, 5M, 5D habitat within the wildlife analysis area would be converted to openings of CWHR 1 around aspen stands in Alternative 1.

Area Thinning

Within the forested habitat types with the implementation of the area thinning and biomass removal in the action alternatives, the major direct effect to habitat is 1) removing the lower layers of vegetation (fuel ladder) composed of small trees, 2) reducing the ground fuels, 3) reducing the amount of snags, and 4) opening up all stands with the removal of trees providing canopy cover, resulting in a post treatment canopy cover provided by conifers between 50-55%. All 4D would become 4M and 5D would become 5M (Table 3.40).

Table 3.39 Freeman Group Selection and Aspen Extended Treatment Zones Pre and Post Alternatives 1, 3, & 4.

CWHR Type	Acres within Wildlife Analysis Area (NF Lands)	Total Acres in groups*			Total Acres in ETZ*			% CWHR within Wildlife Analysis Area		
		Alt. 1	Alt. 3	Alt. 4	Alt. 1	Alt. 3	Alt. 4	Alt. 1	Alt. 3	Alt. 4
4M	13,107	-90	-90	-89	-156	0	0	-1.9	-0.7	-0.7
4D	5,577	-32	-32	-44	-97	0	0	-2.3	-0.6	-0.8
Total 4M/4D	**18,684**	**-122**	**-122**	**-133**	**-253**	**0**	**0**	**-2.0**	**-0.7**	**-0.7**
5M	2,806	-5	-5	-5	-1	0	0	-0.2	-0.2	-0.2
5D	3,500	-9	-9	-9	0	0	0	-0.3	-0.3	-0.3
Total 5M/5D	**6,306**	**-14**	**-14**	**-14**	**-1**	**0**	**0**	**-0.2**	**-0.2**	**-0.2**
Total All	**24,990**	**-136**	**-136**	**-147**	**-254**	**0**	**0**	**-1.6**	**-0.5**	**-0.6**

* Additional acres of groups and ETZ are in other CWHR size classes or CWHR densities.

Table 3.40 Changes in Freeman Area Thinning (AT) Pre and Post Action Alternatives in 4M, 4D, 5M, 5D with Action Alternatives 1, 3 & 4.

CWHR Type	Acres within Wildlife Analysis Area (NF Lands)	Alt. 1 Acres in Area Thinning changed to "M"	%Change in Wildlife Analysis Area-Alt.1	Alt. 3 Acres in Area Thinning changed to "M"	%Change in Wildlife Analysis Area-Alt.3	Alt. 4 Acres in Area Thinning changed to "M"	%Change in Wildlife Analysis Area-Alt.4
4M	13,107	0	0	0	0	0	0
4D	5,577	-427	-7.7	-428	-7.7	-598	-10.7
Total 4M/4D	**18,684**	**-427**	**-2.3**	**-428**	**-2.3**	**-598**	**-3.2**
5M	2,806	0	0	0	0	0	0
5D	3,500	-2	-0.1	0	0	-16	-0.5
Total 5M/5D	**6,306**	**-2**	**0**	**0**	**0**	**-16**	**-0.3**
Total All	**24,990**	**-429**	**-1.7**	**-428**	**-1.7**	**-614**	**-2.6**

Thus with Alternatives 1, 3 & 4 approximately 428 to 614 acres of 4M/4D/5M/5D habitat is modified to "M" with implementation of AT with biomass removal while maintaining 50% canopy cover.

Cumulative effects

The cumulative changes in CWHR 4M, 4D, 5M, and 5D types as a result of implementing DFPZs, Groups and AT with biomass removal as per Action Alternatives are displayed for the wildlife analysis area in Table 3.41.

Table 3.41 Approximate Change in CWHR Habitat types within Wildlife Analysis Area (all acres NF acres)

CWHR Type	Pre-Project (Alt. 2)	Post-Project Alt. 1 (% Remaining)	Post Project Alt. 3 (% Remaining)	Post Project Alt 4 (% Remaining)
4M	13,107	12,861 (98.1%)	13,017 (99.3%)	13,018 (99.3%)
4D	5,577	4,478 (80.3%)	4,536 (81.3%)	4,305 (77.2%)
5M	2,806	2,800 (99.8%)	2,801 (99.8%)	2,801 (99.8%)
5D	3,500	3,338 (95.4%)	3,340 (95.4%)	3,223 (92.1%)
TOTAL	**24,990**	**23,477 (94.0%)**	**23,694 (94.8%)**	**23,347 (93.4)**

3.5.6.2 Action Alternatives—Aquatic Habitat

Direct effects

There would be no direct effects from the DFPZ, AT and GS harvest to TES herptofauna and fish habitat, as no vegetative activities would occur that would cause disturbance to individuals, nor any impacts to the existing habitat conditions. All riparian protection standards apply to action alternatives. SAT guidelines and associated RMO's will be met with both action alternatives (RMO analysis in project record). All applicable BMP's and Soil Standard Protection Measures are included into project design (Drake, 2006).

Indirect effects

The district hydrologist assured that the "action" alternatives met all ten RMOs of the SAT guidelines (RMO analysis located in CWE). Applicable Best Management Practices (BMPs) and Soil Standard Protection Measures (Drake, 2006) would be implemented with all land disturbing activities proposed in the three action alternatives. There is still some potential of sediment reaching the stream courses by ground disturbing activities, but this is greatly minimized by the implementation of the standards, management practices and guidelines as listed above.

The action alternatives provide partial or entire key aquatic and riparian habitat elements including: concentration of snags in the RHCAs and SMZs equipment exclusion zones and therefore recruitment of woody debris to aquatic habitats and the RHCA; shade along the perennial fish bearing and non fish bearing streams by retention of vegetation; reduction in sediment delivery to aquatic habitats through retention of potential recruitment of woody debris near aquatic habitats and within portions of the RHCAs, retention of nutrients and potential woody debris by leaving 10-15 tons per acre of moderate to large down wood.

No group selection is proposed within the RHCAs with the action alternatives. The buffer widths of the RHCAs vary from:

- to a distance equal to the height of two site potential trees or 300’ horizontal distance per side if the stream is fish bearing; or one site potential tree or 150’ horizontal distance per side if the stream is perennial, which ever is greatest, or
- to the outer edges of riparian vegetation.

The buffer widths for SMZs are 50’ per side. Within these RHCAs and SMZs proposed treatments include thinning conifers to identified appropriate fuel treatments based on RHCA characteristics and adjacent fuel treatments which could include mechanical treatments on slopes less than 15% (with the exception of aspen stand treatments in Alternatives 3 & 4 with slope limits of 35%), hand-thinning as described above, under-burning only, and no treatment. Mechanical entry would occur within RHCAs and SMZs, except there would be an equipment exclusion zones within 25 feet in SMZs and aspen stands in RHCAs, 50 feet on non fish bearing RHCAs, and 100 feet on fish bearing RHCAs. The thinning proposed within RHCAs and SMZs would release the existing conifers to grow into larger diameter trees and thus be retained for future natural recruitment of LWD into the stream channel. Thinning within the RHCA and SMZs would also initially reduce the interception of precipitation thus increasing runoff in the short term. Yet, overall transpiration would be reduced by thinning within the RHCAs and SMZs, allowing for increased ground water retention. This is a benefit to TES amphibians and the coldwater fisheries habitat because of the reduced runoff and increased ground water retention providing cold water later into the summer and fall season.

Habitat will be maintained or restored to support well-distributed populations of TES herptofauna, fish, invertebrate populations, and riparian plant communities. This would be accomplished with the action alternatives by the following: 1) retention of litter fall from the overstory trees provides forage macro- invertebrates. 2) Riparian zones, springs, seeps, and bogs have been identified and protected from harvest activities using SAT guidelines. 3) Impacts would further be reduced by the application of BMPs and standard management requirements (Drake, 2006).

Activities proposed in the project area are not expected to negatively impact the timing and variability of water tables within meadows and wetlands. Positive effects derived from the project include increased water percolation and groundwater due to thinning of overstocked RHCAs and SMZs, and the associated reduced transpiration at which water is made available to and moves through meadows and wetlands. Again, all sensitive riparian areas (springs, bogs, wetlands, and meadows) will be protected by the SAT guideline buffers and the implementation of BMPs. Wet meadows and riparian vegetation will be maintained within the RHCAs. Ground based equipment will only be allowed on stable soils, slopes <15% in RHCAs.

The three action alternatives propose to decommission approximately 10 miles of roads within the wildlife analysis area (6 miles of system roads, 1.9 miles of non-system roads & 1.8 miles from a previous decision). Decommissioning may entail culvert removal, subsoiling of the roadbed, recontouring the hillslope, and/or seeding the affected area. These measures help initiate re-vegetation and recovery of the road area. Over time, decommissioned roads produce less sediment and surface runoff to adjacent stream courses (Drake, 2006). A total of approximately 16 miles of roads will be reconstructed which consists of brushing, blading the road surface, improving drainage, and replacing or upgrading culverts as needed. A total of approximately 1 mile of roads in the wildlife analysis area will be closed using earth and log barriers or gates. A total of 0.3 miles of roads will be constructed and another 0.7 miles will be made into single track. The existing road density within the wildlife analysis area and associated stream crossings and culverts has caused fragmentation to the hydrology and aquatic habitat. Ecological processes that occur in the hyporheic zones (water and land meet in saturated sediments beneath and beside a river channel) have strong effects on stream water quality. Rivers with extensive hyporheic zones retain and process nutrients efficiently, which has a positive effect on water quality and on the ecology of the riparian zone. Scientific research emphasizes the importance of maintaining connectivity between the channel, hyporheic, and riparian components of river ecosystems. When human actions, such as encasing streams in pipes, sever those connections, the result is poorer water quality and degraded fish and aquatic species habitat downstream (Meyer et al. 2003). The proposed decommissioning of 10 miles of roads (and the associated removal of culverts and/or road crossings over drainages) will restore connectivity between the hyporheic, riparian and river ecosystems.

Cumulative effects

Past Activities

The analysis of cumulative effects of the proposed alternatives evaluates its anticipated impact on TES wildlife from the existing condition (existing condition reflected by changes that have occurred in the past) within the wildlife analysis area. Past actions in the area include grazing, timber harvest and recreation use. See Appendix D for the cumulative effects list with specific project names, etc.

Resources in the wildlife analysis area have long been utilized. Land use in the wildlife analysis area prior to the turn of the century was limited to sustenance hunting and gathering by the Mountain Maidu. Grazing (cattle and sheep) and dairy farms have been recorded as early as the 1860s. Most small dairies did not survive into the 1900s and by the mid 1880s the emphasis within Grizzly Valley appears to have been focused primarily on ranging beef cattle (Kliejunas and Elliott 2006). By 1920 R.T. Jenkins had acquired at least some of the lands formerly held by George Mapes. Jenkins established a camp and ran thousands of head of sheep from this time until at least the early 1960s (Kliejunas and Elliott 2006). During the mid 1920s, concerns of overgrazing lead to increased restrictions resulting in increased cattle grazing and allotments being managed by the Plumas National Forest. Many of these allotments remain active today, although the numbers of cattle have been substantially reduced over the years. Currently, no sheep graze in Grizzly Valley but the overall pattern of seasonal range use has been continuously present for at least 130 years (Kliejunas and Elliott 2006). With this intensive grazing the meadowlands became compacted and experienced substantial surface erosion resulting in meadow stream systems that experienced degradation. Since that time period, most watersheds have experienced a slow recovery (Drake 2006). Since 1980 there has been continued watershed restoration work on Freeman and Cow Creeks in the form of livestock exclosures, bank stabilization, willow planting, road closures and reseeding of disturbed areas.The history of logging in the project area is quite extensive and has been dated to the 1920s. When the Western Pacific Railroad was completed through Plumas County in 1909 many sawmills were developed along the new route. Among these was the Feather River Lumber Company (FRLC), who in 1915 began using a narrow gauge railroad to bring logs to its mill located in Delleker. By the end of the decade, FRLC had penetrated the southwest end of Grizzly valley and had constructed miles of temporary railroad spurs throughout the area. The company used caterpillar tractors and big wheels rather than steam donkeys due, in larger part to the comparatively gentile topography of much of the area (Kliejunas and Elliott 2006). Railroad logging operations ended in 1940 and by the early 1950s, the old mainline grade along the western end of the valley was converted into the main road; today’s 24N10 road (Kliejunas and Elliott 2006). Between 1926 and 1992 it is estimated from Beckwourth Ranger District Timber Atlases and sale contracts that 90 percent of the project area was harvested using a combination of overstory removal, single tree and group selection. Much of the area was salvage logged from 1990 thru 1996 (Table 3.42). More recent timber harvests (1990 – 2005) within the wildlife analysis area have harvested approximately 66.6 million board feet of timber through regeneration harvests, overstory removal and sanitation silvicultural prescriptions (Table 3.42). 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 (Drake 2006). In addition to all of the timber harvest activities, we have implemented several KV culture projects (site prep, planting, and pre-commercial thinning), Small fuelwood/sawtimber projects (meadow enhancement), Little Summit Lake Post and Pole, and a special public fuelwood permit for Camp 5 (Lake side of FS road 24N10, no woodcutting allowed) for post harvest debris clean up, stand improvement, insect/disease problems and habitat enhancement.

In 2005, approximately 129 commercial woodcutting permits have been issued for the Beckwourth RD allowing for the removal of 1 to 10 cords of wood per permit. An additional 702 personal woodcutting permits have been issued in 2005 for the Beckwourth RD. Also, approximately 5617 Christmas tree permits have been sold on the Beckwourth RD for 2005. It is speculated that commercial woodcutting, personal woodcutting and Christmas tree cutting has occurred within the wildlife analysis area but amounts are not quantifiable.

With in the wildlife analysis area there were approximately 43 fires (20 human caused) that burned 7 acres, with the largest being 1 acre from 1970 – 1996. 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 actions initiated quickly (Lane).

Table 3.42 Harvest Activities in the Project Area and Wildlife Analysis Area on National Forest Lands since 1980.

	Project Area				Wildlife Analysis Area*			
	1980 - 1989	**1990 - 1999**	**2000 - 2005**	**Total mmbf**	**1980 - 1989**	**1990 - 1999**	**2000 - 2005**	**Total mmbf**
Green Sales - mmbf	47.5	0.0	0.2	**47.7**	81.4	15.0	3.2	**99.6**
Salvage – mmbf	0.0	35.0	2.0	**37.0**	11.1	48.4	0.0	**59.5**
Total – mmbf**	**47.5**	**35.0**	**2.2**	**84.7**	**92.5**	**63.4**	**3.2**	**159.1**

*Wildlife analysis area includes project area figures.
** Volumes are estimated (mmbf = 1 million board feet), only includes volume harvested.

Recreation in the form of hunting and fishing was a common activity within Grizzly Valley throughout the late 1800s and early 1900s. In the late 1960s, recreation took on a new and expanded form with the construction of Grizzly Dam and the formation of Lake Davis (Kliejunas and Elliott 2006). Immediately following the formation of Lake Davis the PNF established camping areas and fishing access points.

