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Environmental Assessment for the Champs Project

Lassen National Forest
Eagle Lake Ranger District
Lassen County, California

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Proposed Action – Purpose and Need

Background

Project location

The Eagle Lake Ranger District (ELRD) of the Lassen National Forest (LNF) is proposing the Champs Project. The Proposed Action is designed to implement and be consistent with the 1993 LNF Land and Resource Management Plan (LRMP), as amended by the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act Final Environmental Impact Statement (FEIS, 1999), Final Supplemental Environmental Impact Statement (FSEIS, 2003), and Record of Decisions (RODs, 1999, 2003), and the Sierra Nevada Forest Plan Amendment (SNFPA) FEIS (2001), FSEIS (2004), and ROD (2004). The project area is located in portions of the following Management Areas (MAs): Ebey (MA 11), Harvey (MA 12), Ashurst (MA 13), Eagle (MA 14), and Crater (MA 19). It encompasses approximately 33,241 acres; 32,717 of which are National Forest System land, leaving 524 acres in private ownership. The project area is roughly 28 air miles northwest of Susanville, California, within Lassen County, located in all or portions of Township (T) 32 North (N), Range 9 East (E), Sections 2-4, 9-11, 14-16; T33N, R8E, Sections 5, 6, 8-17, 20-29, 36; T33N, R9E, Sections 1-4, 7-36; T33N, R10E, Sections 6, 7, 16-21, 30; Mount Diablo Meridian. Figure 1 (General Vicinity of the Champs Project, Eagle Lake Ranger District) shows the project location.

The planning area covers portions of the Eagle watershed. It encompasses all or parts of the Bear Valley, Harvey Valley, Champs Flat, North Eagle Lake, Poison Lake, and Lower Pine Creek Range Allotments.

Historic and existing vegetative conditions within the Champs Project area

This section is summarized from the Eastside Historical Assessment and hereby incorporated by reference (Champs project record, Eagle Lake RD office). All research and studies referred to in this section can be found in that document.

Vegetative cover is primarily eastside pine and eastside mixed conifer, interspersed with sagebrush, aspen, and meadows, all of which are considered eastside habitat as defined in the 1999 HFQLG ROD. However, the vegetative composition and structure within the Champs analysis area has undergone dramatic changes within the last one hundred-forty years. These changes include: increased tree density, canopy cover, and surface and ladder fuel loadings, as well as, decreased crown base height. Research indicates that current landscape vegetative conditions within eastside landscapes on the ELRD are outside their range of historical variability in terms of vegetative pattern, structure, tree density and species composition. This movement of ecosystems outside their historical condition is a result, at least in part, of approximately 140 years of grazing, 100 years of fire suppression, and 80 years of timber harvest.

Historically, eastside pine-dominated stands would be expected to burn with a high frequency, low severity fire regime, and it would be expected that fires were of a large size. These fires started burning in the spring/early summer and continued to burn until changes in weather conditions or lack of available

fuels extinguished them. Along meadow-forest edges in eastside habitats studies have shown a frequent and prevalent disturbance at the meadow edge prior to 1850, suggesting that these meadows and intervening forests had a continuous herbaceous component that allowed fire to spread over wide areas. Fire history data from eastside pine and pine savannas show that the lack of fire this century is unprecedented in the fire record over the last 250 years. This is another indicator that the disturbance regime of frequent low severity fires is now outside the historic range of variability.

The lack of fire, unprecedented in the historic record, has led to changes in both the structure and composition of the vegetation within the project area. According to research conducted within and near to the project area, stands have become many times denser and as a result canopy base heights are now much lower than what was found in the area historically. Estimates of historical tree density based on 1938 plot data from Blacks Mountain Experimental Forest (BMEF; located immediately adjacent and west of the Champs project area) indicate that there were approximately 24 trees per acre greater than 12 inches diameter at breast height (dbh). Studies have estimated that historical tree densities for trees greater than two inches dbh within eastside pine forests on ELRD averaged from 19 trees per acre for "open" pine forests to 56 trees per acre for "closed" pine forests.

Within the Champs project area, scattered, remnant trees >30 inches dbh exist within proposed DFPZs. Stand exam data indicate that trees >30 inches dbh currently exist at a density of about one per acre (Silviculture Report, Champs project record). These data also indicate that approximately five trees per acre are between 24-30 inches dbh, and approximately 10 trees per acre are between 20-24 inches dbh. Therefore, the existing density of trees >20 inches dbh is about 16 per acre.

Historical stand examination information from 1916 typed the majority of forest cover in the project area as Yellow or Jeffrey Pine (see Table 1 and Map 1) which is considerably different than conditions found in the Champs project area today (see Table 2 and Map 2). "Western Yellow Pine in Oregon" (USDA, 1917) describes the character of the stands in this forest type, at that time, in various parts of Oregon and California, which could be pure or nearly pure, or in mixture with other species that comprised a small proportion of the coniferous vegetation. These other species included those that were more tolerant and competitively successful on moist sites where they can thrive. The moist soil on which the mixed forest grew was able to carry a denser stand. Pine reproduction cannot compete successfully in these denser stands with mixed species. Other species were apt to grow in groups by themselves and not in intimate mixture with the pine. In yellow pine forests, trees were spaced rather widely with the ground fairly free from underbrush and debris with only occasional patches of saplings and fallen trees. The forests were usually not continuous, but broken by "scab-rock ridges" or natural meadows. In areas where pine was mixed with other species, the forests were usually denser and more brushy (Munger, 1917). In the Champs project area today, white fir accounts for considerable amounts of the sampled trees in some stands. The proportion of white fir increases based on slope position and elevation. Because of white fir ingrowth, several of these pine stands now type out as mixed conifer. Existing overstory species composition is primarily ponderosa and Jeffrey pine, with occasional sugar pine, incense cedar, and white fir in the true eastside mixed conifer stands. Excessive densification of pine and/or white fir ingrowth

dominates the understory and midstory. Shade intolerant pine species are being shaded out and are not regenerating well.

Table 1. Historic Forest and Non-forest Cover Types in the Champs Project Area

Cover Type	Acres	Percent of Project Area
Yellow or Jeffrey Pine	24,030	72
Sage Brush	5,656	17
Grass	2,100	6
Red or White Fir	1,112	3
Brush	43	<1
Other	300	<1
Total Project Area	**33,241**	**100**

Source: Eagle Lake Ranger District GIS (1916 Historic Vegetation on LNF)

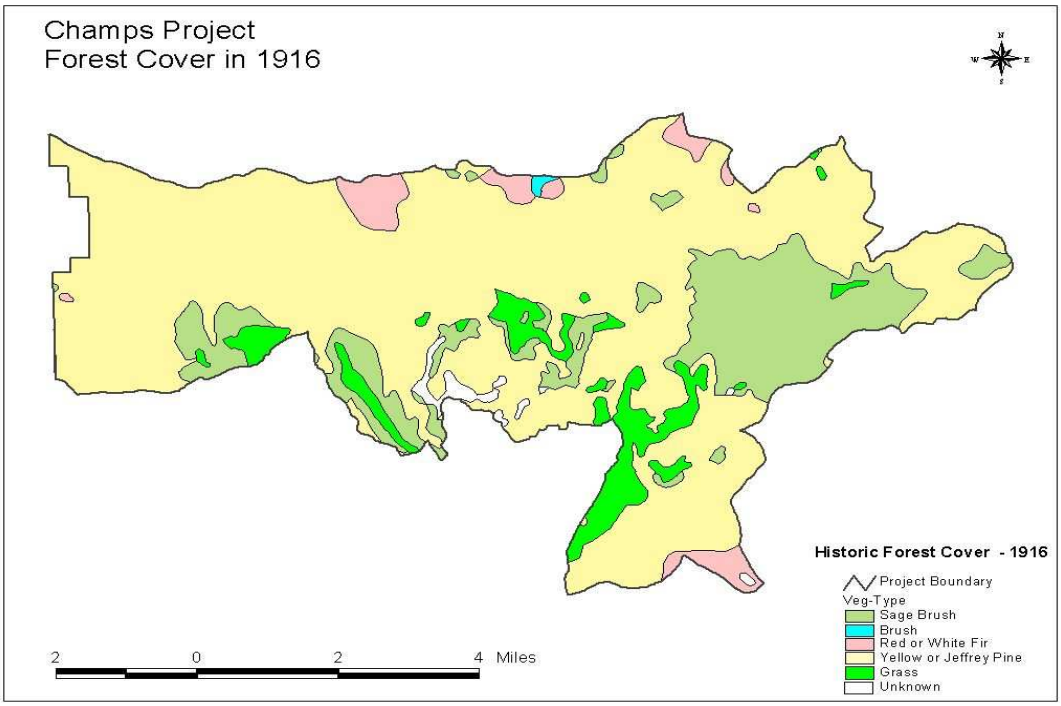
Table 2. Current Forest and Non-forest Cover Types in the Champs Project Area

Cover Type	Acres	Percent of Project Area
Yellow or Jeffrey Pine	13,572	41
Sage Brush	5,655	17
Grass	1,055	3
Red or White Fir (Mixed Conifer)	11,772	35
Brush (Chaparral)	156	<1
Other (Wet Meadow)	359	1
Aspen	114	<1
Private	558	2
Total Project Area	**33,241**	**100**

Source: Eagle Lake Ranger District GIS (CALVEG) Note: (Current terminology)

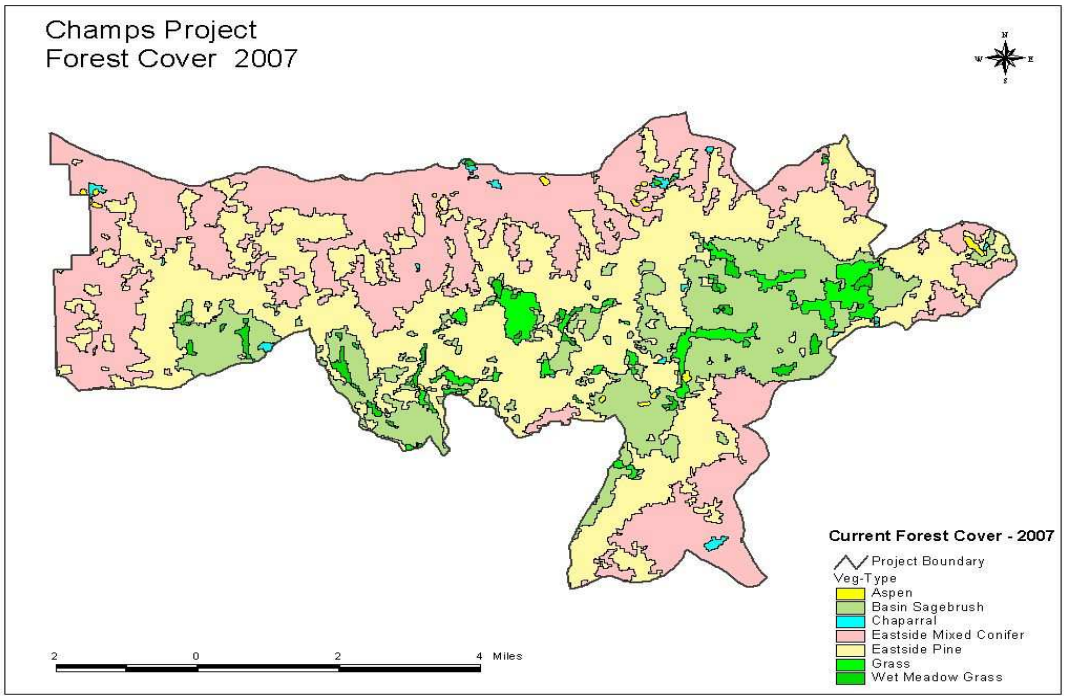
These conditions have led to an overall densification of the stands with encroachment and establishment of small diameter conifers in the understory and midstory. Most of the dominant and codominant trees are approximately 100 years old, which roughly coincides with the beginning of fire suppression on the Lassen National Forest in 1905. Large, remnant, predominant ponderosa, Jeffrey, and sugar pine trees remain, but they are generally widely scattered and small in number. Large pine stumps are also present, providing evidence of past species composition. These remnant trees provide structural diversity and are an important seed source. Existing conditions appear to be quite altered when compared to historical conditions.

Map 1. 1916 Historic vegetation within the Champs Project



Source: Eagle Lake Ranger District GIS (1916 Historic Vegetation on LNF)

Map 2. Current vegetation within the Champs Project



Source: Eagle Lake Ranger District GIS (CALVEG).

Recent photo-interpretation data from the aerial photography indicates a marked contrast of stand structure and composition of the vegetation within the Champs project area between 1941 and 1998 data sets. Results of this comparison indicate that there was very little similarity between 1941 and 1998 forest structure. In 1941, 98% of the photo-interpreted forest was classified as being in size classes 4 and 5, with 33% in size class 5. In 1998, only 5% was classified in size classes 4 and 5, with no acres classified in size class 5. Also, in 1941, 85% was classified in the open canopy stands (canopy closure categories S and P), and only 1% in the dense, or D, category. In 1998, the S and P categories had declined to 45%, while the percent within the D category had increased to 20%. These data illustrate well, the profound changes that have taken place in terms of densification of stands (leading to increased canopy closures) and loss of old-growth trees (contributing to reductions in size class). These data also support the conclusion of other studies that open eastside pine forests and savannas on ELRD, once the dominant seral stages of eastside pine forests, have essentially been eliminated from the landscape today.

Purpose and Need for Action

There is a need to respond to the goals and objectives outlined in the 1998 HFQLG Act and the 1993 Lassen LRMP as amended. The 1998 HFQLG Act and the 1993 Lassen LRMP, as amended, require completion of resource management activities that include a strategic system of defensible fuel profile zones (DFPZs), area thinnings, and group selections. The Proposed Action would move the project area toward the desired future condition as described in these plans. The purpose and need for the Champs project is as follows:

1. The proposed action is intended to implement the Herger-Feinstein Quincy Library Group Forest Recovery Act (1998 HFQLG Act), which requires the construction of a network of DFPZs, group selection timber harvest, and individual tree selection (area thinning).

The 1998 HFQLG Act directed that, as part of a pilot project involving three National Forests, the LNF would test and demonstrate the effectiveness of certain resource management activities designed to meet ecologic, social, economic, and fuel-reduction objectives to the extent consistent with applicable federal law. Accomplishing the purpose of the 1998 HFQLG Act requires the construction of a network of DFPZs on 40,000-60,000 acres and group selection timber harvest on 8,700 acres each year in the pilot project area. In his decision for the 2004 SNFPA ROD (pg. 5), the Regional Forester directed that the Plumas, Lassen, and Tahoe National Forests are to fully implement the HFQLG Pilot Project to, "…allow knowledge to be gained from moving forward with the pilot project, as it was originally envisioned.".