Most of the recreation use within the wildlife analysis area consists of dispersed activities (concentrated around Lake Davis) by individuals and small groups, which include hiking, horseback riding, mountain biking, pleasure driving, ATV’s, snowmobiles, swimming, ice skating, cross country skiing, snow play, wildlife watching, hunting, fishing, ice fishing, camping, picnicking, and firewood gathering. There are three developed fee-use Forest Service Campgrounds (Grizzly, Lightning Tree, and Grasshopper Flat Campground), four free – use boat launches (Lightning Tree, Mallard Cove, Honker Cove, and Camp 5) and approximately 20 fishing access points within the wildlife analysis area . One boat launch (Camp 5) and approximately eight fishing access points are in the project area. Approximately 206,000 visitors come to Lake Davis each year (Schaber 2006). Use in these campgrounds ranges from 20% to 30% in any given year. The fishing access points and boat launch in the project area see mostly moderate (20% -30%) and high (40%- 60%) use throughout the year with holidays showing the highest use (70%-80%). The wildlife analysis area is also within deer hunting zones X6A and X6B, which allocated 380 (X6A) and 425 (X6B) deer tags in 2005. Since 1980 there has been continued recreation facilities maintenance and improvement in the form of fisherman access road improvements, vault toilets (sweet smelling), and barriers to keep vehicles from going off road. In 1997 CDF&G poisoned Lake Davis with rotenone in an attempt to eradicate pike and improve the trout fisheries.

Present or Reasonably Foreseeable Future Activities

Present and future HFQLG and non-HFQLG projects planned that overlap with the wildlife analysis area may have cumulative impacts to wildlife, fisheries and amphibians (Table 3.43). After these HFQLG projects are implemented, the area will be guided by the direction described for the other Sierra Nevada national forests (SNFPA SFEIS ROD, 2004).

Table 3.43 Reasonably Foreseeable Projects on the Plumas National Forest within the Wildlife Analysis Area.

Reasonably Foreseeable Projects	Implementation Year	Status
Westside Lake Davis	2005-2006	On going
Humbug DFPZ	2003-2006	On-going
Long Valley KV	2005-2006	On-going
Hazard Tree Removal	2005	On-going
DFPZ maintenance	2016	-
FS Road 24N10 Chip Seal Project	2006	Planning
Lake Davis Pike Eradication	2007	Planning

Grazing would be expected to continue on private and National Forest lands at current levels. There are seven livestock grazing allotments (Grizzly Valley Community, Grizzly Valley, Humbug, Chase, Lake Davis, Long Valley and Willow Creek 2) that overlap into the wildlife analysis area of which four are active. Approximately 40 percent of the Humbug allotment is within the project area. Ninety five cow/calf pairs area authorized from June 1 thru August 1. One hundred percent of the Grizzly Valley allotment is within the project area. Five hundred cow/calf pairs are authorized from June 16 thru September15. Approximately 50 percent of the Grizzly Valley Community allotment is within the project area. One hundred fifty seven cow/calf pairs are authorized from June 16 thru September 30 and another One hundred and twenty cow/calf pairs are authorized from June 16 thru September15. The remaining four allotments only overlap the wildlife analysis area with the Chase allotment being the only active allotment.

Westside Lake Davis watershed restoration project would restore 50 headcuts and gullies within the project area. Implementation of this project would improve channel stability and reduce sedimentation within 20 stream channels.

Future activities include on going work within the Humbug DFPZ, Long Valley KV, and hazard tree removal projects. Little to no change in overstory vegetation is anticipated with these projects. However, all snags that present hazards to road traffic, regardless of size, are being, or would be, removed. Removal of these snags would have a negative effect on individual animals that use snags, yet these hazard trees make up a very small amount of the total snag component in the wildlife analysis area.

The Grizzly DFPZ, which is in the wildlife analysis area, Proposed Action is currently under development and could not be precisely evaluated at the time of this report however, the effects are expected to be similar to the Freeman project. Additional potential projects (tentatively identified as Cutoff and Mt. Ingalls), involve fuel treatments and fall within the wildlife analysis area near Bagley Pass and Crocker Cutoff. However, no site specific planning has occurred. Planning could potentially occur in 2007.

The Personal Use Firewood program on the Plumas National Forest is an ongoing program that has been in existence for years and would continue. This program allows the public to purchase a woodcutting permit and remove fuel and firewood from National Forest lands. A 10-year average (1991-2000) indicates that 3,273 permits were issued annually resulting in the annual sale of 10,417 cords of wood on the Plumas. Since 1993 there has been a declining trend in both number of permits and cords sold (for the year 2000, 2,227 permits issued selling 6,392 cords, while in 2003, 819 permits were sold for a total of 2,154 cords). Much of this wood material either consists of down logs found in the forest, along forest roads, and within cull decks created by past logging operations, or as standing snags. The Freeman 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. More area would be accessible to woodcutting with the No-action alternative, as no existing roads would be closed.

The past and future effect of these actions has and would be to shift forest successional stages to somewhat earlier stages, while generally retaining continuous forest cover. Future effects include persistence of the largest trees, retention of snags away from roads, and reduction in habitat losses due to large, damaging wildfires.

The DFPZ is designed to be effective for a period of 10-years. The earliest maintenance treatment to maintain effectiveness is expected to be approximately 10 years from completion of the initial DFPZ, based on a review of similar projects completed since the mid 1990's. The direct, indirect, and cumulative effects of the foreseeable maintenance (hand, mechanical and prescribed fire treatments) would be similar to those described in the HFQLG FSEIS (pages 47 – 305).

The future maintenance for the Proposed Action is projected to include 1,594 acres of prescribed fire, 419 acres of hand treatment, 1,618 acres of mechanical treatment, and 16 acres of herbicides. Alternative 3 was not analyzed separately due to the fact that it has only 22 fewer acres of treatment than Alternative 4. Alternative 4 is projected to include 1,576 acres of prescribed fire, 411 acres of hand treatment, 1,615 acres of mechanical treatment, and 15 acres of herbicides. The herbicide treatment shows up due to isolated small acreages of shrubs within treatment units. Based on site-specific analysis of the vegetation types and slopes in the project area, reviews of other projects completed within similar types and slopes, and current direction to avoid use of herbicides, the foreseeable maintenance would consist of prescribed fire, hand treatments, and some mechanical treatments. Herbicide use is not planned as part of the reasonably foreseeable DFPZ maintenance. See Appendix E for the tables generated on DFPZ maintenance.

Viability determinations for threatened, endangered and old forest associated sensitive species, based on the effects of DFPZ maintenance, are found on pages 139 – 140 of the HFQLG FSEIS, Chapter 3 – Affected Environment and Environmental Consequences (determinations for aquatic/riparian associated species are found on pages 241 – 243).

Recreational use is expected to continue at the current rate. The current rate includes approximately 13 Special Use Permits that are within the wildlife analysis area. These include hunting outfitters & guides, fishing outfitters & guides, snowmobile poker runs, sled dog races, and film productions.

Recreation is proposing to chip seal a portion of FS Road 24N10 from the intersection with West Street to the Camp 5 fishing access road turnoff. This entails widening the existing sub grade up to 30 feet (approximately 6-10 feet). The proposed chip sealing of FS Road 24N10 will likely reduce airborne dust created by vehicles traveling over a gravel/dirt surface.

Treatment to eradicate the Pike from Lake Davis is being proposed and assessed by the State of California. The Proposed Action and alternatives are currently under development and could not be precisely evaluated at the time of this report. Preliminary analysis shows there are potential negative effects to the fishery, macroinvertebrate, and water quality in all the streams within the Freeman project area from both the eradication and the lowering of the lake. The Forest Service is proposing the following associated actions, 1) issuance of a special use permit for access through, and use of National Forest lands to lake Davis and it's tributaries for the implementing the pike eradication program, 2) a Forest order to close the entire area to the public during this procedure and to close access to the lake bed as the lake level lowers.

Alternative 2 (No-action)

No direct effects (disturbance or habitat changes) on TES species (both terrestrial and aquatic) are expected to result from the "No-action" alternative. Potential indirect effects relate to the long-term effects on stand structures, riparian areas and the increased possibility of catastrophic wildfire due to implementing the No-action alternative. The effects of a catastrophic wildfire are speculative, but a worst case situation of a high intensity, wind driven fire could result in the direct loss of 1-6 spotted owl PACs, 1-8 goshawk PACs, 1-4 potential great gray owl PACs, elimination of existing late seral habitat (5M, 5D, 6), as well as alteration of riparian zones with potential increases in soil erosion above normal levels. Direct mortality of wildlife would occur, but the magnitude of this mortality is unknown.

The BA/BE for HFQLG EIS (1999) stated that any alternative that would reduce the threat of large, stand replacement fires by creating conditions that would reduce the fire size and intensity, will benefit forest and aquatic dependent species. Large fires create large- scale fragmentation across landscapes that removes suitable habitat, isolates habitat parcels, and creates large openings that could prevent species occupancy, emigration and immigration. Alternative 2 does not move the habitat in a direction to reduce the threat of large stand replacement fires. There would be No-action taken to close and/or decommission up to 9 miles of road or reconstruct up to 16 miles of road.

3.5.6.3 Species Specific Effects, TES species

Bald eagle

General Effects of the Action Alternatives

Bald eagles exhibit great variation in response to human activity depending on the type, frequency, and duration of activity, modification of the physical environment, time of reproductive cycle, and individual bird accommodation to the disturbance (US Forest Service, Region 5, 1977). On the Chippewa National Forest, rather than habituating to repeated intrusion, eagles flushed at increasing distances with additional disturbances. Thus, it cannot be assumed that eagles will readily adapt to new stimuli. Although some may indeed adapt to changes, it appears that others will not, at least in the short run (Fraser et al, 1985). The variable effects of human activity on the reproductive performance of bald eagles (Grier 1969, Fraser 1985) imply a threshold for detrimental impact between pristine isolation and outright destruction. Disturbance in relation to eagle breeding chronology is important. Vulnerability is greatest during egg-laying, incubation, hatching and when eagles are small and downy. Nest-attending eagles are relatively sedentary, whereas foraging eagles are the most easily disturbed. Thus, eagles are more consistently flushed from perches than from nests (Grubb and King, 1991). Distance to disturbance is the most important aspect of human disturbance. Human activities that are distant, of short duration, out of sight, few in number, below, and quiet have the least impact on nesting bald eagles.

Despite the multi-dimensional nature of human disturbances, any category of disturbance can, in excess or under the proper circumstances, disrupt normal behavior or cause nesting failure (Grubb and King, 1991). The five week period that includes egg laying and incubation is the most critical in terms of reproductive success. Disturbance at this time may cause the adults to leave eggs unattended. Interruption of incubation may cause heat loss to the point of nest failure. Unnatural exposure of young reduces the chances of survival, especially during times of inclement weather. Interruption of feeding visits by adults may also affect survivability of young nestlings. Disturbance may also cause young to leave the nest prematurely.

Several studies exist which examine bald eagle responses to various disturbances (Stalmaster and Newman 1978; Knight and Knight 1984; Fraser et al. 1985; McGarigal et al. 1991; Grub and King 1991). Most of the disturbances are from recreational activities. Experiments that determine flush response rate and flush distance of eagles to approaching disturbances are the most common tools used to evaluate impacts. There are some distinctive forms of recreational disturbance and patterns in eagle response behavior that are consistent in their effects. Mean flush distance was 197 m for breeding eagles responding to boating activities on the Columbia River estuary (McGarigal et al. 1991); 196 m for wintering adult eagles in response to pedestrians on the Nooksack River (Stalmaster and Newman 1978); 168 m and 150 m for wintering birds perched in trees when they responded to boating disturbances on the Skagit and Nooksack rivers, respectively (Knight and Knight 1984) 137 m for eagles responding to boating disturbances in

North Carolina (Smith 1988); and 215 m for eagles of all ages and seasons responding to boats along Chesapeake Bay (Buehler et al. 1991). The overall similarity in these distances suggests that there may be a general tolerance threshold for foraging eagles. Incubating eagles flushed at greater distances when disturbed repeatedly (Fraser et al. 1985), whereas the flush distance of winter migrants did not change when disturbed repeatedly (Stalmaster and Newman 1978). Eagles flushed more often when boats approached slowly or were loud than when boats approached rapidly or were quiet (McGarigal et al. 1991). Slow-moving boats disrupted eagle feeding activity more than fast-moving boats (Stalmaster et al. unpublished report). McGarigal et al. (1991) noted that eagles were largely unaffected by fast-moving, land-based vehicles, but became increasingly agitated as vehicles slowed to a stop. Time of day also seems to influence flush response; eagles flushed more often in response to human activities before 1000 hours; therefore human activities during early morning were potentially more disturbing to foraging eagles (McGarigal et al. 1991).

Direct effects

Potential direct effects on the bald eagle may result from the modification or loss of habitat or habitat components (primarily large trees, snags and other perches), and rarely from direct mortality if nest trees are felled. The proposed action and alternatives will not cut or remove nest trees. All of the action alternatives treatments (thinning, group selection, etc.) within the bald eagle management area have been designed to enhance bald eagle habitat via the Lake Davis BEHMA Plan by encouraging the regeneration of pine.

Approximately 5,823 acres of the 6,256 acre BEHMA are present in the wildlife analysis area. Of the 5,823 acres of BEHMA present in the wildlife analysis area approximately 225 acres are currently suitable bald eagle nesting habitat with another approximately 3,537 acres being potentially suitable for nesting in the next 25 to 100 years. No currently suitable nesting habitat would be impacted with the implementation of any of the action alternatives. Alternative 1 would release 191 acres of 1,032 acres in the primary use areas and 732 acres of 2,505 acres in the secondary use areas. Of the 912 acres being released, dominant and co-dominant trees would average an inch of growth every 5 years (personal comm. Beckwourth District Culturist). This means that a 20 inch dbh tree would reach suitable nesting size in 5 (21” dbh) to 50 years (30” dbh) instead of 25 to 100 years if the stand went untreated. The implementation of alternative 1 would remove 20 acres in the primary use area and 69 acres in the secondary use area through GS and aspen ETZs of potentially suitable nesting habitat rendering it unsuitable. Alternative 3 would release 209 acres of 1,032 acres in the primary use areas and 768 acres of 2,505 acres in the secondary use areas, for a total of 977 acres treated for release. The implementation of alternative 3 would remove two acres in the primary use area and 25 acres in the secondary use area through GS and aspen ETZs of potentially suitable nesting habitat rendering it unsuitable. Alternative 4 would release 259 acres of 1,032 acres in the primary use areas and 857 acres of 2,505 acres in the secondary use areas, for a total of 1,116 acres treated for release. The implementation of alternative 4 would remove two acres in the primary use area and 21 acres in the secondary use area through GS and aspen ETZs of potentially suitable nesting habitat rendering it unsuitable. A total of 912 – 1,116 acres of the 3,537 acres of potentially suitable habitat within the BEHMA in the wildlife analysis area would be released under Alternatives 1, 3 and 4.