The Champs project is intended to be the next increment of implementation of this Congressional mandate and LNF LRMP direction.

2. The proposed action is intended to implement DFPZs as part of an extensive fuel treatment network that is effective in reducing the potential size of wildfires, and providing fire suppression personnel safe locations for taking actions in the event of a wildfire.

The DFPZs proposed for the Champs project area are designed and located to be part of a larger strategic system of DFPZs that provides fire suppression personnel relatively safe locations from which to take action against wildfires. The proposed DFPZ would be effective in reducing the potential size of wildland fires due to the decreased fire behavior of fires entering the DFPZ network. This decrease would give firefighters more time to contain wildland fires and allow for the use of direct attack suppression methods. The use of direct attack methods is safer and generally results in smaller fire sizes than when indirect attack methods must be utilized. The increased number of acres added to the DFPZ network would increase the probability that any wildland fire start in the project area would be in close proximity to a DFPZ and this would also help in keeping fires smaller. The proposed DFPZs are a link in the HFQLG DFPZ network. Portions of DFPZs have been completed within the project area, but the network is currently incomplete. The proposed DFPZs connect to Blacks Mountain Experimental Forest on the west, completed DFPZs to the south of the Champs project area, and to future fuels reduction treatments to the north and east of this project area.

Wildfire suppression efforts can be assisted by the availability of DFPZs located along strategic landscape features such as roads and ridgelines. DFPZs, such as the ones being proposed in this action, are needed to reduce fire intensity in locations where firefighters should be deployed for safe and effective suppression efforts. The DFPZs within the Champs project area are oriented in a manner that would inhibit the spread and size of a fire moving from the southwest to northeast, which is the predominant orientation that large fires historically moved through the area.

The amended Forest Plan directs that management of land and resources be designed to maintain desired conditions or to move existing conditions toward desired conditions. An assessment of the Champs project area shows that existing fuels exceed desired levels for DFPZs. Treatments within the DFPZs are designed to move the treated stands toward desired conditions by reducing surface fuel loading, raising crown base height by reducing ladder fuels, reducing crown fuels, and reintroducing fire.

Existing conditions within the project area include surface fuel loading ranging between 9-31 tons per acre. Approximately 34 percent of the treatment area is considered to contain moderate surface fuel loadings, and approximately 66 percent of the treatment area contains high surface fuel loadings. Existing surface fuel conditions within the vegetation types vary and are displayed in Table 3.

Table 3. Estimated fuel loading by vegetation type (less than 11 inches diameter).

Vegetation Type	Existing		Desired
	Surface Fuel Loading (Tons/Acre)	Mean Surface Fuel Loading (Tons/Acre)	Mean Surface Fuel Loading (Tons/Acre)
Eastside Ponderosa Pine	6-13	9.0	<5
Eastside Mixed Conifer	10 - 23	15.0	<5

Source: HFQLG FEIS and Fuels Specialist Report

In an effective DFPZ, a low amount of surface fuels would be present. Existing surface fuels need to be treated to bring surface fuels loadings to less than five tons per acre for coarse down woody material in

the 0.1-11 inch diameter range. At 90th percentile fire weather, an effective DFPZ treatment would have a predicted surface flame length of less than four feet, forest structure that would not allow transition of a surface fire to a crown fire (torching index (TI)) and would not allow an approaching crown fire to persist in the canopy of the DFPZ (crowning index (CI)).

TI is a measure of how susceptible a stand is to the vertical movement of fire. It is the 6.1meter (20 feet) windspeed at which crown fire is expected to initiate based on Rothermel's (1972) surface fire model and Van Wagner's (1977) crown fire initiation criteria. TI is a function of surface fuel characteristics (fuel model), surface fuel moisture content, foliar moisture content, canopy base height, slope steepness, and wind reduction by the canopy (Scott and Reinhardt 2001). The higher the TI the less susceptible a stand is to the vertical movement of fire.

CI is a measure of the ability of a stand to sustain a fire that moves through the canopy (active crown fire). It is the 6.1 meter (20 feet) windspeed at which active crowning is possible, based on Rothermel's (1991) crown fire spread rate model and Van Wagner's (1977) criterion for active crown fire spread. CI is a function of canopy bulk density, slope steepness and surface fuel moisture content (Scott and Reinhardt 2001). The higher the CI the less susceptible a stand is to an active crown fire.

The 90th percentile 6.1meter (20 feet) windspeed for the Champs project area is 11 mph. This means that stands that have a TI or CI equal to or less than 11 are susceptible to crown fire under 90th percentile weather.

Under current stand conditions and 90th percentile weather, a wildfire could result in crown fire activity in many stands within the project area. Predicted flame lengths range from 9 to 79 feet (excluding Prescription D, Underburn Only areas), which exceeds the recommended flame length for direct attack suppression methods using ground forces. Ladder fuels within most of the stands in the Champs project area are relatively dense and live crown base heights range from four to eight feet. These existing ladder fuels and low crown base heights increase the risk that fire could be transferred into the crown, thereby increasing the probability of sustained crown fire and unsafe conditions for fire suppression efforts. The current fuel conditions do not provide for safe fire suppression efforts. Treating surface, ladder, and crown fuels as described in the proposed action is needed in order to reduce flame lengths, reduce the probability of crown fire, and to provide a safer and more effective fire suppression environment.

The forested stands within the Champs project area are predominately in Fire Regime Condition Class (FRCC) 3 which is described in A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment – 10-Year Comprehensive Strategy (USDA FS and USDI, 2001). FRCCs are defined in terms of departure from the historic fire regime. Condition Classes are determined by the number of missed fire return intervals and the departure of stand structure and species composition from the historic reference condition. The relative risk of fire caused losses of the key ecosystem components that define each condition class increases for each respectively higher numbered condition class. These conditions are far removed from historic conditions and are the result of altered forest structures that have occurred because of many years of livestock grazing, fire suppression, and from past forest management practices. These conditions have led to overall densification of the stands with

encroachment and establishment of small diameter conifers in the understory and mid-story. Thinning and other proposed fuel reduction treatments are needed to reduce stand densities and improve condition classes.

Stand densities are described by a Stand Density Index (SDI), which converts a stand's current density into a density at a constant reference size of 10 inches dbh. This allows for a direct comparison of density between stands and between various treatments. Other measures of stocking such as trees per acre or basal area (the cross sectional area of a tree bole measured at dbh) per acre can reflect varying densities depending on a stand's average dbh. For example, a basal area of 100 square feet per acre would indicate a low stand density if the average dbh were 24 inches, but would indicate a higher stand density if the average dbh were eight inches. Additionally, different tree species tolerate different maximum stand densities. Pines have a suggested maximum SDI of 365(Oliver, 1995), and because this is the most limiting species within the stands this would be the maximum SDI used for all stands, even though other species can persist at higher densities. At densities between 60 and 70 percent of maximum, tree growth and vigor is severely impacted by inter-tree competition. As stands exceed 60 percent of maximum SDI, they grow at increasingly slower rates as trees are stressed for resources; thus, potentially affecting stand and forest health. Individual tree mortality occurs throughout a stand at these densities often due to a combination of factors. Stands may persist at these levels for years; however, they are prone to large scale insect and disease outbreaks, and stand replacing fire because of their stressed condition and density. Drought events can exacerbate this condition and lead to widespread mortality as well. Thinning treatments would attempt to ensure that stand densities do not exceed an upper limit of 60 percent of maximum SDI in order to reduce health risks associated with density. Also, thinning treatments need to ensure that this level would be maintained for at least 20 years after thinning (RO letter, 2004).