In addition, disturbances associated with logging, temporary road building, or other associated activities within or adjacent to occupied habitat may disrupt nesting, fledging, and roosting activities. There is a low potential for smoke from burning piles, etc. to disrupt the normal behavior patterns of eagle using the area. Implementation of LOPs around known bald eagle nests would remove the effects associated with direct disturbance on treatment units and temporary roads.

Indirect effects

Reconstruction of existing roads may result in roads that are more accessible to general passenger vehicles and thus lead to a minor increase in recreational use of the area. New road construction would be in the form of minor skid roads leading to treatment areas, and thus would not likely result in an increase in recreational use, except perhaps by hunters in the fall. Construction of temporary roads would have no long term impacts in the form of increased human use and presence in the area, but could lead to minor, temporary impacts in the form of increased sedimentation in streams and thus a decrease in water quality, which could negatively affect bald eagle foraging. However, changes in the fishery production are not expected as a result of implementing proposed fuel treatments, groups, and area thinning with biomass removal. Implementation of BMPs and meeting all RMO (RMO Analysis located in CWE report within project record) assures that there will be no indirect effects on the fisheries or fisheries habitat.

Cumulative effects

The analysis of cumulative effects of the proposed action alternatives evaluates its anticipated impact on TES wildlife from the existing condition (existing condition reflected by changes that have occurred in the past) within the wildlife analysis area. The past actions in the wildlife analysis area that contributed to the existing condition include grazing, timber harvest and recreation use.

Grazing would be expected to continue on private and National Forest lands at current levels. There are seven livestock grazing allotments (Grizzly Valley Community, Grizzly Valley, Humbug, Chase, Lake Davis, Long Valley and Willow Creek 2) that overlap into the wildlife analysis area of which four are active. Approximately 40 percent of the Humbug allotment is within the project area. Ninety five cow/calf pairs area authorized from June 1 thru August 1. One hundred percent of the Grizzly Valley allotment is within the project area. Five hundred cow/calf pairs are authorized from June 16 thru September15. Approximately 50 percent of the Grizzly Valley Community allotment is within the project area. One hundred fifty seven cow/calf pairs are authorized from June 16 thru September 30 and another One hundred and twenty cow/calf pairs are authorized from June 16 thru September15. The remaining four allotments only overlap the wildlife analysis area with the Chase allotment being the only active allotment. This activity would continue to contribute to bank erosion and sedimentation of stream habitats thus potentially affecting the food source of bald eagles that forage on and around Lake Davis.

The Westside Lake Davis Watershed Restoration Project would restore 50 headcuts and gullies within the project area. Implementation of this project would improve channel stability and reduce sedimentation within 20 stream channels. This action potentially improves the habitat for the bald eagles food source.

Future activities include on going work within the Humbug DFPZ, Long Valley KV, and hazard tree removal projects. Little to no change in overstory vegetation is anticipated with these projects. However, all snags that present hazards to road traffic, regardless of size, are being, or would be, removed. Removal of these snags would have a negative effect on individual animals that use snags, yet these hazard trees make up a very small amount of the total snag component in the wildlife analysis area.

The proposed action for the Grizzly DFPZ, partly within the wildlife analysis area, is currently under development and could not be precisely evaluated at the time of this report however; the effects are expected to be similar to the Freeman project. Additional potential projects (tentatively identified as Cutoff and Mt. Ingalls), involve fuel treatments and fall partly within the wildlife analysis area near Bagley Pass and Crocker Cutoff. However, no site specific planning has occurred. Planning could potentially occur in 2007. These future projects would continue to implement measures from the BEHMP thus potentially improving habitat conditions for bald eagles.

The Personal Use Firewood program on the Plumas National Forest 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 lands. Much of this wood material either consists of down logs found in the forest, along forest roads, and within cull decks created by past logging operations, or as standing snags. The Freeman 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. More area would be accessible to woodcutting with the no action alternative, as no existing roads would be closed.

The past and future effect of these actions has and would be to shift forest successional stages to somewhat earlier stages, while generally retaining continuous forest cover. Future effects include persistence of the largest trees, retention of snags away from roads, and reduction in habitat losses due to large, damaging wildfires.

Recreational use is expected to continue at the current rate. The current rate includes approximately 13 Special Use Permits that are within the wildlife analysis area. These include hunting outfitters & guides, fishing outfitters & guides, snowmobile poker runs, sled dog races, and film productions.

The Forest Service is chip sealing a portion of FS Road 24N10 from the intersection with West Street to the Camp 5 fishing access road turnoff. This entails widening the existing sub grade up to 30 feet (approximately 6-10 feet). The chip sealing of FS Road 24N10 will likely reduce airborne dust created by vehicles traveling over a gravel/dirt surface. This project has the potential to affect bald eagle reproductive at the Camp 5 nest is which is located approximately 100 feet upslope from Forest Service Road 24N10.

The California Department of Fish and Game is proposing to draw down the water level of Lake Davis and use the piscicide rotenone in an attempt to contain and eradicate the northern pike from the reservoir and its upstream tributaries. The drawdown and treatment are proposed to start in the fall of 2007. This project has a potential to affect the food source of bald eagles that forage on and around Lake Davis. The lake was treated in a similar way in 1997. Both the Cow Creek and Mosquito Slough eagles attempted nests in 1996 and both failed. In 1997, the Mosquito Slough pair fledged 2 young. No data exists for the Cow Creek pair in 1997. In 1998, again both territory pairs attempted nests and both failed. Then in 1999 both pairs attempted nests and both were successful, with the Cow Creek pairs fledging 2 young and the Mosquito Slough pair fledging 1.

Effects of Alternative 2 (No-action)

Direct effects

There would be no direct effects on bald eagles or bald eagle habitat, as no activities would occur that would cause disturbance to nesting or foraging birds, nor any impacts to the existing habitat conditions.

Indirect effects

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 bald eagle nesting habitat and other important habitat attributes such as large trees, large snags and down woody material. Thus suitable habitat for productive bald eagle territories could become patchy or unevenly distributed with this alternative, and could lead to reduced or lower abundance of bald eagles within the wildlife analysis area

With the current Plumas National Forest 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 bald eagles, 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.

Cumulative effects

The No-action Alternative for the Freeman project would provide no long-term protection of bald eagle 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 eagle abundance from existing condition within the wildlife analysis area. There would be no thinning that could enhance the growth of dominant and co-dominant trees that may provide future habitat availability.

Mountain yellow-legged frog & Foothill yellow-legged frog

The analysis of effects of the alternatives for these two species has been combined as proposed treatments have similar impacts to the aquatic environments in which these species exist.

Action Alternatives

Habitat in RHCAs is prescribed for treatment to reduce the potential for catastrophic wildfire and release the remaining live vegetation.

The objective within the RHCAs (potential habitat for both species of yellow-legged frogs (YLFs)) is to maintain microclimate, protect stream banks from disturbance, and retain key attributes such as riparian vegetation, down logs and LWD recruitment within slower gradient creeks capable of supporting habitat for these species.

To achieve the above objective, RHCAs will be designated on the ground and appropriate fuel treatments prescribed, based on RHCA characteristics and adjacent fuel treatments. All hardwoods will be retained in all units, and removed material will be hand piled and burned. A backing fire will be allowed within RHCAs to reduce the immediate removal of live vegetation. Mechanical equipment would not enter the RHCA equipment exclusion zones (25 feet from SMZs and in aspen treatment units, 50 feet from non-fish bearing RHCAs and 100 feet from fish bearing RHCAs), thus potential for direct impacts is negligible and very low risk.

Direct effects of Thinning and Prescribed Fire

Direct effects include the killing or injuring of individuals from harvest machinery, hand thinning, construction of slash piles, and burning activities. Harassment of individual frogs from thinning activity (e.g. noise disturbance and ground vibration) within or near habitat may also directly affect the species. Hand thinning within the 300-foot and 150-foot RHCAs, as well as the underburning could result in direct mortality of individuals if these activities are conducted during the period of time that overland movements may be going on. Use of riparian areas and adjacent upland movements of FYLF are not well understood (SNFPA 2001). Dispersal of FYLF is unknown, yet dispersal may occur from the main stems up the tributaries in the fall and winter months (pers. comm. Tina Hopkins and PG&E Aquatic Biologist, 3/2001). Dispersal behavior and habitats may be similar to MYLF, although it is unknown as to what extent if any overland travel occurs.

In a recent telemetry study by Matthews and Pope (1999), mountain yellow-legged frog overland movements were restricted to the month of September and were thought to have been associated with seasonal migrations between summer and over-wintering sites. During this migrational period frogs were found in exposed rocky habitats significantly more. Frogs moved from their original capture lake an average distance of 145m (476 feet). These movements were often associated with stream corridors however overland movements in dry rocky terrain were observed for up to 66m (216 feet). Overland movements did not appear to be influenced by cover types. Movements were clearly destination driven and occurred in short bursts with one individual completing this 66m journey in only 44 minutes. This new information suggests that the use of upland habitat by the mountain yellow-legged frog is very limited in both space and time.

It is unknown if or to what extent overland movements occur with stream dwelling MYLFs. An ongoing telemetry study is currently investigating this subject with individual frogs on the Plumas National Forest. Findings from the MYLF study show that the frogs are extremely territorial and found at or near the same pool after each visit. Findings also show that female MYLFs move downstream towards male frogs when temperatures drop (pers. comm. L. Vance, 2003). MYLFs occupying streams within the study areas on the Plumas do not seem to travel overland, but move within the confines of the aquatic environment (Ibid). Based on the telemetry results of frogs within stream on the Plumas National Forest, keeping activity from the riparian edge would not directly affect frogs or bank habitat. Thus previous concerns regarding direct mortality of MYLFs in the upland due to mechanical thinning, group selection, area thinning and burning are not warranted for MYLFs occupying streams. If MYLFs are found during the implementation of the project, an LOP would be implemented in the occupied drainages (Oct 1 through April 15th).

RHCAs with sensitive areas (springs, bogs, erosive soils etc.) and RHCAs > 15% slopes would not be entered with ground-based equipment per the SAT guidelines and project design. Within all RHCAs burning intensities within RHCAs would be very light, due to restricted ignition within RHCAs and subsequent cool back burning that would occur, resulting in little consumption of LWD logs >12” dbh to meet the Soil Quality Standards and to retain 10-15 tons per acre of LWD. Backburning would occur during times when there is increased moisture and potentially less consumption of LWD. Also, the “general burn plan” prescription is to consume fine fuels. Short-term sediment after burning will occur. A greater long-term benefit is the protection of the RHCAs from catastrophic wildfire. Again, applicable BMPs would be implemented.

While fire would not be ignited within the RHCAs, fire would be allowed to back into those riparian areas. There is a small potential for the modification of streamside vegetation and loss of duff layer due to prescribed fire in riparian areas. In addition, prescribed fire activities, when paired with past and future vegetation management activities, may result in some habitat loss through sedimentation and loss of riparian vegetation. However, any impacts from prescribed fires are expected to be short lived. Fire intensity should be low enough to allow some retention of duff layer and riparian vegetation that would prevent soil erosion and expedite recovery.

Direct Effects of Group Selection

Group selections will not occur within the RHCAs, although they may be located immediately adjacent to RHCAs, and certainly within the movement distances that MYLF may exhibit within lacustrine (lake) environments. There is a suitable lacustrine environment (Lake Davis) within the project area however its suitability is questionable due to the presents of several predatory fish species.

Direct Effects of Water Drafting

The use of water for dust abatement by drafting water from creeks especially during the summer months may cause changes in the flow regimes and water quality, especially within deeper pools and off channel waterholes. Changes in flow regimes can result in changes in surface water elevations, exposing egg masses to air drying for short periods (early summer) to potentially longer periods of exposure later in the summer, resulting in loss of egg viability. There is also the potential for individual tadpoles, egg masses, or amphibians to be taken up by the “drafting” process, resulting in mortality of individuals. New or existing water drafting sites would be evaluated by a biologist prior to changes and uses. As necessary, back down ramps will be maintained to ensure bank stability, and sedimentation is minimized, amphibian/fish protection devices such as suction strainer (2mm gauge or less) will be used during drafting operations to prevent entrainment of tadpoles, egg masses or amphibians, and if necessary post-project rehab will occur.

Indirect effects

Vegetation management in the uplands can potentially change the hydrologic regime in the area. Soil erosion could direct sedimentation into streams that could create short -term unsuitable water quality that could disrupt habitat use by this species. However, with the implementation of SAT guidelines, RHCA buffers, and Best Management Practices, it is anticipated that there would be no disruption in flows and minimal short-term sedimentation into streams (refer to CWE Report, Drake, 2006).

Indirect effects of Vegetation Treatments

Within the RHCAs, there is the potential for the following indirect effects: loss of sheltering habitat from backing fire and hand thinning, potential loss of riparian vegetation due to burning activities, changes in the microclimate (reduced humidity, and increased air temperatures) due to the thinning and burning activities, and increased sedimentation to the stream channel to increased overland flows from the proposed project.

Again, the CWE analysis suggests that there is a moderate risk that the activities proposed in the action alternatives would lead to detrimental watershed effects (Drake 2006). Riparian vegetation could be enhanced and expanded as a result of thinning and underburning.

Backing fires in the RHCAs and underburning in the uplands can increase sediment production in streams if buffer strips are not maintained (Chamberlin et al. 1991, USDA-SNFPA-BO 2001). Annual water yields can be significantly increased after fire due to the reduction of transpiring vegetation (Agee 1993, USDA-SNFPA-BO 2001). Hand pile burning has essentially no direct effect on riparian vegetation since piles are typically not placed immediately adjacent to shrubs and other live vegetation. Some impact may occur to annual and perennial riparian plants that occur underneath or immediately adjacent to the pile. Riparian vegetation between piles would be unaffected. Since hand piles focus on removal of smaller sized fuels, existing larger diameter down woody debris would remain on site to provide for alternate sheltering and dispersal cover.

Indirect Effects of Road Management

Approximately 10 miles of roads are proposed for decommissioning, while another one mile is proposed for closing. This will decrease compaction, increase percolation into the roadbed, increase soil stability and limit concentrated flow as well as surface erosion derived from temporary roads. All temporary skid roads will be treated with water bars, in addition to being closed to traffic by installation of dirt berms. New road construction would increase the potential for soil movement and increased potential sedimentation into streams and aquatic habitats. Approximately two miles of new temporary road would be constructed but decommissioned upon completion of the proposed activities. The .3 miles of new system road construction would relocate two small segments of roads outside of RHCAs thus decreasing potential sedimentation into the streams and aquatic habitat.

Indirect Effects of Predation

Habitat modifications as identified above, that are unfavorable to amphibians may favor their predators and increase the likelihood of further population declines due to unsustainable levels of predation (Knapp and Matthews 2000, Jennings & Hayes 1994). The perennial streams within the project area contain northern pike, rainbow, brown and brook trout, known predators of yellow-legged frogs. Implementation of RHCAs, BMPs, and meeting Riparian Management Objectives would maintain suitable habitat conditions for trout in all streams they currently occupy.

All three species of garter snakes (*Thamnophis sp.*) that occur within the project area will feed on frogs, tadpoles and egg masses. Garter snake populations, especially those of the aquatic garter snake, are not expected to be affected by project activities.

Cumulative effects

The analysis of cumulative effects of the Proposed Action alternatives evaluates its anticipated impact on TES wildlife from the existing condition (existing condition reflected by changes that have occurred in the past) within the wildlife analysis area. The past actions in the wildlife analysis area that contributed to the existing condition include grazing, timber harvest and recreation use.

Direct and indirect effects, as described above, on more than one stream can lead to larger effects downstream. Cumulative effects may occur from the historic vegetation and fuel management projects, road construction and densities, stream restoration projects, recreational use, and grazing within the proposed project area. With reference to the Cumulative Watershed Effects Analysis (Drake 2005), the effects of the action alternatives are very similar, and after full recovery (30 year period), these alternatives result in slightly lower ERA values of watershed condition, due to the road decommissioning in some subwatersheds.

Key management activities (identified in the SNFPA 2001 analysis for MYLFs) that the Forest Service can influence (exotic fish stocking, pack stock use and access, recreation, and locally applied chemical toxins, including pesticides and herbicides) are not part of the action alternatives and would not change above existing conditions under either the action alternatives or No-action alternative. Certain key management activities identified in the SNFPA 2001 analysis for FYLFs that the Forest Service can influence (dams and diversions, mining, livestock grazing, recreation, and locally applied chemical toxins, including pesticides and herbicides) are not part of the action alternatives and would not change above existing conditions under the action alternatives or No-action alternative.

Grazing would be expected to continue on private and National Forest lands at current levels. There are seven livestock grazing allotments (Grizzly Valley Community, Grizzly Valley, Humbug, Chase, Lake Davis, Long Valley and Willow Creek 2) that overlap into the wildlife analysis area of which four are active. Approximately 40 percent of the Humbug allotment is within the project area. Ninety five cow/calf pairs area authorized from June 1 thru August 1. One hundred percent of the Grizzly Valley allotment is within the project area. Five hundred cow/calf pairs are authorized from June 16 thru September15. Approximately 50 percent of the Grizzly Valley Community allotment is within the project area. One hundred fifty seven cow/calf pairs are authorized from June 16 thru September 30 and another One hundred and twenty cow/calf pairs are authorized from June 16 thru September15. The remaining four allotments only overlap the wildlife analysis area with the Chase allotment being the only active allotment. This activity would continue to contributing to bank erosion and sedimentation of stream habitats.

Westside Lake Davis watershed restoration project would restore 50 headcuts and gullies within the project area. Implementation of this project would improve channel stability and reduce sedimentation within 20 stream channels. This action potentially improves the suitability of habitat for YLFs.

Future activities include on going work within the Humbug DFPZ, Long Valley KV, and hazard tree removal projects. Little to no change in overstory vegetation is anticipated with these projects. However, all snags that present hazards to road traffic, regardless of size, are being, or would be, removed. Removal of these snags would have a negative effect on individual animals that use snags, yet these hazard trees make up a very small amount of the total snag component in the wildlife analysis area.

The Grizzly DFPZ, which is in the wildlife analysis area, Proposed Action is currently under development and could not be precisely evaluated at the time of this report however, the effects are expected to be similar to the Freeman project. Additional potential projects (tentatively identified as Cutoff and Mt. Ingalls), involve fuel treatments and fall within the wildlife analysis area near Bagley Pass and Crocker Cutoff. However, no site specific planning has occurred. Planning could potentially occur in 2007. These future projects would continue to implement protection measures for YLFs.

The Personal Use Firewood program on the Plumas National Forest is an ongoing program that has been in existence for years and would continue. This program allows the public to purchase a woodcutting permit and remove fuel and firewood from National Forest lands. Much of this wood material either consists of down logs found in the forest, along forest roads, and within cull decks created by past logging operations, or as standing snags. The Freeman 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. More area would be accessible to woodcutting with the No-action alternative, as no existing roads would be closed.

The past and future effect of these actions has and would be to shift forest successional stages to somewhat earlier stages, while generally retaining continuous forest cover. Future effects include persistence of the largest trees, retention of snags away from roads, and reduction in habitat losses due to large, damaging wildfires.

Recreational use is expected to continue at the current rate. The current rate includes approximately 13 Special Use Permits that are within the wildlife analysis area. These include hunting outfitters & guides, fishing outfitters & guides, snowmobile poker runs, sled dog races, and film productions. This dispersed recreation occurs throughout the project area, with a concentration of activity around Lake Davis within the project area and do not seem to be having any major impact to the steep, well armored riparian systems within the project area. Several meadows have experienced some damage from OHV use. These activities will continue to cause streambank disturbance and trampling from humans; and will have adverse effects to riparian vegetation.

Recreation is proposing to chip seal a portion of FS Road 24N10 from the intersection with West Street to the Camp 5 fishing access road turnoff. This entails widening the existing sub grade up to 30 feet (approximately 6-10 feet). The proposed chip sealing of FS Road 24N10 will likely reduce airborne dust created by vehicles traveling over a gravel/dirt surface. This project has the potential to improve the suitability of habitat for YLFs along Forest Service Road 24N10 due to reduced sedimentation and improved stream connectivity (improved culverts).

The California Department of Fish and Game is proposing to draw down the water level of Lake Davis and use the piscicide rotenone in an attempt to contain and eradicate the northern pike from the reservoir and its upstream tributaries. The drawdown and treatment are proposed to start in the fall of 2007. This project has a potential to improve habitat suitability for YLFs by removing northern pike from Lake Davis and its upstream tributaries while slightly reducing water quality with regards to a decline in taxa diversity of macroinvertebrates.

Alternative 2 (No-action)

Direct effects

There would be no direct effects on YLF habitat, as no activities would occur that would cause disturbance to individual YLF, nor any impacts to the existing habitat conditions.

Indirect effects

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 RHCAs and suitable YLF habitat. Any acres burnt at high intensity could contribute to increased sedimentation, which would adversely affect aquatic habitats and potential breeding habitat for the YLF.

Cumulative effects

The No-action Alternative for the Freeman Project would not protect or enhance YLF habitat. There would be No-actions designed to reduce the risk of high intensity wildfire. There is the potential for RHCAs to act like chimneys and carry fire up and down the watershed. Watershed restoration through these fuel reduction projects would not occur to protect watersheds from catastrophic wildfire. Cumulative effects livestock grazing would continue to create water quality problems, including sedimentation and bank cutting.

Northwestern pond turtle

General Effects of the Action Alternatives

Direct effects

Potential direct effects to upland habitats include thinning of stands and underburning, both removing vegetative cover and terrestrial structural components across the stand. If animals occur, logging activity could cause direct mortality (crushing from tree falling and ground based equipment) while they are in the uplands. There is marginal to moderate suitable habitat for the northwestern pond turtle within the wildlife analysis area. Habitat on National Forest Land is marginal, as few “ponded” areas exist within the riverine environments. If present, some individuals could be affected by harvest activities during migrations to upland egg laying and overwintering sites. The risk to the species is remote due to no detections of turtles within the wildlife analysis area.

Indirect effects

See indirect effects to FYLF and MYLF above, as these same indirect effects that have been analyzed apply to this species. Water temperatures would not be affected because very little changes to canopy cover along streams and within all RHCAs is expected as a result of the action alternatives. Vegetation management in the uplands can potentially change the hydrologic regime in the area. Soil erosion could direct sedimentation into streams that could create short -term unsuitable water quality that could disrupt habitat use by this species. However, with the implementation of SAT guidelines, RHCA buffers, and Best Management Practices, it is anticipated that there would be no disruption in flows and minimal short- term sedimentation into streams (Drake 2006).

Cumulative effects

Impacts to aquatic habitat have been identified above for the amphibians; direct impacts to upland habitats have been addressed earlier in the document. The same cumulative effects identified for YLFs apply to the WPT, except the predation factors identified do not apply. No pond turtle habitat has been directly affected by any similar projects on the Beckwourth RD.

Alternative 2 (No-action)

Direct effects

There would be no direct effects on Western pond turtle habitat (WPT) or WPT habitat, as no activities would occur that would cause disturbance to individual WPT, nor any impacts to the existing habitat conditions.

Indirect effects

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 RHCAs and suitable WPT habitat. Any acres burnt at high intensity could contribute to increased sedimentation, which would adversely affect aquatic habitats and potential breeding habitat for the WPT.

Cumulative effects

The No-action Alternative for the Freeman Project would not protect or enhance WPT habitat. There would be No-actions designed to reduce the risk of high intensity wildfire. There is the potential for RHCAs to act like chimneys and carry fire up and down the watershed. Watershed restoration through these fuel reduction projects would not occur to protect the sensitive watersheds from catastrophic wildfire.

American peregrine falcon

General Effects of the Action Alternatives

Direct effects

There are no known peregrine territories and no records of peregrine sightings within the wildlife analysis area. An existing peregrine nest eyrie is located approximately 7 miles from the project area, which could be outside of the foraging distance used by this pair. The wildlife analysis area generally lacks suitable cliff nesting habitat. Since there is no known or expected nesting activity in the wildlife analysis area and no suitable nesting habitat within the project area, project activities would not affect peregrine falcons directly.

Indirect effects

Opening up the forested stands through thinning and group selection may cause a shift of avian species diversity within the wildlife analysis area (HFQLG EIS 1999) but no net decline in prey availability. As mentioned, the project area could be outside the used foraging radius by the known pair, thus any increase in prey availability may not affect peregrines.

Cumulative effects

The proposed alternatives will have no affect on known nest sites, nor will cause any change in population distribution across the Plumas National Forest or the Sierra Nevada range. The Freeman Project will have no effect on peregrine falcon, and will not contribute to any cumulative effects on populations of this species.

California Spotted Owl

General Effects of the Action Alternatives

Direct effects to the Wildlife Analysis Area

Potential direct effects on the spotted owl 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 will 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 LOP around known spotted owl nests would remove the effects associated with direct disturbance on treatment units and access routes.

Based on the vegetation layer and the CWHR model, about 15% or 6,306 acres within the wildlife analysis area (41,388 NF acres) may be considered suitable spotted owl nesting habitat (5M, 5D, and 6), and about 45% or 18,684 acres may be considered suitable foraging habitat (4M and 4D) (see Table 3.31).

Changes to suitable habitat as a result of implementing fuels treatments as per action alternatives 1, 3 & 4 would occur where large structural components would be removed and canopy cover would be opened up to 40 - 50%, resulting in open canopied forested stands which are still considered suitable habitat based on canopy cover retention, but deemed unsuitable due to the removal of the needed understory structural components (high total live tree basal area, snag basal area, basal area of large snags, and at least two canopy layers) (see Table 3.29). Canopy cover reductions are expected to occur with the removal of some trees ≤29.9 inches dbh. The combined impacts of mechanical thinning of the understory and achieving the desired conditions for DFPZ by opening up the overstory would result in creating more open forest from dense forest (D stands decreasing to M) (open up to around 40% canopy cover). Area thinning with biomass removal also creates more open, lesser quality owl habitat and thus is analyzed as decreasing to M. There may also be some additional risk associated with isolated torching events during prescribed fire removing trees, opening up the canopy, and reducing nesting opportunities.

Based on figures in Table 3.44, Alternative 1 reduces foraging habitat on 2,760 acres, reduces nesting habitat 246 acres; Alternative 3 reduces foraging habitat on 2,610 acres and reduces nesting habitat 243 acres; Alternative 4 reduces foraging habitat on 3,037 acres and reduces nesting habitat 379 acres.

Table 3.44 Comparison of Action Alternatives 1, 3 & 4 on Spotted Owl Nesting & Foraging Habitat (4M, 4D, 5M, 5D) within DFPZ, Group Selection, and Area Thinning areas.

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 & Aspen ETZ's	Area Thinning w/biomass		DFPZ	GS	Area Thinning w/biomass	
4M*	-589	-246	-826	87.3%	-654	-90	-825	88.0%
4D	-543	-129	-427	80.3%	-581	-32	-428	81.3%
Total Foraging Change	**-1132**	**-375**	**-1253**	**85.2% retained (-14.8%)**	**-1235**	**-122**	**-1253**	**86.0% retained (-14.0%)**
Nesting Habitat								
5M*	-38	-6	-40	97.0%	-38	-5	-40	97.0%
5D	-151	-9	-2	95.4%	-151	-9	-0	95.4%
Total Nesting Change	**-189**	**-15**	**-42**	**96.1% retained (-3.9%)**	**-189**	**-14**	**-40**	**96.1% retained (-3.9%)**

Foraging Habitat	Alternative 4 (Preferred Alternative) Acres			% (Alt. 4) Remaining in Wildlife Analysis Area
	DFPZ	GS	Area Thinning w/biomass	
4M*	-797	-89	-879	86.5%
4D	-630	-44	-598	77.2%
Total Foraging Change	**-1427**	**-133**	**-1477**	**83.7% retained (-16.3%)**
Nesting Habitat				
5M*	-57	-5	-40	96.4%
5D	-252	-9	-16	92.1%
Total Nesting Change	**-309**	**-14**	**-56**	**94.0% retained (-6.0%)**

* 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 123 square feet/acre, approximately 140 square feet/acre in 4D, approximately 175 square feet/acre in 5M and 5D based on FIA data put through the FVS model (see Freeman Forest Vegetation Report for data). Large tree (>24" dbh) density ranges from less than 1 to 12 per acre, averaging less than 2 large trees per acre, compared to 5-30 large trees per acre in the pre-European period (see Freeman Forest Vegetation Report). These figures represent what is projected to remain on site immediately after project implementation.

Direct Effects to the Protected Activity Centers (PACs) & Spotted Owl Habitat Areas (SOHAs)

No PACs or SOHAs would be entered with the action alternatives. There one 1000 acre base SOHAs located within the wildlife analysis area (Figure 3.3). No fuels treatments, including DFPZ construction, group selection, AT with biomass removal would occur within the designated 1000 acre base SOHAs or 300 acre PACs.

Direct Effects to the Home Range Core Areas (HRCA)

Portions of three owl HRCA would be treated under the action alternatives (each HRCA is associated with an established PAC).

Table 3.45 Action Alternatives 1, 3 & 4: DFPZ, Group Selection and Area Thinning harvest units within Spotted Owl HRCA (suitable habitat).

PAC ID # for HRCA	Total acres of DFPZ Rx within HRCA			Total acres of groups and aspen ETZs* within HRCA			Total acres of AT within HRCA			Total Acres Reduction in Suitable Habitat in HRCA		
	1	**3**	**4**	**1**	**3**	**4**	**1**	**3**	**4**	**1**	**3**	**4**
PL203	81	81	81	35	14	15	207	191	191	269	253	287
PL204	0	0	0	23	23	23	320	320	320	342	342	342
PL274	1	1	1	0	0	0	25	25	0	1	1	1
TOTAL	**82**	**82**	**82**	**58**	**37**	**38**	**552**	**536**	**511**	**612**	**596**	**630**

* Aspen Extended Treatment Zones (ETZs) only in Alternative 1 (PA).