Stocking density in the stands proposed for treatment is moderate to heavy with average basal areas generally between 140 to 220 square feet per acre. Most stands are approaching or exceeding 60 percent of their maximum SDI and have undesirably dense surface and ladder fuels. Desirable stand densities for the DFPZ would range from 35 to 50 percent of maximum SDI, with basal area ranging from 80 to 140 square feet per acre. Fuel reduction treatments, such as thinning from below by removing most of the saplings and poles and some of the small and medium sized trees, are needed in order to develop the desired stand conditions within DFPZs and to move stands in the direction of the desired Condition Class of 1. Fuel reduction treatments would create conditions conducive to reintroducing periodic low-intensity prescribed fire.

Stand thinning must be sufficient enough to allow for equipment operations such that residual stand damage is kept to a minimum. ELRD experience has shown that tree spacing in the range of 18-20 feet between residual trees is the minimal range for harvest operability. Where the average residual tree spacing is between this range and less, equipment operability would be more restricted and residual tree damage from mechanical equipment would increase (bole scars that expose the cambium). White fir is especially susceptible to damage because of its thin bark.

Thinning would also provide forest products that contribute to community stability through employment and value added processing.

Because this project proposes to thin forest stands, and thus create conditions that may cause the spread of annosus root disease, there is a need to treat all conifer stumps ≥ 14 inches in diameter with SPORAX® (Sporax). Annosus root disease is known to historically exist within and adjacent to the Champs project area in both pine and white fir. A site survey by a Pacific Southwest Region plant pathologist in September of 2006 found that recent annosus root disease activity was evident in pine and white fir with p-type and s-type annosus root disease. Within the Champs project area, all isolates of H. annosum from naturally infected ponderosa pine, Jeffrey pine, sugar pine, incense-cedar, western juniper, and manzanita are of the p-type. Isolates from true fir are of the s-type. However, no actively spreading annosus root disease was observed during this survey. Sporax is an approved fungicide in Region 5 for annosus root disease prevention and control. The current recommendations in the Forest Service Handbook (FSH 3409.11) for annosus root disease prevention and control is to apply Sporax on all conifer stumps 14 inches in diameter and larger in the eastside pine forest type.

Fuel reduction treatments that encompass Riparian Habitat Conservation Areas (RHCAs) are designed to be consistent with meeting or contributing to Riparian Management Objectives (RMOs). Coupled with the need to reduce fuels within RHCAs encompassed by DFPZs, thinning within RHCAs to a lower residual basal area level than the surrounding DFPZ is needed in order to: 1) improve riparian function by increasing understory vegetation along stream banks, and 2) prolong the beneficial effects of the treatment such that another entry would not be necessary for approximately 20 to 40 years. Pertinent RMOs for the project area include:

1) Maintain or restore riparian vegetation to provide an amount and distribution of large woody debris characteristic of natural aquatic and riparian ecosystems.

Within much of the RHCAs, the existing conifer stands are both overstocked and are relatively even aged. There is a need to thin the conifer stands to allow the remaining trees to reach larger sizes sooner and reduce tree stress, increasing the potential for delivery of larger trees to the RHCAs in the long term.

2) Maintain or restore the diversity and productivity of native and desired non-native plant communities in the RHCA.

There is a need to apply selective fuels treatment to open the canopy, which is currently at 40-65 percent cover, to allow more light to penetrate the forest floor and improve conditions for riparian and understory vegetation.

3) Maintain or restore habitat to support populations of well-distributed native and desired non-native plant, vertebrate, and invertebrate populations that contribute to the viability of riparian plant communities.

There is a need to increase the diversity and overall health of the RHCA vegetation and to reduce the effects of wildfires. Treatments within RHCAs would move the areas toward a more historical structure and composition providing the opportunity for native flora and fauna to trend towards a more sustainable condition.

The proposed action is intended to achieve the desired conditions on the areas treated through reductions in surface fuels, ladder fuels, crown fuels, and stand density.

3. The proposed action is intended to implement individual tree selection (area thinning) to promote forest health and provide structural diversity to forested stands.

Within the Champs project area, area thinning is needed to reinforce the DFPZs. Area thinning would help enhance a strategic network of reduced fuel concentrations where fire severity and rates of spread are appreciably reduced.

The residual basal area for the Prescription G area thinning unit is 60 to 80 square feet, including within the RHCAs. Thinning within RHCAs is needed in order to: 1) improve riparian function by increasing understory vegetation along stream banks, and 2) prolonging the beneficial effects of the treatment such that another entry would not be necessary for approximately 20 to 40 years.

As discussed under the need to implement DFPZs (#2 above), most stands within the project area have been altered from historical structures due to many years of livestock grazing, fire suppression, and past forest management practices. These conditions have led to overly dense stands with encroachment and establishment of small diameter conifers. Currently, the unit proposed for area thinning (excluding plantations) has stand density indices over 60 percent of maximum SDI, with basal areas generally from 140 to 220 square feet per acre. Also, trees per acre within the area proposed for area thinning average 300 to 400 per acre for all size classes over 2 inches dbh, and approximately 60 to 80 for trees $\geq$12 inches dbh. Historical forest reconnaissance reports and other information sources indicate that historical densities of trees $\geq$12 inches dbh in this area were likely <30 per acre, and more specifically, approximately one tree per acre in the area proposed for area thinning.

Over-stocked stands are at risk for insect and disease outbreaks, and are susceptible to stand replacement due to wildfire. Desired densities for these stands are approximately 30 percent of maximum SDI, with basal areas generally ranging from 60 to 80 square feet per acre. Post-harvest, the number of trees per acre $\geq$12 inches dbh would be approximately 30 to 50, thus serving to incrementally return the area to a semblance of historical tree densities. The proposed area thinning treatments are needed in order to promote healthy forested stands by improving the growth and vigor of residual trees, and to reduce the risk of stand replacement due to wildfire. Thinning treatment, along with post-treatment prescribed burning, should also lead to a restoration of understory vegetation, primarily grasses that were historically a prominent component of eastside pine stands. Similar to the needs for DFPZs, area thinning treatments need to allow for equipment operability, be effective for at least 20 years before reaching 60 percent of maximum stand density index, and treat conifer stumps $\geq$ 14 inches in diameter with Sporax.

Area thinning proposed within plantations is needed to disrupt fuel continuity and improve stand health by reducing stocking to desired levels. These plantations are currently at their initial planting densities of 300 to 400 trees per acre at approximately a 10 by 10 foot spacing. Desired densities for these 10 to 20 year old stands are approximately 150 trees per acre, at a 17 by 17 foot spacing.

4. The proposed action is intended to implement group selection as directed in the 1998 HFQLG Act to achieve a desired future condition of an all-age, multi-story, fire resilient forest, while contributing to the local economy through a sustainable output of forest products.

The 1998 HFQLG Act requires that the effectiveness of group selection be demonstrated in achieving an all-age, multi-story, fire-resilient forest. It calls for a pilot project to carry out group selection prescriptions described in the Quincy Library Group Community Stability Proposal over an average of 0.57 percent of the pilot project land area each year (or 5.7 percent each decade), using the most cost effective means available. Group selections are intended to create all-age, multi-storied stand conditions that are currently lacking across the landscape, maintain a relatively continuous forest cover, employ rotation ages that vary by timber site quality, and promote an adequate timber supply and local economic stability.

The Champs project group selections are designed to contribute to goals of the 1998 HFQLG Act while meeting requirements of the amended Forest Plan. Project design is intended to contribute to the group selection acreage goals noted above, consistent with protection of ecosystems, watersheds, and other forest resources, good silvicultural practices, and economic efficiency. To achieve this purpose, group selection units would be located in the most abundant timber strata within the project area; in this case, size class 3 stands [Region 5 size class, or California Wildlife Habitat Relationship (CWHR), size class 4]. Lands supporting important environmental and social resources, as well as silviculturally unsuited lands, were excluded from the placement of groups, including off-base and deferred lands, spotted owl protected activity centers (as required by the 1998 HFQLG Act), RHCAs, late-successional old growth ranks 4 and 5, plantations established after 1960, and shrubfields.

Group selections provide conditions for the regeneration and growth of more fire tolerant pine species that otherwise do not grow well in a shaded environment underneath an overstory. Group selections provide recruitment of future overstory pine, and provide structural diversity by creating small patches of vegetation and young trees interspersed in stands of larger trees. When viewed from the landscape level, a multi-storied effect would be achieved.

Similar to the needs for DFPZs and area thinning treatments, conifer stumps $\geq$ 14 inches in diameter within group selection harvest units need to be treated with Sporax.

5. The proposed action is intended to implement economically efficient treatments to reduce hazardous fuels and to contribute to community stability.

The 1998 HFQLG Act requires that the pilot project carry out authorized activities using the most cost effective means available. The proposed action treatments need to be designed utilizing cost-effective methods in order to minimize the cost of implementing the treatments to the government. Factors of economic efficiency are: 1) neutral or positive benefit/cost ratios which include factors such as revenues generated in the implementation of fuel reductions and group selection treatments, compared to the costs of implementing those treatments, and 2) equipment operability within timbered stands during the

implementation of thinning treatments. Insufficient spacing between trees greatly reduces the ability of ground-based equipment to maneuver without leading to excessive residual stand damage.

The Champs project is needed to contribute to community stability by providing employment for contractors involved in the removal of wood by-products, for employees in wood manufacturing and energy production plants, and for personnel involved in labor intensive work. The project is also needed to provide a wood supply for local manufacturers who rely on federal timber to keep local plants in operation, which provides wood products (e.g., lumber, electricity) to the public.

6. The proposed action is intended to provide the necessary access for the construction of the DFPZs, group selection timber harvest, and area thinning, and to reduce impacts of the transportation system.

In order to provide access for the construction of the DFPZs, group selection timber harvest, and area thinning, existing Forest system and non-system roads in the project area would be utilized. In addition, several existing non-system roads are needed for long-term future management and, thus, would be upgraded to Forest transportation standards and added to the Forest transportation system.

Alternative 1, Proposed Action

The Forest Service proposes to implement the following activities which are consistent with LNF Land and Resource Management Plan (1993), as amended, to meet the purpose and need for the project.

Defensible Fuel Profile Zones (DFPZs):

A series of Defensible Fuel Profile Zones would be developed on National Forest System land throughout the Champs project area, forming a network that has been segmented by specific locations (See Figure 2, Champs Project, Proposed Action map for locations of DFPZs). DFPZ locations and boundaries have been refined from those identified in the 1999 HFQLG FEIS based on site-specific review by District specialists. They are typically designed to be an average of ½ mile wide, approximately ¼ mile on each side of the designated road system, and characterized by a primary and secondary zone. The primary zone extends from the road 200 feet into the stand, with the secondary zone continuing from this point out to 1,320 feet into the stand. The primary zone is designed to allow firefighters to safely and effectively take direct action (i.e., backburning or burnout operations) on an approaching wildland fire. The secondary zone is designed to slow the spread, reduce the flame length and fireline intensity, and transition an approaching crown fire to a surface fire. Treatments are designed to achieve DFPZ conditions as described in the HFQLG FEIS (1999, Appendix J) and comply with the standards and guides set forth in the 2004 SNFPA ROD (pages 67-68). Post-treatment stands would be fairly open, dominated by larger, fire tolerant trees. This openness, in conjunction with increased crown base height, reduced numbers of small understory trees, and the low amount of surface fuel would produce a very low probability of sustained crown fire. After treatments, these stands would be moving in the direction that reflects the desired Fire Regime Condition Class 1 as described in *Protecting People and Sustaining Resources in Fire-Adapted Ecosystems, A Cohesive Strategy* (Laverety, 2000).

Design criteria for DFPZ construction have been developed based on desired fire behavior characteristics of a completed DFPZ. Modifying and reducing surface, ladder, and canopy fuels achieve desired fire behavior objectives. Surface fuels include dead and down wood, and live and dead understory vegetation such as brush. Ladder fuels are defined by their position in the canopy relative to other vegetation. Ladder fuels are brush or trees that are underneath and adjacent to taller overstory trees. Their crowns provide a fuel "ladder" that allows fire to move into the canopy of overstory trees. A small tree may be considered a ladder fuel when it is growing near a larger tree, but is not considered a ladder fuel when it is growing in the open, away from the overstory.

DFPZ construction would be completed utilizing commercial timber sales, service contracts, and Forest Service personnel. Thinning would consist of removing the smallest trees first, known as thinning from below, until the desired stocking level/density has been achieved in an attempt to remove ladder fuels and reduce fuel continuity. Live trees 30 inches diameter at breast height (dbh), or 4.5 feet from the ground, or greater would be retained, except as necessary for operability. For example, in the last 10 years of implementing similar prescriptions on the Eagle Lake Ranger District, there have only been a few occasions where trees 30 inches dbh or greater were removed for operability. These included trees that were removed to create landings and skid trails or as identified as hazards per Occupational Safety and Health Act (OSHA) requirements for logging operations. This is consistent with the 2004 SNFPA ROD (page 68). DFPZ construction would be accomplished via mechanical, ground-based equipment, to harvest trees down to three inches dbh. Whole-tree yarding would be used when possible. Sawlogs, limbs, and tops would be taken to landings for processing. Most treated material not used for sawlogs would be chipped and removed.

Small surface fuels less than an 11-inch diameter would be retained at no more than five tons per acre. Prescribed fire would be used in most stands to either burn piles or broadcast burn surface fuels. All prescribed fire implementation would follow a specific Burn Plan that follows Region 5 standards and guidelines and has been approved by the LNF Forest Supervisor.

Stocking would generally be retained towards the lower end of full site occupancy, with basal area as the tool to measure site occupancy. The objective is to leave 40 percent of normal square feet of reserve basal area within the primary zone and 55 percent to 60 percent of normal within the secondary zone of the DFPZ, with normal determined by specific site indexes. With this objective in mind, following thinning, the desired reserve stand basal area would generally range from 80-100 square feet in the primary zone and 100-120 square feet in the secondary zone in eastside pine stands, and range from 100-120 square feet in the primary zone and 120-140 square feet in the secondary zone in eastside mixed conifer stands. Attributes are averaged over treatment units rather than stands. Residual overstory trees would be irregularly spaced across the landscape. Large-scale continuity of canopy fuels would be broken up. Understory small diameter conifer trees (less than 6 inches dbh) would be relatively few and scattered. Small, understory trees would typically not be left where they serve as ladder fuels to adjacent overstory trees.