Approximately 612 acres of suitable habitat (CWHR 4M, 4D, 5M, 5D) could potentially be rendered unsuitable under Alternative 1, 596 acres under Alternative 3 and 630 acres with Alternative 4, based on DFPZ, AT with biomass removal and Group Selection prescriptions within the 3 directly affected HRCAs. Acres of habitat change ranges from a high of 342 acres in HRCA associated with PL204 (Alternative 1, 3 & 4) to a low of 1.0 acres in HRCA associated with PL274 (Alternative 1, 3 & 4); the average reduction in suitable acres for the 3 HRCAs would be 204 acres with Alternative 1, 199 acres with Alternative 3 and 210 acres with Alternative 4.

With Alternatives 1, 3 and 4, approximately 631-692 acres of the 2,184 acres of HRCA present within directly affected PACs/HRCAs would be treated (or 29-32% of the HRCA acreage is directly affected). Approximately 631-692 acres of the 4,418 acres of HRCA present within the wildlife analysis area (or 14-16% of the HRCA acreage within the wildlife analysis area) would be impacted by the Freeman Project. Within the wildlife analysis area there is approximately 6,281 acres of PAC and HRCA combined; thus approximately 89-90% of all PAC/HRCA combined acres would not be treated under these action alternatives.

Habitat alteration by the Proposed Action alternatives and the associated risks to known owl occupancy within individual HRCAs is displayed in Table 3.46.

Table 3.46 Habitat Impacts and Risks for 3 Directly Affected HRCAs associated with owl occupancy.

PAC	Occupancy*	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**	
PL203	M	323	700	46%	1,000	32%	269		253		287	High
PL204	M	343	775	44%	1,076	32%	342		342		342	High
PL274	M	26	709	4%	1,058	2%	1		1		1	Low
		692^	**2184**	**32%**	**3,134**	**22%**	**612**		**596**		**630**	

*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 1 (Proposed Action) which treats the greatest number of acres.

HRCAs are delineated based on guidelines provided in the SNFPA FEIS 2001 ROD and the SNFPA FSEIS 2004 ROD. Not all habitats within a HRCA are composed of 4M, 4D, 5M, 5D, due to availability. Thus Table 3.47 displays the amount of these suitable habitat types present within 3 HRCAs and modified by each alternative.

Table 3.47 Suitable Habitat (4M/4D/5M/5D) impacted within each HRCA.

HRCA	Existing 4M/4D	Existing 5M/5D	Total Suitable	Reduction in Suitable Acres					% 4M/4D remaining*	% 5M/5D remaining*
				1		**3**		**4**		
PL203	436	161	597	269		253		287	42.2%	78.3%
PL204	467	9	476	342		342		342	26.8%	100.0%
PL274	307	357	664	1		1		1	100.0%	99.7%
			1,737	**612**		**596**		**630**		

*Figure displayed is for Alternative 4, as it creates the most reduction in suitable habitat within these HRCAs.

It appears that with implementation of Alternative 4, approximately 18 more acres of 4M, 4D, 5M, 5D would be treated over what Alternative 1 treats in HRCAs. Alternatives 1 & 3 result in 18 and 34 less acres of suitable habitat being reduced when compared to Alternative 4.

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 3.46, a few PAC/HRCA habitats exceed 1000 acres and thus are buffered with additional acres over SNFPA standards & guidelines. PACs & HRCAs are designated from aerial photos and additional acres are the result of designating the best available habitat in relationship to geographical features and stand continuity.

Table 3.46 indicates that PACs PL 203 and PL204 have the highest risk for potential PAC abandonment due to the direct habitat impacts associated with action alternatives. Table 3.47 indicates that approximately 51.9% and 28.2% of the suitable habitat will be present post project implementation of the action Alternative 4. Overall suitable habitat within HRCAs for PL203 and PL204 fall below 90% of existing. These owl sites have moderate occupancy history, are already at or just above 1000 acres and PL204 appears to have lower than average amounts of suitable habitat (<75% HRCA is suitable). Thus action alternatives 1, 3 and 4 increase risk and uncertainty to PAC viability as a result of habitat modification within HRCAs.

Owl populations may go through periodic declines with periods of non-breeding followed by breeding pulses (Verner et al. 1992: 72-73). The loss of available nest sites due to catastrophic events or as a result of habitat disturbance may preclude population expansion following breeding pulses. It is possible that owl use of these PACs/HRCAs may be “transitory” in nature; that is they are used by owls during periods of peak owl populations, and possibly are empty during lower owl population periods or may provide areas for occupation by dispersing juveniles and sub-adults. LaHaye et al (2001) reported that frequently vacant sites had records of successful reproduction, and these frequently vacant sites supported high survival and reproduction when they were occupied. These authors felt that dispersal of individuals may be cued to the existence of suitable habitat, which individuals may preferentially disperse to occupied sites, and thus take advantage of suitable vacant sites. This could be demonstrated through the findings of the administrative study.

Several researchers have evaluated the spatial scale at which northern spotted owls respond to habitat (Hunter et al 1995, Bingham & Noon 1997, Meyer et al 1998, Franklin et al. 2000 and Zabel et al. 2003). Blakesley (2003) has provided insight into spatial availability of habitat for California spotted owls. Each of these studies found that areas within ~200 ha (500 acres) of nests were influential in determining occupancy and/or fitness. Blakesley (2003) states that occupancy, apparent survival, and nesting success all increased with increasing amounts of old-forest characteristics and that reproductive output decreased with increasing amount of non-habitat within the nest area (nest area = 203 ha scale, or 500 acres). These studies suggest that effects outside of the PAC (on another 200 acres) may influence a site’s “quality” for spotted owls. Based on these studies, one could argue that management actions that reduce high-quality spotted owl habitat within a 500-acre area around known nests could present more risk to owls than activities occurring outside of this area. There would be no activities within the 300-acre PACs with the

Freeman Project. Table 3.48 shows the potential suitable habitat acres treated within the 500-acre area around an owl activity center for the owl activity centers directly affected with Alternatives 1, 3 and 4.

Table 3.48 Analysis of potential acres treated within 500-acre area of each directly affected activity center with Alternative 1, 3 & 4 (suitable habitat).

HRCA	Acres of HRCA in 500 acre area	% of HRCA in 500 acre area	Acres of DFPZ Rx in HRCA within 500 acre area			Acres of Area Thinning in HRCA within 500 acre area			Projected # acres of groups/ETZs* in HRCA within 500 acre area			Total Acres Reduction in Suitable Habitat in HRCA within 500 acre area		
			Alt. 1	Alt. 3	Alt. 4	Alt. 1	Alt. 3	Alt. 4	Alt. 1	Alt. 3	Alt. 4	Alt. 1	Alt. 3	Alt. 4
PL203	91	13.0%	6	6	6	57	60	60	7	3	3	70	69	69
PL204	103	13.3%	0	0	0	15	16	16	0	0	0	15	16	16
PL274	10	1.4%	0	0	0	0	0	0	0	0	0	0	0	0
Total	**204**	**9.3%**	**6**	**6**	**6**	**72**	**76**	**76**	**7**	**3**	**3**	**85**	**85**	**85**

* Alternative 1 (PA) is the only alternative with Aspen Extended Treatment Zones (ETZs).

With Alternatives 1, 3 and 4, approximately two HRCAs would have potential habitat reduction within the 500-acre area around the activity center. Table 3.48 indicates that acreage treated ranges from 69 to 70 acres in PL203s 500-acre area, from 15 to 16 in PL204s 500-acre area and 0 acres in PL274s 500-acre area. The largest amount of habitat treatment occurs in PL203, with potentially 6 acres of DFPZ, 60 acres of AT w/biomass removal and 7 acres of groups/ETZs occurring in the HRCA within the 500-acre area. To further reduce risk and uncertainty associated with spatial treatment of habitat near the vicinity of a nest or activity center, deferring placement of treatments, such as fuels treatments, group selection and AT within 500 acres of a nest site, including portions of HRCAs, could be incorporated into project layout and design.

The CASPO Technical Report concluded that management activities should avoid increasing the mean distances between suitable owl pair sites (defined in this BA/BE as PACs). The average distance, as measured from edge of one PAC to the edge of its neighbor for all PACs across the Plumas National Forest is approximately 1.5 miles (HFQLG EIS, 1999). Because PACs and SOHAs are not directly affected by resource management activities within the project area, there would be no change in the distances between PACs.

Direct Effects of Fragmentation

Within the Freeman project area, the action alternatives would result in an increase in low contrast fragmentation; that is that dense canopy closure would be reduced within the DFPZ and Area Thinning units but would maintain a continuity of large trees within treated stands and across the landscape. According to the 1993 CASPO IG EA (Page IV-81), within stand fragmentation of the small tree canopy (trees <20 to 30 feet) is less of a concern than large tree or old forest attribute removal because 1) historical understory densities were discontinuous; 2) this habitat component can return relatively quickly (versus large overstory layer) and 3) creating this type of fragmentation can help avoid larger scale, high contrast fragmentation of forested stands due to wildfire. The key to lessening impacts of fragmentation within DFPZs and Area Thinning is to maintain forest cover composed of the largest, fire resistant conifer species, while also providing structural attributes needed for prey species (snag/large logs). Removal of some trees up to 29.9" dbh would occur, with the overall objective of leaving enough dominant and co-dominant trees to provide from 40-50% canopy cover. This tree retention opens up the treated stand but does not isolate stands from surrounding forest or create habitat islands isolated by non-forest, thus increasing the likelihood for successful dispersal of wildlife. All action alternatives are designed to retain these attributes within DFPZs and AT w/biomass removal treated areas.

Group selection and Aspen ETZ openings, including skid trail access to these openings, would create low-high density openings within stands, but each group would retain structural elements (if present) such as conifers over 30" dbh, black oaks and down logs up to 10-15 tons/acre, that would reduce within stand fragmentation and contribute to decreasing the size of the forest opening. Group selection openings up to 2 acres meet the definition of continuous forest cover. This interpretation is made because group selection tends to mimic natural regeneration patterns and other harvests (intermediate harvests), while variable in appearance, tend to leave sufficient forest vegetation that a perception of continuous forest cover is maintained" (CASPO IG EA, page IV-62, 1993). This is the assumption used in the programmatic analysis for the HFQLG FEIS (1999), assuming group selection harvest at a ten-year treatment cycle (5.7% of the land base) up to a 20-year treatment cycle (11.4% of the land base). Groups at this level could mimic naturally occurring gaps within forested stands.

The density of groups within stands potentially increases edge effects, reduces forest interior habitat, and creates a condition in which otherwise suitable owl habitat becomes less suitable because it is adjacent, and/or surrounded by, non-habitat. Franklin et al (2000) found a positive relationship with the amount of edge between owl habitat and non-habitat and that Northern spotted owls showed higher reproductive success in sites with intermediate numbers of owl habitat patches intermixed with non-habitat areas. Blakesley (2003) on the other hand reported a model of reproductive output showing a weak negative relationship with elevation and amount of non-owl habitat within the nest area. It is unknown at what threshold the amount of edge to interior habitat results in use, marginal use or non-use by old forest species, including spotted owls. Alternative 4 was developed to reduce the risk and uncertainty of impacts associated with group placement and density.

In terms of acres treated, Alternative 1 treats 485 more acres of owl habitat with groups/ETZs than Alternative 4 and treats 507 more acres of owl habitat in groups/ETZs than Alternatives 3. All alternatives propose to construct approximately 2 miles of temporary road, all of which would be closed post harvest and .3 miles of new system road construction which would relocate two small segments of roads outside of RHCAs. Thus there would be a very slight increase in habitat fragmentation with new road construction. In addition, 10 miles of existing road would be decommissioned and another 1 mile would be closed. Actions including road closure and decommissioning would be implemented on this new temporary road construction as well as 11 miles of existing road, to create conditions to allow for vegetation recovery and reduce within stand gaps created by road openings. Indirect effects

As part of a strategic system of defensible fuel profile zones, this project will help eliminate understory fuel buildup and reduce the potential for high-severity wildfires, which have a great potential to eliminate vast tracts of habitat for this species. The fire history within the Freeman project area indicates the area is not prone to large stand-replacing fires however, the fuel loads indicate the area is ripe for a large fire.

Home ranges of neighboring spotted owls commonly overlap (Verner et al. 1992: 149). An indirect effect of 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 6 PACs/HRCAs within the wildlife analysis area (including one SOHA); 3 directly affected and 3 indirectly affected (Figure 3.3).

Based on acres affected within individual HRCAs displayed in Tables 3.45 – 3.48, it is difficult to predict if there would be a shift in owl use due to habitat alteration. Two HRCAs directly affected by habitat reduction as a result of this project are located within half mile of each other between Smith Peak and Threemile Rock (PL203 and PL204). Potential habitat reduction in PL203 is 253-287 acres, and within PL204 is 342 acres. PL203 was discovered in 1991, and records indicate it was last recorded occupied in 2005. PL204 was discovered in 1991, and records indicate it was last recorded occupied in 2005. No nest sites or young have ever been recorded for PL203 or PL204. Potential habitat reduction in HRCA of PL274 is 1 acre. PL274 is based on a 1992 owl detection, with no detections until 2004 and 2005 with the detection of a single male.

With an average reduction of 204 acres of suitable habitat per HRCA with Alternative 1 (derived from Table 3.45) and an average reduction of 199 and 210 acres of suitable habitat per HRCA with Alternatives 3 & 4 respectively, it is anticipated that owl behavioral and competitive interactions may increase, which could impact owl activity and occupancy of PAC/HRCAs already low in suitable habitat. Although the HRCAs are well distributed across the wildlife analysis area, they are also confined across the Freeman Project area by large blocks of unsuitable habitat as a result of extensive meadow systems and past timber activities.

Thus it is uncertain as to whether the same number of owl sites occupied in 2005 (three) 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 seems reasonable to assume that occupancy would be maintained.

The remaining three 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 PL203, PL204 and PL274 due to changes in habitat in portions of HRCAs.

It is an 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 observation). 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 1 treats approximately 215 more acres than Alternative 3; thus fewer snags could be removed (due to hazards, operability, etc) with Alternative 3. Alternatives 4 treat approximately 91 less acres than Alternative 3, thus this action alternatives potentially retain the most snags of these three alternatives.

Multiple edges created by multiple 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 monitoring that would be conducted by PSW research through the administrative study. The administrative study 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.

No new road construction would occur within PACs or HRCAs.

Cumulative effects

The analysis of cumulative effects of the Proposed Action alternatives evaluates its anticipated impact on TES wildlife from the existing condition (existing condition reflected by changes that have occurred in the past) within the wildlife analysis area. The past actions in the wildlife analysis area that contributed to the existing condition include grazing, timber harvest and recreation use.

Grazing would be expected to continue on private and National Forest lands at current levels. There are seven livestock grazing allotments (Grizzly Valley Community, Grizzly Valley, Humbug, Chase, Lake Davis, Long Valley and Willow Creek 2) that overlap into the wildlife analysis area of which four are active. Approximately 40 percent of the Humbug allotment is within the project area. Ninety five cow/calf pairs area authorized from June 1 thru August 1. One hundred percent of the Grizzly Valley allotment is within the project area. Five hundred cow/calf pairs are authorized from June 16 thru September15. Approximately 50 percent of the Grizzly Valley Community allotment is within the project area. One hundred fifty seven cow/calf pairs are authorized from June 16 thru September 30 and another One hundred and twenty cow/calf pairs are authorized from June 16 thru September15. The remaining four allotments only overlap the wildlife analysis area with the Chase allotment being the only active allotment. This activity would continue to degrade riparian habitats through the browsing of aspen, willow, etc. thus potentially affecting the diversity within spotted owl habitat.

Westside Lake Davis watershed restoration project would restore 50 headcuts and gullies within the project area. Implementation of this project would improve channel stability and reduce sedimentation within 20 stream channels. This action should have negligible affects on spotted owls.

Future activities include on going work within the Humbug DFPZ, Long Valley KV, and hazard tree removal projects. Little to no change in overstory vegetation is anticipated with these projects. However, all snags that present hazards to road traffic, regardless of size, are being, or would be, removed. Removal of these snags would have a negative effect on individual animals that use snags, yet these hazard trees make up a very small amount of the total snag component in the wildlife analysis area.

No other vegetation or fuels type projects have occurred within the project area or wildlife analysis area on National Forest lands since 2000.

Table 3.49 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 Beckwourth Ranger District.

Based on Table 3.49, the three action alternatives in the Freeman project could contribute to a cumulative reduction in spotted owl nesting habitat. 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 Freeman Project activities, to conserve habitat for these species, and additional PACs and HRCAs would be created in the future, if warranted by new site-specific owl information.

A foreseeable future project the Grizzly DFPZ, which is in the wildlife analysis area, Proposed Action is currently under development and could not be precisely evaluated at the time of this report however, and the effects are expected to be similar to the Freeman project. Additional foreseeable future projects (tentatively identified as Cutoff and Mt. Ingalls), involve fuel treatments and fall within the wildlife analysis area near Bagley Pass and Crocker Cutoff.

However, no site specific planning has occurred. Planning could potentially occur in 2007. Site-specific analysis of direct, indirect and cumulative effects of this project would be documented in a separate analysis.

Table 3.49 Cumulative reduction of Nesting Spotted Owl Habitat (5M, 5D, 6) within Beckwourth RD for HFQLG FRA Project Implementation

Project	**Red Clover DFPZ/GS**	**Dotta DFPZ/GS**	**Last Chance DFPZ/GS**	**Poison DFPZ/GS**	**Crystal-Adams DFPZ/GS**	**Humbug DFPZ**
	Alt. 3*	**Alt. 2***	**Alt. 4***	**Alt. 4***	**Alt. 1***	**Alt. 3***
Nesting Habitat	0	0	0	1 acre	672 acres	0
Project	**Mabie DFPZ**	**HappyJack DFPZ/GS**	**Freeman DFPZ/GS**			
	Alt. 3*	**Alt. 4***	**Alt. 1**	**Alt. 3**	**Alt. 4**	**Potential Cumulative Change**
Nesting Habitat	0	19 acres	246 acres	243 acres	379 acres	**935 – 1,071acres**

*Selected Alternative for the projects.

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 Table 4.3.2.3g); 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 a net reduction of 7% would materialize 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 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% basal area retention standard. Also, under 2004 ROD, the canopy cover in CWHR class 5M, 5D and 6 stands are more likely to drop to 40% in DFPZs. (SNFPA SFEIS 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 SFEIS 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.

FIA data collected from the Freeman project area run through the FVS growth and yield model appear as if tree growth and subsequent habitat recovery follows the trends projected in the SNFPA FSEIS. Modeling indicates that all action alternatives that implement fuels treatments and area thinning w/biomass removal in the Freeman project result in providing suitable owl habitat over time (year 20). Individual groups are projected to be CWHR 3 by 20 to 40 years, with structurally suitable habitat occurring beyond year 40 (see Forest Vegetation Report in Project Record).

Large scale changes in owl habitat as a result of recent wildfires and anticipated future fires in spotted owl habitat has 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 SFEIS Chapter 3, page 145). Table 3.2.2.3b within the SNFPA FSEIS indicates that approximately 7 PACs on the Plumas National Forest are considered to be lost due to fire effects. None of these PACs have been removed from the Plumas designated PAC network, and at least three have been re-designated around the periphery of the Stream Fire and owls have been found in all three sites (Sloat 2002, GANDA 2003, Holmes Forestry 2005). Approximately 2300 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, resulting in lower owl numbers and occupancy in the general area. None of these large scale fires have occurred within the Freeman project area.

The Personal Use Firewood program on the Plumas National Forest is an ongoing program that has been in existence for years and would continue. This program allows the public to purchase a woodcutting permit and remove fuel and firewood from National Forest lands. Much of this wood material either consists of down logs found in the forest, along forest roads, and within cull decks created by past logging operations, or as standing snags. The Freeman 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. More area would be accessible to woodcutting with the No-action alternative, as no existing roads would be closed.

The past and future effect of these actions has and would be to shift forest successional stages to somewhat earlier stages, while generally retaining continuous forest cover. Future effects include persistence of the largest trees, retention of snags away from roads, and reduction in habitat losses due to large, damaging wildfires.

The petition to list the California spotted owl identified West Nile Virus (WNV) as a serious potential threat to owls and that its effects on owls be monitored (70 Federal Register, June 21, 2005). West Nile Virus has not yet been detected in a wild spotted owl (Ibid). In 2004 researchers tested for WNV (Eldorado study area, northern spotted owls in the Willow Creek Study area) and in 2005 blood samples were taken from spotted owls in the Plumas and Lassen National Forests. None of these owls tested positive for WNV exposure (Ibid, J. Keane, personal communications, 2005). The USFWS found there was no substantial information that WNV may threaten the continued existence of spotted owl (70 Federal Register, 35612, June 21, 2005).

The documented range expansion of the barred owl has been hypothesized as a contributing factor in the decline in northern spotted owls, through both hybridization as well as replacing the spotted owl in some areas. It is thought that this range expansion and subsequent northern spotted owl displacement can be a result of forest fragmentation and the barred owls ability to adapt better to a mosaic of habitats. The latest information regarding barred owls versus 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) the authors suggest 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 sometimes may 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.

Barred owls have expanded their range in California as far south as Sequoia National Park, and in the last two years (2004/2005) the known range of barred owls has expanded 200 miles southward in the Sierras (70 Federal Register, 35613, June 21, 2005). The USFWS has concluded that barred owls constitute a threat to site occupancy, reproduction, and survival of the California spotted owl, but that there currently is not enough information to conclude that hybridization with barred owls poses a threat (Ibid).

According to Keene (2005) in a presentation of the Plumas Lassen Administrative Study (PLAS) spotted owl module, there have been 33 barred owl detections in the entire Northern Sierra Nevada (El Dorado NF north) since 1989, twenty of which have been in the last three years. Of these twenty detections, 9 have been barred owls and 11 have been sparred (barred X spotted hybrid). Within the PLAS study area within the HFQLG area, there have been 10 detections in the last three years (6 barred and 4 sparred).

The closest sighing of a barred owl to the Freeman project area is approximately 20 miles to the west. This is based on a barred owl having been detected twice in Butterfly Valley (approximately 20 miles west of the Freeman project area) in 2005.

Barred owls readily respond to spotted owl calls (Forsman et al. 1984, McGarigal and Fraser 1985, Hamer 1988, Reid et al. 1999; all referenced in Pearson & Livezey 2003). Since 2001 approximately 111,843 acres has been called to the two year protocol on the Beckwourth Ranger

District. No barred owls were found. No barred owls were discovered in either the spotted owl or great gray owl surveys conducted within the Freeman 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 for the barred owl to establish and compete with spotted owls within the Freeman project area is a possible additional cumulative effect.

The Freeman Project is not located within any CASPO identified AOC. This project would not improve or exacerbate any of the habitat conditions within these two AOC.

Alternative 2 (No-action)

Direct effects

There would be no direct effects on spotted owl or spotted owl habitat, as no activities would occur that would cause disturbance to nesting or foraging birds, nor any impacts to the existing habitat conditions.

Indirect effects

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. Thus suitable habitat for productive owl sites could become patchy or unevenly distributed with this alternative, and could lead to reduced or lower abundance of owls within the wildlife analysis area

With the current Plumas National Forest 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.

Cumulative effects

The No-action Alternative for the Freeman 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 trees that may provide future habitat availability.

Summary

The viability of California spotted owls in the Sierra Nevada is uncertain (SNFPA FEIS 2001, Volume 4, Appendix E-51), and is currently undergoing a 12 month status review by the USFWS (Federal Register/Vol. 70, No. 118, June 21, 2005/Proposed Rules). Key uncertainties related to viability in the Sierra Nevada include 1) uncertainty about factors driving population trends, 2) uncertainty about habitat relationships and habitat quality, 3) uncertainty about current distribution, amount, and quality of habitat, and 4) uncertainty about treatment effects, including fuels and silvicultural treatments) on habitat and populations at multiple scales.

As discussed in this BA/BE, the best scientific evidence suggests that California spotted owl populations are either declining gradually or stable, but perhaps leaning toward decline (Franklin 2003, Dunk 2005). It is acknowledged that the actions proposed with the Freeman project would reduce suitable owl habitat. It is acknowledged that there are some disparities in habitat typing between CWHR and stand inventory data and that the acres of 4M, 4D, 5M and 5D could be inexact estimates of habitat availability. This data is probably adequate for evaluating landscape-level changes in habitat types, but may not be precise enough for evaluation of site-specific impacts to owl core areas. But as mentioned earlier the FIA plot data run through the FVS, for the most part, all vegetation layer CWHR size classes matched the appropriate size class based on the QMD for all trees >10” dbh.

Lee and Irwin (2005) using a combination of population data from the southern Sierra Nevada, and canopy cover measurements and forest simulation models, demonstrated that modest fuels treatments (mechanical thinning plus fuel-break construction) in the Sierra Nevada would not be expected to reduce canopy cover sufficiently to have measurable effects on owl reproduction. They predicted that with mechanical thinning plus fuel break construction treatments (including DFPZ construction scenario) in combination with either no fire or mixed –lethal fire scenarios would not degrade canopy conditions in productive owl territories, nor impeded improvement of non-productive territories. In contrast, lethal fire simulations produced a pronounced and lasting negative effect. The general trend with all fuel treatments was towards higher proportions of intermediate canopy covers (40-69% canopy cover) and lower proportions of sparse canopy cover (0-39%) over time, whereas lethal fire scenarios produced sparse canopy cover discernible 4 decade later. “The immediacy of the fire threat creates an urgency to act even as key uncertainties remain” (Lee & Irwin, 2005).

There are slight difference in the effects to owl habitat between Alternatives 1, 3, and 4 in regards to implementation of actions designed to create DFPZs, implementing group selection, aspen extended treatment zones (Alternative 1), and area thinning w/biomass removal. For a summary of the effects see the summary section at the beginning of the Wildlife Effects section of this EIS.

Northern goshawk

General Effects of the Action Alternatives

Direct 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 will 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 LOPs around known goshawk nests would remove the effects associated with direct disturbance on treatment units and access routes.

Project activities could occur within ¼ mile from known nest sites within all but five of the designated PACs within the wildlife analysis area. On possible unknown goshawk nesting sites not protected by PACs, proposed activities could cause short-term displacement and disruption during the time equipment is present and underburning activities are taking place.

Based on the CWHR model, about 24,990 acres (Table 3.34) within the wildlife analysis area (60%) may be considered suitable goshawk nesting habitat (4M, 4D, 5M, 5D). Dunk and Keane (unpublished analyses) found that the probability of a stand being a nest site increased with increasing amounts of 4D and 5D. In the Freeman wildlife analysis area, 8% of the above nesting habitat is composed of 5D, 7% 5M, 13% is composed of 4D, and 32% is composed of 4M. An additional 12% or 5,000 acres (derived from Appendix B) may be considered suitable foraging habitat (ASP, EPN, JPN, LPN, MHC, PPN, RFR, SMC, and WFR in 3M, 3D, 4P and 5P). This wildlife analysis area encompasses 41,388 National Forest acres and was chosen in order to put habitat treatments within the context of the surrounding landscape. As mentioned under Table 3.34, uncertainty exists in the amount of nesting habitat that is actually available within the wildlife analysis area, but using vegetation layer mapped data provides consistency throughout this analysis.

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 but used half as often as would be expected based on the availability of such areas). The goshawk habitat for the Freeman 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, including the Plumas, 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 as per action alternatives 1, 3 & 4 would occur where large structural components would be removed and canopy cover would be opened up to 40 - 50%, resulting in open canopied forested stands which are still considered suitable habitat based on canopy cover retention, but deemed unsuitable due to the removal of the needed understory structural components (high total live tree basal area, snag basal area, basal area of large snags, and at least two canopy layers) (see Table 3.29). Canopy cover reductions are expected to occur with the removal of some trees ≤29.9 inches dbh. The combined impacts of mechanical thinning of the understory and achieving the desired conditions for DFPZ by opening up the overstory would result in creating more open forest from dense forest (D stands decreasing to M) (open up to around 40% canopy cover). Area thinning with biomass removal also creates more open, lesser quality owl habitat and thus is analyzed as decreasing to M. There may also be some additional risk associated with isolated torching events during prescribed fire removing trees, opening up the canopy, and reducing nesting opportunities.

Based on figures in Table 3.50, Alternative 1 reduces foraging habitat on 156 acres, reduces nesting habitat 3,006acres; Alternative 3 reduces foraging habitat on 101 acres and reduces nesting habitat 2,853 acres; Alternative 4 reduces foraging habitat on 89 acres and reduces nesting habitat 3,416 acres. In terms of habitat changes to 4D and 5D (assuming higher probability of goshawk use of these types based on the findings of Dunk and Keane’s unpublished analyses), 92.1 to 95.4 percent of the CWHR 5D would be retained with action alternatives and 77.2 to 81.3 percent of CWHR 4D would be retained.

Direct Effects to Protected Activity Centers (PACs)

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.

Portions of two goshawk PACs would be entered with the Proposed Action alternatives. These enters would be to thin a total of approximately 11 acres of aspen with an 18 inch upper diameter limit. This limitation was designed to maintain nesting habitat for goshawks, which is what the PAC are designed for, while maintaining habitat diversity within the PAC boundaries. Based on Table 3.51 no suitable habitat is reduced with any of the Proposed Action alternatives.

PACs are delineated based on guidelines provided in the SNFPA FEIS 2001 ROD and the SNFPA FSEIS 2004 ROD. Not all habitats within a PAC are composed of 4M, 4D, 5M, 5D, due to availability. Habitat alteration by the Proposed Action alternatives and the associated risks to known goshawk occupancy within individual PACs is displayed in Table 3.51.

Indirect effects

No new road construction would occur within PACs. As part of a strategic system of defensible fuel profile zones, this project will help eliminate understory fuel buildup and may reduce the potential for high-severity wildfires, which have the potential to eliminate vast tracts of habitat.