DFPZs would be constructed using silvicultural and/or fuels treatments. See Table 4 (Summary of Proposed Action Vegetative Treatments) for acres of proposed DFPZ treatments, and Figure 2 for location of treatments. Activity generated landing piles would be burned. To maintain within-stand diversity, approximately 10 percent of each silvicultural treatment unit within DFPZs would be left unthinned in patches (non-treated leave islands), generally ranging in size from ¼ to five acres, and generally located in the secondary zone of DFPZs. Untreated leave islands would contribute to the overall treatment unit reserve basal area. Where existing, at least three of the largest, 15 inches or larger dbh, available snags per acre would be retained, and at least three down logs, 12 inches diameter or larger, per acre would be retained (2004 SNFPA ROD, page 69). Snags within DFPZ units may require felling during project implementation to meet safety concerns. If felled, such snags would be left in place, and not included as product with the sale.

These Defensible Fuel Profile Zones would be created as follows:

Prescription A. DFPZ, Thin and Underburn:

Under this prescription, ladder and canopy fuels would be mechanically thinned to desired levels utilizing whole tree removal to reduce fuels and stocking levels, focusing primarily on thinning from below. Small understory conifer trees would be thinned where they serve as ladder fuels to adjacent overstory trees. Mid and upper story trees would be removed to protect adjacent "leave" trees and break up ladder and canopy fuel continuity. This treatment would be followed with prescribed underburning to reduce surface fuels to desired levels. Underburning would also serve to promote an increase in understory vegetation such as grasses, which is currently below a desired ecological condition.

Prescription B. DFPZ, Thin and Masticate:

Under this prescription, ladder and canopy fuels would be mechanically thinned to desired levels utilizing whole tree removal to reduce fuels and stocking levels, focusing primarily on thinning from below. Small understory conifer trees would be thinned where they serve as ladder fuels to adjacent overstory trees. Mid and upper story trees would be removed to protect adjacent "leave" trees and break up ladder and canopy fuel continuity. This treatment would be followed with mastication to reduce surface and ladder fuels to desired levels. Mastication entails on-site reduction of woody material by mechanized chopping/chipping.

Prescription C. DFPZ, Thin and Underburn within Riparian Habitat Conservation Areas (RHCAs):

Within RHCAs to be thinned, generally 60 to 80 square feet reserve basal area in the largest trees would be retained in order to reduce excess ladder and canopy fuels and also to restore historical forest densities and spatial patterns of trees along streams, meadows, and spring edges. This thinning would be followed by prescribed burning to reduce surface fuels to desired levels, and promote understory vegetation development.

Prescription D. DFPZ, Underburn Only:

Under this prescription, prescribed underburning would be used to reduce surface fuels to desired levels within DFPZs. These treatment areas do not require silvicultural treatments prior to burning.

Prescription E. DFPZ, Masticate Only:

Under this prescription, brush and/or surface fuel concentrations would be masticated to desired levels within DFPZs. These treatment areas do not require silvicultural treatments prior to masticating. Mastication entails on-site reduction of woody material by mechanized chopping/chipping.

Prescription F. Group Selection (GS):

Groups would be placed in forest stands that have been identified as suitable for this method of uneven-aged management. These are lands that are capable of growing forest stands and are not precluded from timber harvest because of wildlife habitat allocations, land use or administrative constraints. Approximately 5.7 percent of the available and suitable land base within the project area was considered for group selection harvest under this proposal. This is based upon a projected 10-year re-entry period and equates to a group selection harvest level of 0.57 percent of the available land base per year.

See Table 4 for acres of proposed group selection harvest, and Figure 2 for group selection locations.

Group selection harvest is proposed as follows:

- Groups would range in size from ½ to 2 acres.
- Groups would generally be located within size class 3 stands (Region 5 size class) which have average diameters ranging from 12 to 24 inches dbh. Size class 3 stands are equivalent to California Wildlife Habitat Relationship (CWHR) size class 4.
- Live trees 30 inches dbh or greater would be retained, except as necessary for operability, which includes trees removed to create landings and skid trails or which are identified as hazards per OSHA requirements for logging operations.
- Where existing, at least three of the largest, 15 inches or larger dbh, available snags per acre would be retained, and at least three down logs, 12 inches diameter or larger, per acre would be retained. Snags within group selection harvest units may require felling during project implementation to meet safety concerns. If felled, such snags would be left in place, and not included as product with the sale.
- Generally, groups would be site prepared (as needed) within one year following logging operations during the dry period of the year. Site preparation would be implemented via machine piling with a brush rake. Small surface fuels less than 11-inch diameter would be retained at no more than five tons per acre. Prescribed fire would be used in most groups to burn piles or broadcast burn surface fuels to desired levels. All prescribed fire implementation would follow an approved Burn Plan that follows Region 5 standards and guidelines. Soil compaction would be determined on a site specific basis post-harvest, and if results indicate a need, subsoiling would be performed. Where compaction is an issue, subsoiling with a winged-ripper would be employed.

- Artificial regeneration would be the primary method used to achieve R5 stocking levels of group selection units, emphasizing shade-intolerant species. In eastside pine types, groups would be planted with ponderosa pine and/or Jeffrey pine, and if mixed with both species, the mixture would be approximately 50:50. In eastside mixed conifer types, ponderosa pine, Jeffrey pine, and sugar pine would be planted at the approximate mixture of 40:40:20 respectively. Approximately 300 to 400 trees per acre would be planted in groups. Approximately *489* acres would be planted.
- Planting survival would be monitored after the first and third years as required by the National Forest Management Act (NFMA), and regeneration actions would be undertaken, if needed, to ensure successful regeneration within five years after harvest.
- Release for survival and growth of establishing conifer seedlings would occur within five years of planting (monitoring may adjust treatment timing). Competing vegetation would be controlled either via hand grubbing or scalping, or mechanical mastication, to assure survival and growth of planted trees.

Area Thinning (individual tree selection):

Area thinning, utilizing individual tree selection harvest would be used as intermediate treatments within selected areas. This treatment is intended to provide for improved forest health and fire resiliency in the interim prior to the next scheduled entry. Area thinnings help build a strategic network of reduced fuel concentrations where fire severity and rates of spread are appreciably reduced. Stands would be thinned with emphasis on forest health, breaking up fuel continuity, reducing competition for site resources, and promoting structural diversity. Proposed area thinning treatments are described below. See Table 4 for acres of proposed area thinning, and Figure 2 for location of treatments.

Prescription G. Area Thinning, Thin and Underburn:

This restoration prescription would return a semblance of historical density and spatial pattern of trees within this treatment area. This prescription would be implemented using thinning from below to retain 30 percent of the existing basal area (generally retaining 60 to 80 square feet) in the largest trees. This prescription would also be implemented within the RHCAs within this prescription area. Residual mid and overstory trees would be irregularly spaced such that large-scale continuity of canopy fuels would be broken up. Understory small diameter trees (6 inches dbh or less) would be relatively few and isolated from serving as ladder fuels to the overstory. Thinning would be followed by prescribed burning to reduce surface fuels to desired levels and to promote understory vegetation development, which is currently below a desired ecological condition. All prescribed fire implementation would follow an approved Burn Plan that follows Region 5 standards and guidelines. Live trees 30 inches dbh or greater would be retained, except as necessary for operability, which includes trees removed to create landings and skid trails or which are identified as hazards per OSHA requirements for logging operations.

Where existing, at least three of the largest, 15 inches or larger dbh, available snags per acre would be retained, and at least three down logs, 12 inches diameter or larger, per acre would be retained. Snags within area thinning units may require felling during project implementation to meet safety concerns. If

felled, such snags would be left in place, and not included as product with the sale. Small surface fuels less than 11-inch diameter would be retained at no more than five tons per acre.