Table 3.50 Comparison of Action Alternatives 1, 3 & 4 on Northern Goshawk Nesting Habitat (EPN, JPN, LPN, MHC, PPN, RFR, SMC, and WFR) within DFPZ, Group Selection areas, Aspen Extended Treatment Zones (Alt. 1 only) and Area Thinning with biomass removal

Forage Habitat	Alternative 1 Acres DFPZ	Alternative 1 Acres GS/ Aspen ETZ's	Alternative 1 Acres AT w/biomass removal	% Remaining in Wildlife Analysis Area	Alternative 3 Acres DFPZ	Alternative 3 Acres GS	Alternative 3 Acres AT w/biomass removal	% Remaining in Wildlife Analysis Area
3M	-44	-16	+45	97.7%	-23	-1	+48	103.7%
3D	0	-2	-64	88.2%	-23	-2	-64	84.1%
4P	0	-68	0	98.0%	0	-33	0	99.0%
5P	0	-7	0	98.1%	0	-3	0	99.2%
Total Foraging Change (acres)	**-44**	**-93**	**-19**	**96.9% retained (-3.1%)**	**-46**	**-39**	**-16**	**98.0% retained (-2.0%)**
Nesting Habitat								
4M*	-589	-246	-826	87.3%	-654	-90	-825	88.0%
4D	-543	-129	-427	80.3%	-581	-32	-428	81.3%
5M*	-38	-6	-40	97.0%	-38	-5	-40	97.0%
5D	-151	-9	-2	95.4%	-151	-9	0	95.4%
Total Nesting Change (acres)	**-1321**	**-390**	**-1295**	**88.0% retained (-12.0%)**	**-1424**	**-136**	**-1293**	**88.6% retained (-11.4%)**

Forage Habitat	Alternative 4 (Preferred Alternative) Acres DFPZ	Alternative 4 (Preferred Alternative) Acres GS	Alternative 4 (Preferred Alternative) Acres AT w/biomass removal	% Remaining in Wildlife Analysis Area
3M	-20	-1	+68	107.2%
3D	-26	-2	-84	80.0%
4P	0	-24	0	99.3%
5P	0	0	0	100.0%
Total Foraging Change (acres)	**-46**	**-27**	**-16**	**98.2% retained (-1.8%)**
Nesting Habitat				
4M*	-797	-89	-879	86.5%
4D	-630	-44	-598	77.2%
5M*	-57	-5	-40	96.4%
5D	-252	-9	-16	92.1%
Total Nesting Change (acres)	**-1736**	**-147**	**-1533**	**86.3% retained (-13.7%)**

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

Table 3.51 Habitat Impacts and Risks for 3 Directly Affected PACs Associated with Northern Goshawk Occupancy.

PAC	Occupancy*	PAC Acres Treated	Acres in PAC	% PAC Treated	Suitable Habitat Reduction (acres) by alternative					Potential Risk to PAC viability
					1		3		4	
Freeman Creek	H	2	261	0.8%	0		0		0	Low
Midway House	H	9	220	4.1%	0		0		0	Low
		11	**481**	**2.3%**	**0**		**0**		**0**	

*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 territorial goshawk found at least one of the last 2 years,
Low Occupancy: Reproduction and/or pair occupancy not documented since 1992, no territorial goshawk found the last two years.

It is an 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 opening up forested stands and/or openings, while some do not (HFQLG 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. Post project monitoring would provide information as to the response by these prey species to DFPZ and group selection harvesting.

Cumulative effects

Please refer to cumulative effects discussion above for 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 stand replacement fires, and the firefighting practices used by land managers to control them, have contributed and will continue to contribute to loss of habitat for these species.

Table 3.52 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 Beckwourth Ranger District.

Based on Tables 3.50 and 3.52, the Freeman project potentially contributes to a cumulative reduction in goshawk nesting habitat. It is uncertain as to what influence these various reductions in habitat would do to 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 of known goshawk PACs, based on very limited entry into PACs, the location of project activities to known PACs, distribution of known PACs across the wildlife analysis area, and retention of at least 86% of available suitable nesting habitat distributed across the wildlife analysis area post project implementation.

Table 3.52 Cumulative changes (reduction) in Nesting Goshawk 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**
	Alt. 3*	**Alt. 2***	**Alt. 4***	**Alt. 4***	**Alt. 1***	**Alt. 3***
Nesting Habitat	1,574 acres	0	25 acres	35 acre	1,051 acres	0
Project	**Mabie DFPZ**	**HappyJack DFPZ/GS**	**Freeman DFPZ/GS**			
	Alt. 3*	**Alt. 4***	**Alt. 1**	**Alt. 3**	**Alt. 4**	**Potential Cumulative Change**
Nesting Habitat	0	2,355 acres	3,006 acres	2,853 acres	3,416 acres	**7,893 – 8,456 acres**

*Selected Alternative for the projects.

Alternative 2 (No-action)

Direct effects

There would be no direct effects on goshawk or goshawk habitat, as no activities would occur that would cause disturbance to nesting or foraging birds, nor any impacts to the existing habitat conditions.

Indirect effects

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 Plumas National Forest 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 Freeman Project would not provide for the long-term protection of goshawk 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).

There would be no thinning that could enhance the growth of dominant and co-dominant trees that may provide future habitat availability.

Summary

There are slight difference in the effects to owl habitat between Alternatives 1, 3, and 4 in regards to implementation of actions designed to create DFPZs, implementing group selection, aspen extended treatment zones (Alternative 1), and area thinning w/biomass removal. A summary to the effects to northern goshawks can be found at the beginning of the Wildlife Effects section of this EIS.

Great gray owl

General Effects of the Action Alternatives

Direct effects

Potential direct effects on the great gray owl may result from the modification or loss of habitat or habitat components through thinning (reduce canopy cover and availability of future nest trees), and through underburning (snag/log and tree removal). 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) will reduce or completely eliminate potential disturbance impacts to this species from the Proposed Action.

There are three preliminary great gray owl PACs within the wildlife analysis area, based on surveys of suitable habitat conducted in 2004 and 2005. Approximately 52 acres of the 1,836 acres of preliminary PACs will be treated. There will be approximately 18 acres of hand thinning and 34 acres of mechanical thinning (aspen treatment, etc.). No reduction in suitable habitat is expected with the above mentioned treatments. As side from the 52 acres of treatment suitable meadow/conifer habitat within these preliminary PACs would not be impacted.

Based on the vegetation layer and the CWHR model, about 21% or 8,553 acres within the wildlife analysis area (41,388 NF acres) may be considered suitable great gray owl nesting habitat (4M, 4D, 5M, 5D, and 6 within 300 yards of a meadow) (SNFPA FSEIS ROD 2004), and about 26% or 10,627 acres may be considered suitable foraging habitat (meadows and open forested stands (CWHR S and P)). In the Freeman wildlife analysis area, 2% or 829 acres of the above nesting habitat is composed of 5D (optimal), 2% or 991 acres is composed of 5M (optimal), 6% or 2,346 acres is composed of 4D, and 11% or 4,387acres is composed of 4M. Additionally in the Freeman wildlife analysis area, 8% or 3,372 acres of the above foraging habitat is composed of meadow (optimal) and 18% or 7,255 acres is composed of other (sagebrush and CWHR S/P stands).Indirect effects

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

Please refer to cumulative effects discussion above for 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 stand replacement fires, and the means by which land managers utilized to control them, have contributed and may 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 seven livestock grazing allotments (Grizzly Valley Community, Grizzly Valley, Humbug, Chase, Lake Davis, Long Valley and Willow Creek 2) that overlap into the wildlife analysis area of which four are active. Approximately 40 percent of the Humbug allotment is within the project area. Ninety five cow/calf pairs area authorized from June 1 thru August 1. One hundred percent of the Grizzly Valley allotment is within the project area. Five hundred cow/calf pairs are authorized from June 16 thru September15. Approximately 50 percent of the Grizzly Valley Community allotment is within the project area. One hundred fifty seven cow/calf pairs are authorized from June 16 thru September 30 and another One hundred and twenty cow/calf pairs are authorized from June 16 thru September15. The remaining four allotments only overlap the wildlife analysis area with the Chase allotment being the only active allotment. 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.

Westside Lake Davis watershed restoration project would restore 50 headcuts and gullies within the project area. Implementation of this project would improve channel stability and reduce sedimentation within 20 stream channels. This action should improve the meadow hydrology thus potentially improving great gray owl foraging habitat.

Alternative 2 (No-action)

Direct 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.

Indirect effects

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 Plumas National Forest 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 Freeman Project would not provide for the long-term protection of great gray 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). There would be no thinning that could enhance the growth of dominant and co-dominant trees that may provide future habitat availability.

Willow flycatcher

General Effects of the Action Alternatives

Direct and Indirect effects

Potential direct effects on the willow flycatcher may result from the modification of habitat or habitat components through aspen thinning (reduce canopy cover increased riparian plant growth). Thinning conifers in RHCAs would favor growth of riparian hardwoods and potentially benefit willow flycatchers. 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 occupied meadow habitats will reduce or completely eliminate potential disturbance impacts to this species from the Proposed Action.

There are no known willow flycatchers, and approximately 590 acres of suitable willow flycatcher habitat within the wildlife analysis area. The only proposed treatment planned in or adjacent to willow flycatcher habitat in this area is aspen restoration which is expected to improve meadow hydrology. The known willow flycatcher sites located north of the wildlife analysis area at Chase and south at Delleker/Mabie are not located in any watersheds where there would be any potential influences from project activities.

Cumulative effects

Cumulative effects on the willow flycatcher 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.

Grazing would be expected to continue on private and National Forest lands at current levels. There are seven livestock grazing allotments (Grizzly Valley Community, Grizzly Valley, Humbug, Chase, Lake Davis, Long Valley and Willow Creek 2) that overlap into the wildlife analysis area of which four are active. Approximately 40 percent of the Humbug allotment is within the project area. Ninety five cow/calf pairs area authorized from June 1 thru August 1. One hundred percent of the Grizzly Valley allotment is within the project area. Five hundred cow/calf pairs are authorized from June 16 thru September15. Approximately 50 percent of the Grizzly Valley Community allotment is within the project area. One hundred fifty seven cow/calf pairs are authorized from June 16 thru September 30 and another One hundred and twenty cow/calf pairs are authorized from June 16 thru September15. The remaining four allotments only overlap the wildlife analysis area with the Chase allotment being the only active allotment. This activity would continue to degrade riparian habitats through the browsing of aspen, willow, etc. thus potentially affecting the nesting suitability of the willow habitat for willow flycatchers.

Westside Lake Davis watershed restoration project would restore 50 headcuts and gullies within the project area. Implementation of this project would improve channel stability and reduce sedimentation within 20 stream channels. This action should improve the meadow hydrology thus potentially improving willow flycatcher habitat.

Alternative 2 (No-action)

Direct and Indirect effects

There would be no direct or indirect effects on willow flycatchers or willow flycatcher habitat, as no activities would occur that would cause disturbance to nesting or foraging birds, nor any impacts to the existing habitat conditions.

Cumulative Effects

Since there are no direct or indirect effects to willow flycatchers or it’s habitat, this project would not contribute to cumulative effects.

Greater Sandhill Crane

Action Alternatives

Direct and Indirect effects

There is suitable foraging habitat and potentially suitable nesting habitat within the wildlife analysis area. However, direct habitat modification is not expected because sandhill cranes use wetland habitats that would not be treated. 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 occupied meadow habitats or within ½ mile of nesting sites would reduce or completely eliminate potential disturbance impacts to this species from the Proposed Action.

There have been sandhill crane sightings within the wildlife analysis area and flying over the wildlife analysis area as the sandhill cranes migrate south during fall migration. The only proposed treatment planned in or adjacent to sandhill crane habitat in this area is aspen restoration which is expected to improve meadow hydrology thus improve potential nesting and foraging habitat.

Cumulative effects

Cumulative effects on the sandhill cranes 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.

Grazing would be expected to continue on private and National Forest lands at current levels. There are seven livestock grazing allotments (Grizzly Valley Community, Grizzly Valley, Humbug, Chase, Lake Davis, Long Valley and Willow Creek 2) that overlap into the wildlife analysis area of which four are active. Approximately 40 percent of the Humbug allotment is within the project area. Ninety five cow/calf pairs area authorized from June 1 thru August 1. One hundred percent of the Grizzly Valley allotment is within the project area. Five hundred cow/calf pairs are authorized from June 16 thru September15. Approximately 50 percent of the Grizzly Valley Community allotment is within the project area. One hundred fifty seven cow/calf pairs are authorized from June 16 thru September 30 and another One hundred and twenty cow/calf pairs are authorized from June 16 thru September15. The remaining four allotments only overlap the wildlife analysis area with the Chase allotment being the only active allotment. This activity would continue to impact meadow vegetation thus degrading potential nesting habitat and potentially affecting prey species abundance/availability due to the lack of suitable breeding, foraging and hiding cover.

Westside Lake Davis watershed restoration project would restore 50 headcuts and gullies within the project area. Implementation of this project would improve channel stability and reduce sedimentation within 20 stream channels. This action should improve the meadow hydrology thus potentially improving sandhill crane habitat.

Alternative 2 (No-action)

Direct and Indirect effects

There would be no direct or indirect effects on sandhill cranes or sandhill crane habitat, as no activities would occur that would cause disturbance to nesting or foraging birds, nor any impacts to the existing habitat conditions.

Cumulative Effects

Since there are no direct or indirect effects to sandhill cranes or its habitat, this project would not contribute to cumulative effects.

Forest carnivores (Pacific fisher, American marten, Sierra Nevada red fox, California wolverine)

Action Alternatives

Direct effects

A population is defined as a group of individuals of the same species occupying a defined area at the same time (Hunter, 1996). Regarding Sierra Nevada Red Fox, wolverine, and possibly the fisher, all of which have very large home ranges, the Plumas National Forest would probably contribute to the population within the Sierra Nevada mountain range, if individuals were found on the Forest. Numerous systematic surveys using various tested methodologies, spatially conducted over 50% of the entire Plumas National Forest since the mid 1980's, indicate that the Plumas does not now contribute to the Sierra Nevada populations of these three forest carnivores; they are either non-existent or in such small numbers that the known detection methodologies are inadequate to determine presence. A small population of marten exists on the Plumas, located within the Lakes Basin area on the Plumas/Tahoe NF border. Martens have not been detected anywhere else on the Plumas outside this area for 10 years.

Potential direct effects on these carnivores from vegetation management activities consist of modification or loss of habitat or habitat components, especially in regards to denning/resting habitat and foraging/travel habitat. Additional direct effects are possible behavioral disturbance to denning from logging, road-building, or other associated activities (refer to HFQLG BA/BE).