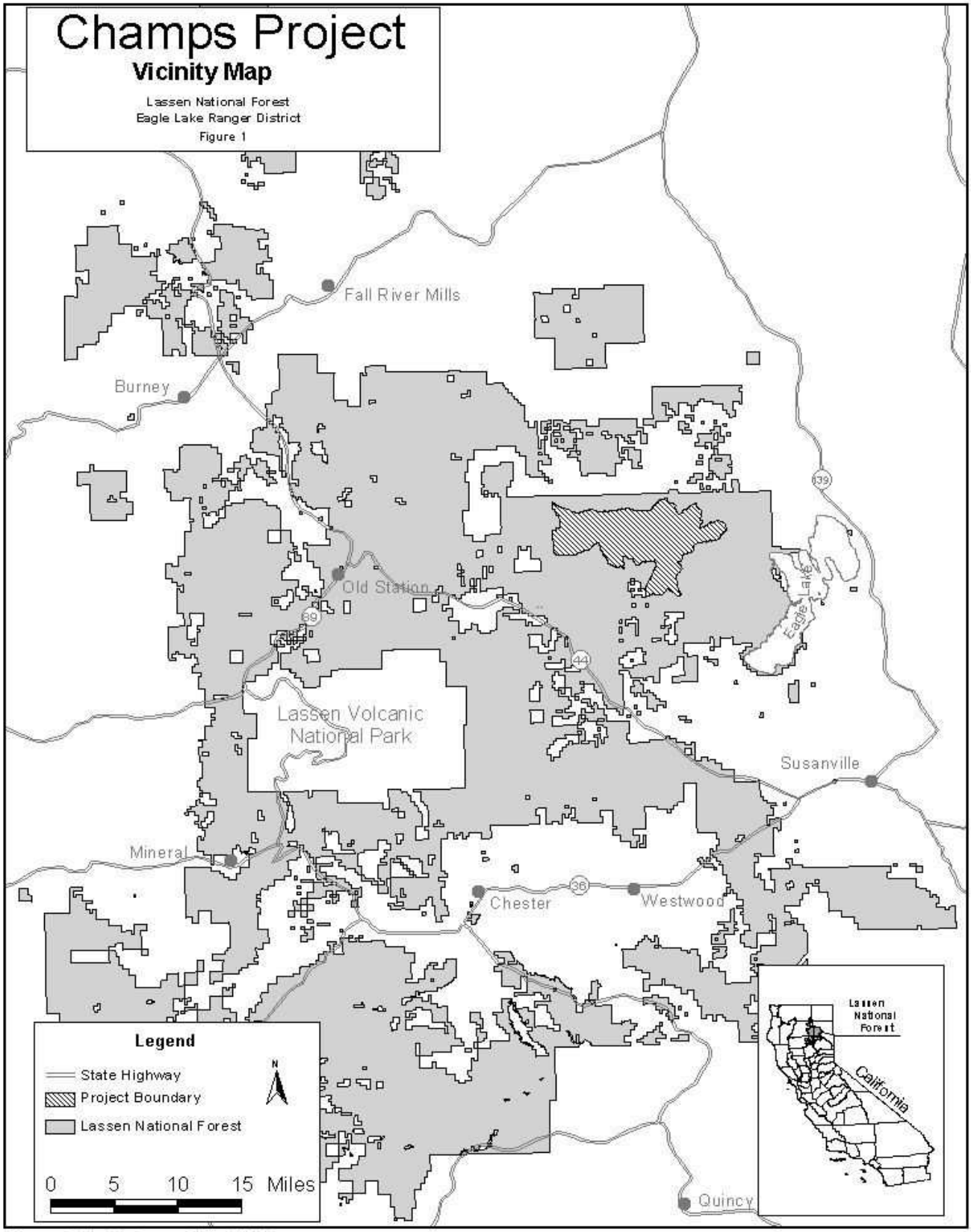
Prescription H. Area Thinning, Plantation Hand Thin

Areas treated under this prescription include plantations which would be pre-commercially hand thinned to approximately 17 by 17 foot spacing (150 trees per acre) to reduce stocking levels. This treatment includes limbing the entire bole of thinned trees, lopping these boles into 2 foot pieces, and dispersing this cut material so it has ground contact. In primary zones of DFPZs thinned material would be masticated and/or hand piled and burned.

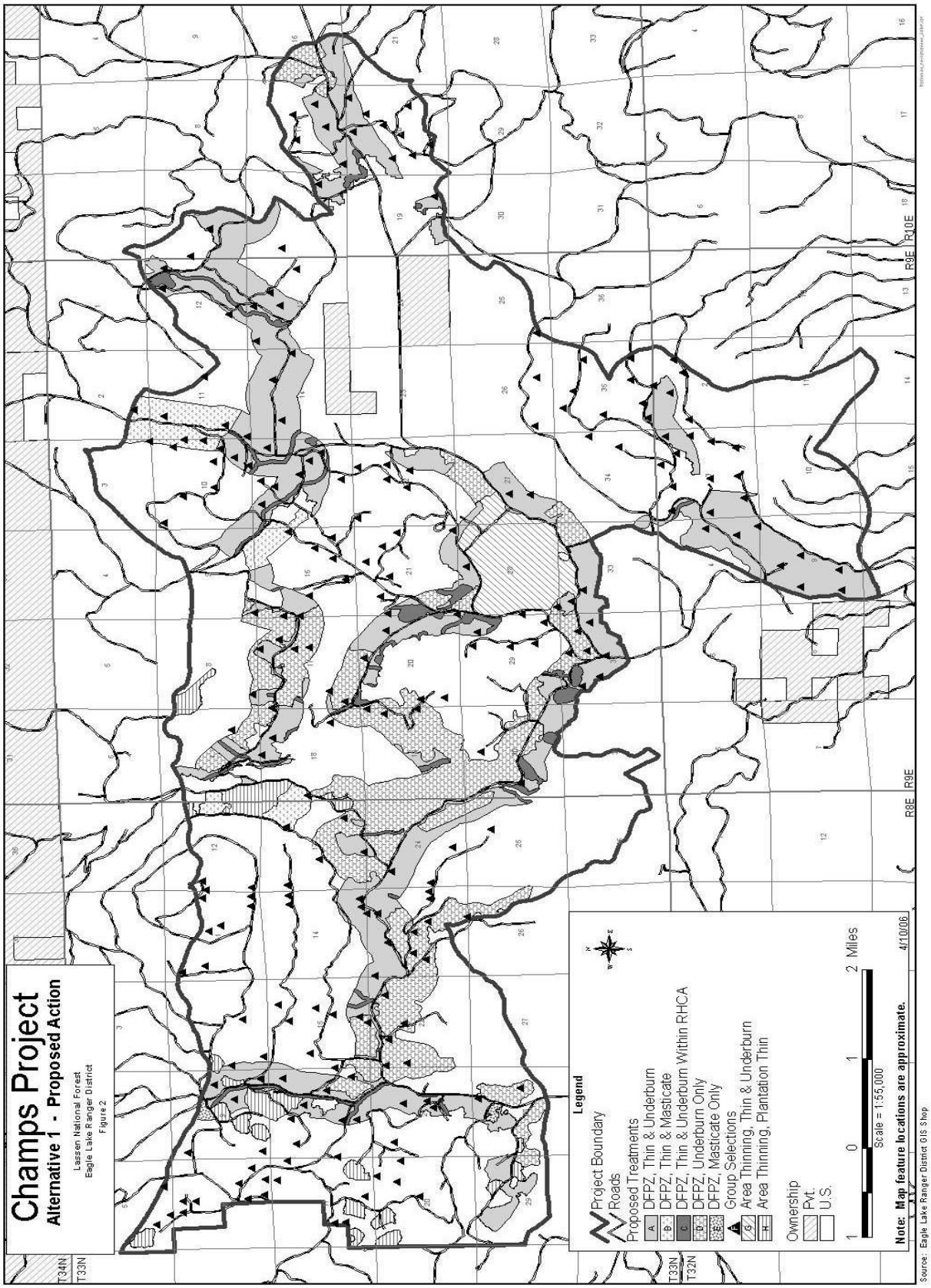
Table 4. Summary of Proposed Action Vegetative Treatments.