Changes to suitable habitat as a result of implementing fuels treatments as per action alternatives 1, 3 & 4 would occur where large structural components would be removed and canopy cover would be opened up to 40 - 50%, resulting in open canopied forested stands which are still considered suitable habitat based on canopy cover retention, but deemed unsuitable due to the removal of the needed understory structural components (high total live tree basal area, snag basal area, basal area of large snags, and at least two canopy layers) (see Table 3.29). Canopy cover reductions are expected to occur with the removal of some trees ≤29.9 inches dbh. The combined impacts of mechanical thinning of the understory and achieving the desired conditions for DFPZ by opening up the overstory would result in creating more open forest from dense forest (D stands decreasing to M) (open up to around 40% canopy cover). Area thinning with biomass removal also creates more open, lesser quality owl habitat and thus is analyzed as decreasing to M. There may also be some additional risk associated with isolated torching events during prescribed fire removing trees, opening up the canopy, and reducing denning/resting opportunities.

Based on the vegetation layer, about 22% or 9,077 acres within the wildlife analysis area (41,388 NF acres) may be considered suitable denning habitat for fisher (4D, 5D and 6), and about 38% or 15,913 acres may be considered suitable foraging habitat (4M and 5M) (Table 3.36). About 22% or 9,077 acres within wildlife analysis area (41,388 NF acres) may be considered suitable denning and resting habitat for marten (4D, 5D and 6), and about 38% or 15,749 acres may be considered suitable foraging habitat (4M and 5M) (Table 3.37).

For fisher and marten habitat, based on figures in Tables 3.44 and 3.50, Alternative 1 reduces 4D and 5D (denning habitat) on 1,261 acres, reduces 4M and 5M (foraging habitat) quality on 1,745 acres; Alternative 3 reduces 4D and 5D habitat on 1,201 acres and reduces 4M and 5M quality on 1,652 acres; Alternative 4 reduces 4D and 5D quality on 1,549 acres and reduces 4M and 5M quality on 1,867 acres. Projected activities within red fir habitat (habitats proposed for entries are Red Fir 2S, 3P, 3M, 3D, 4S, 4M and 5D) indicate the following:

- Alternative 1: up to 14 acres in group selection, 3 acres of aspen ETZs, 369 acres of DFPZ and 133 acres of Area Thinning (AT) w/biomass removal
- Alternative 3: up to 14 acres in group selection, 369 acres of DFPZ and 133 acres AT w/biomass removal
- Alternative 4: up to 14 acres group selection, 367 acres of DFPZ and 110 acres AT w/biomass removal

Retention of conifer trees >30” dbh, and retention of all oaks would provide structural attributes selected by fisher for denning and resting sites. Down woody debris would be retained in treatment units at 10-15 tons/acre in the largest logs. Snags would be retained at 4 snags per acre.

The Plumas forest carnivore network is within the western portion of the wildlife analysis area, running southeast to northwest along Grizzly Ridge composed primarily of white fir and red fir habitat. This section of the network provides connectivity from the Lakes Basin and Middle Fork of the Feather River to the south, and connects with the Mt. Jura connection to the northwest. This network is designed to allow for unimpeded corridors for Forest carnivores to travel between home ranges and allow for habitat/population connectivity between the Tahoe NF and the Lassen NF. Approximately 10,923 acres of the 275,000 acre network is present in the wildlife analysis area. Approximately 1,817 acres within the forest carnivore network potentially could be treated with Alternatives 1, 1,745 acres treated with Alternative 3 and 1,651 acres treated with Alternative 4.

Under the action alternatives, from 1,000 acres to 1,010 acres of the network would be treated with DFPZ, 133 to 207 acres in 4M, 57 to 84 acres in 4D, 38 to 57 acres in 5M and 129 to 229 acres in 5D. Table 3.53 displays projected changes to CWHR types within Forest Carnivore Network in the wildlife analysis area.

Table 3.53 Acres treated within Forest Carnivore Network in Wildlife Analysis Area.

CWHR	Alternative 1				% of Carnivore Network Treated (10,923 acres) in Wildlife Analysis Area	Alternative 3				% of Carnivore Network Treated (10,923 acres) in Wildlife Analysis Area
	Acres					Acres				
	DFPZ	GS/ ETZs	AT w/Biomass	Total		DFPZ	GS	AT w/ Biomass	Total	
4M	-133	-69	-113	-315	2.9%	-151	-24	-115	-290	2.7%
4D	-57	-30	-97	-184	1.7%	-60	-18	-103	-181	1.7%
5M	-38	-6	-40	-84	0.8%	-38	-5	-40	-83	0.8%
5D	-129	-9	0	-138	1.3%	-129	-9	0	-138	1.3%
Total Change	**-357**	**-114**	**-250**	**-721**	**6.6%**	**-378**	**-56**	**-258**	**-692**	**6.3%**

CWHR	Alternative 4 (Preferred Alternative)				% of Carnivore Network Treated (10,923 acres) in Wildlife Analysis Area
	Acres				
	DFPZ	GS	AT w/ Biomass	Total	
4M	-207	-24	-115	-346	3.2%
4D	-84	-8	-103	-195	1.8%
5M	-57	-5	-40	-102	0.9%
5D	-229	-9	-16	-254	2.3%
Total Change	**-577**	**-46**	**-274**	**-897**	**8.2%**

Based on figures in Table 3.53, it is estimated that with Alternative 1, 114 acres of group selection and aspen ETZs acres would create gaps within 4M, 4D, 5M, 5D forested stands within the carnivore network, with the average size of group selection gaps at 1.5 acres. It is estimated that approximately 114 acres of Area thinning w/biomass would occur within 4M, 4D, 5M forested stands within the carnivore network. Alternative 3, 56 acres of group selection acres would create gaps within 4M, 4D, 5M, 5D forested stands within the carnivore network, with the average size of gap at 1.5 acres. It is estimated that approximately 258 acres of AT w/biomass would occur within 4M, 4D, 5M forested stands within the carnivore network. Alternative 4, 46 acres of group selection acres would create gaps within 4M, 4D, 5M, 5D forested stands within the carnivore network, with the average size of gap at 1.5 acres. It is estimated that approximately

274 acres of AT w/biomass would occur within 4M, 4D, 5M, 5D forested stands within the carnivore network. Thus a total of 692 -897 acres of the 10,923 acres of forest carnivore network within the wildlife analysis area would be treated under Alternatives 1, 3 and 4. Table 3.44 indicates a higher risk to maintaining forest interior habitat between group selection openings and ETZs (Alternative 1) with Alternative 1 than with Alternatives 3 & 4.

Zielinski et al. (2004) reported that fisher used large trees, large conifer snags and large hardwoods supporting cavities or platforms for rest sites, and suggested that fishers require multiple resting structures distributed throughout their home ranges. Zieleinski et al. suggested that "managers can maintain resting habitat for fishers by favoring the retention of large trees and the recruitment of trees that achieve the largest sizes". With all alternatives, no trees over 30" dbh would be removed, 4 of the largest snags would be maintained in treatment areas (except group selections), all hardwoods would be retained and adjacent to meadows, would be scattered conifers possessing one or more of the following characteristics that are of value for wildlife: large limbs extending into the meadow; mistletoe brooms higher than 20' from the ground; multiple tops; bole sweep; broken tops; heart rot; snags; etc. Leaving a few such trees in units would decrease the risk of deleterious effects to old-forest related wildlife over the Freeman project area in the long term (Dunk, 2005).

Indirect effects

All alternatives propose to construct approximately 2 miles of temporary road, all of which would be closed post harvest and .3 miles of new system road construction which would relocate two small segments of roads outside of RHCAs. Thus there would be a very slight increase in habitat fragmentation with new road construction. In addition, 10 miles of existing road would be decommissioned and another 1 mile would be closed. Actions including road closure and decommissioning would be implemented on this new temporary road construction as well as 11 miles of existing road, to create conditions to allow for vegetation recovery and reduce within stand gaps created by road openings. This should also reduce human activities that often lead to decreased habitat capability for carnivores (snag removal, log removal thru woodcutting, habitat loss, and disturbance). Open road density within the wildlife analysis area would decline under all action alternatives from the existing approximately 2.9-miles/square mile to about 2.7-miles/square mile, which is still providing for low habitat capability for forest carnivores. As part of a strategic system of defensible fuel profile zones, this project would help eliminate understory fuel buildup and may reduce the potential for high-severity wildfires, which have a great potential to eliminate vast tracts of habitat for this species. 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. Responses of prey species, including small mammals and passerine bird use of group openings and DFPZs is one of the main objectives of the administrative study conducted by PSW.

Cumulative effects

Please refer to cumulative effects discussion above for 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 stand replacement fires, and the means by which land managers utilized to control them, have contributed and may continue to contribute to loss of habitat for this species.

Table 3.54 Cumulative Change (Reduction) of Su3.54 Fisher and Marten 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**
	Alt. 3*	**Alt. 2***	**Alt. 4***	**Alt. 4***	**Alt. 1***	**Alt. 3***
Suitable Habitat	1,562 acres	0	549 acres	2 acres	814 acres	127 acres
Project	**Mabie DFPZ**	**HappyJack DFPZ/GS**	**Freeman DFPZ/GS**			
	Alt. 3*	**Alt. 4***	**Alt. 1**	**Alt. 3**	**Alt. 4**	**Potential Cumulative Change**
Suitable Habitat	375 acres	371 acres	1,261 acres	1,201 acres	1,549 acres	**5,001 – 5,349 acres**

Based on Table 3.54, the Freeman project potentially contributes to cumulative effects in the carnivore network habitat. It is uncertain as to what influence these various effects in habitat would do to marten or fisher activity and occupancy within the wildlife analysis area. The Proposed Action alternatives would not increase any large scale, high contrast fragmentation above existing levels. 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 fire (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 large stand 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 Freeman wildlife analysis area supports large blocks of contiguous suitable habitat. Based on studies of home range sizes referenced in the above-mentioned Federal Register, estimates of potentially suitable and contiguous habitat that must be present before an area can sustain a population of fishers range from 31,600 acres in California, 39,780 acres in the northeastern United States, and 64,000 acres in British Columbia. Based on the vegetation layer and GIS, it appears as if the Freeman project falls short of this acreage figure under existing conditions, 26,882 acres of 4M, 4D, 5M, 5D habitats in the wildlife analysis area. Thus the Freeman project area may not support habitat attributes needed to contribute to the potential for recovery of the species in this area of the Plumas National Forest.

Since no California wolverines or Sierra Nevada red fox are believed to exist in, or near, the project area, no direct, indirect or cumulative impact are expected for the California wolverine and Sierra Nevada red fox.

Alternative 2 (No-action)

Direct 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.

Indirect effects

Indirect effects of No-action include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and create a more intense burn, which could lead to increased rates of spread resulting in potential loss of suitable forest carnivore habitat and other important prey habitat attributes such as large trees, large snags and down woody material. With the current Plumas National Forest 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 marten, especially during the denning season, could cause disturbance that could disrupt and preclude successful denning.

Cumulative effects

The No-action Alternative for the Freeman Project would not provide for the long-term protection of forest carnivore 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). Large scale habitat fragmentation created as a result of wildfire could preclude the Freeman wildlife analysis areas potential to contribute to fisher recovery.

Bats (Pallid bat, Townsend's big-eared bat, Western red bat)

Action Alternatives

The implementation of Management Area direction and habitat prescriptions and allocations for bald eagle, California spotted owl, northern goshawk, forest carnivores, willow flycatcher, and great gray owl, including the retention of large trees, retention of oaks, snags and LWD and maintaining aquatic/riparian ecosystem processes, would provide many of the habitat attributes necessary to support the sensitive bat species. Potentially suitable habitat may exist within the project area for all three of these bat species.

Direct effects

Direct effects from the Proposed Actions are possible if any of these species occurs in the project area. Destruction of active roosts through felling or removal of small trees with hollows could displace or harm individual bats. Chain saw activity or the use of heavy equipment causing ground vibrations may cause noise and tremor disturbance significant enough to cause temporary or permanent roost abandonment resulting in lowered reproductive success. These effects would be most severe during the breeding season (May 20 to August 15) when the potential exists for disturbance to active breeding females and maternity colonies. If any of these sensitive bat species breed in the area, project activities during the breeding season could affect individual bats, including direct mortality. These bats have been known to utilize large conifer snags and tree hollows as day roosting sites, so some roosting habitat may be lost. Habitat attributes like large trees, and large snags could be removed or modified by the Proposed Action alternatives. Hazard trees, including snags, along the road, and those removed for safety reasons, could result in direct mortality of bat species that may be roosting within the tree or snag. The Proposed Action alternatives provide for large conifers (all over 30” dbh) retained across the landscape, including the treatment units, retention of oak, four snags/acre retained, and 10-15 tons/acre of down woody debris retained on site; all habitat attributes that provide for bat nesting, roosting and/or foraging habitat.

Due to the small stature of bats, and the difficulty of surveying for them, it is difficult to determine where they are roosting. Because they are insectivores, removal of logs may reduce the amount of microhabitat available for wood boring beetles that may be utilized as prey.

No riparian tree species, including cottonwood, are planned for removal. There would be no habitat disruption or modification to rock outcrops, caves and mining adits. No man-made structures that could provide habitat for bats are planned for removal or modification, other than roads and culverts, both of which do not provide habitat.

Indirect effects

No permanent roads will be constructed so no long-term increases in human activity are expected as a result of this action. As part of a strategic system of defensible fuel profile zones, this project will help eliminate understory fuel buildup and may reduce the potential for high-severity wildfires, which have a great potential to eliminate vast tracts of habitat for these species. Prey base for bats (insects) may have some site-specific short-term reductions post underburning due to direct mortality of eggs, larvae, pupae and adults from fire. However, post fire conditions have been shown, in many instances, to increase plant vigor (Lyon and Stickney 1976, Debyle 1984, Stein et al. 1992). It has also been shown that many herbivore insects preferentially feed on and have increased reproductive success and fitness on more vigorous plants and plant parts “the plant vigor hypothesis” (Price 1991, Spiegel and Price 1996). Therefore, post fire conditions may increase the forage base available to bats.

Cumulative effects

No populations of sensitive bat species are known to occur in the project area, but based on surveys conducted across the Forest in various habitats, their presence is suspected. Cumulative effects on bats 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 stand replacement fires, and the means by which land managers utilized to control them, have contributed and may continue to contribute to loss of habitat for this species. Construction and strategic placement of DFPZ’s can reduce the threat of large scale habitat altering, stand replacing fires, thus providing some protection to residual habitat attributes like large trees, large snags, and buildings across the landscape for bat species use.

Alternative 2 (No-action)

Direct effects

There would be no direct effects on bats or bat habitat, as no activities would occur that would cause disturbance to denning bats, nor any impacts to the existing habitat conditions.

Indirect Effects

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 modification of suitable bat habitat including the loss of large trees, large snags and down woody material.

With the current Plumas National Forest 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 bats, especially during the breeding season (maternity roosts), could cause disturbance that could disrupt and preclude successful recruitment of young.

Cumulative Effects

The No-action Alternative for the Freeman Project would not provide for the long-term management of bat habitat from being greatly altered by a catastrophic fire. There would be No-actions designed to reduce the risk of high intensity wildfire. There would be no thinning that could enhance the growth of dominant and co-dominant trees that may provide future habitat availability.