Prescription	Treatment	Mechanized Acres	Hand Thin Acres	Underburn Acres Only	Total Acres
A	DFPZ, Thin and Underburn	5,245			
B	DFPZ, Thin and Masticate	535			
C	DFPZ, Thin and Underburn within RHCAs	519			
D	DFPZ, Underburn Only			3,103	
E	DFPZ, Masticate Only	34			
				Total DFPZ Acres	**9,436**
F	Group Selection	489			
				Total Group Selection Acres	**489**
G	Area Thinning, Thin and Underburn	676			
H	Area Thinning, Plantation Thin		534		
				Total Area Thinning Acres	**1,210**
Total Treatment Acres		**7,498**	**534**	**3,103**	**11,135**

Source: Eagle Lake Ranger District GIS



Source: Eagle Lake Ranger District GIS Shop


Champs Project
Alternative 1 - Proposed Action
Lassen National Forest
Eagle Lake Ranger District
Figure 2
T34N
T33N
T32N
R8E
R9E
R10E
Legend
Project Boundary
Roads
Proposed Treatments
A DFPZ, Thin & Underburn
B DFPZ, Thin & Masticate
C DFPZ, Thin & Underburn Within RHCA
D DFPZ, Underburn Only
E DFPZ, Masticate Only
Group Selections
G Area Thinning, Thin & Underburn
H Area Thinning, Plantation Thin
Ownership
Pvt.
U.S.
1 0 1 2 Miles
Scale = 1:55,000
Note: Map feature locations are approximate.
4/10/06
Source: Eagle Lake Ranger District GIS Shop

Road Management / Transportation:

The following transportation system action items would be implemented with this project.

1. Necessary access would be provided for current and future needs. In order to provide access for the construction of the DFPZs, group selection timber harvest, and area thinning, existing Forest system and non-system roads in the project area would be utilized. Approximately 8.7 miles of existing non-system roads would be used for project activities.

2. All roads used for the project would be maintained to provide for road surface protection and erosion control.

3. Proposed road management is as follows:

- Reconstruction of 2.3 miles of existing Forest system roads to bring them up to current standards (heavy maintenance, reconstruction, 1 armored crossing, and 1 culvert crossing).
- Construction in the form of realignment of a 0.85 mile portion of Forest system and non-system road would be completed for this project. The non-system portion of this road (approximately 0.3 miles) would be added to the Forest transportation system.
- Reclassify 1.5 miles of existing non-system roads by adding them to the Forest transportation system as Level 2 roads.
- A dust abatement plan would be developed and implemented. Logging and vegetation management activities would be dust abated where rubber-tired vehicles are operating on haul routes. There are no water sources identified within the project area. Water for dust abatement would be trucked-in or an approved dust palliative may be approved which may include magnesium chloride, calcium chloride, or lignin sulfate. The dust palliative would not be used within 25 feet of water bodies.

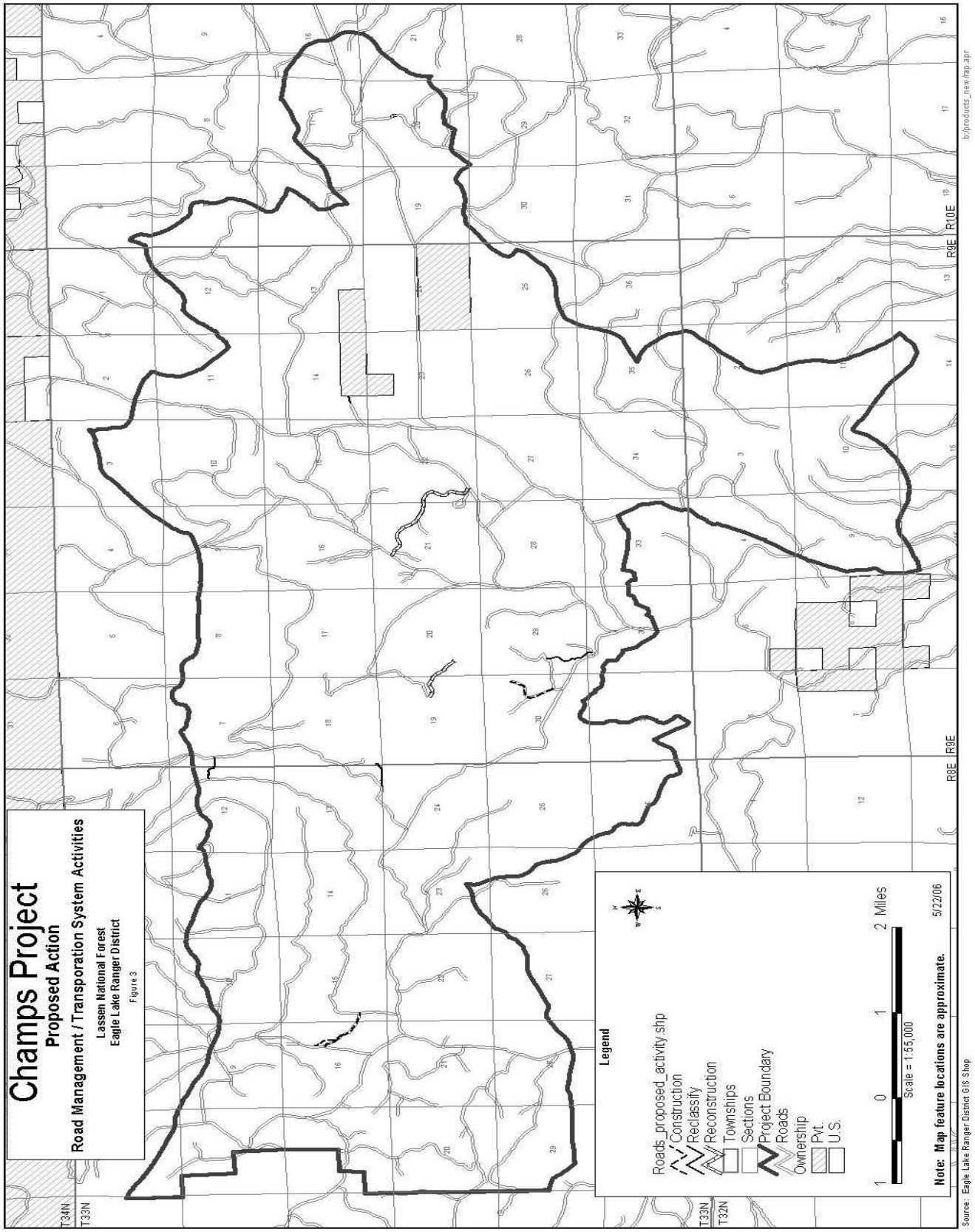
4. Existing landings and skid trails would be used whenever possible, and designated prior to the start of operations.

Table 5 below summarizes changes to the transportation system that would be made with this project. Figure 3 (Champs Project, Proposed Action – Road Management/Transportation System Activities) shows the location of changes to the transportation system.

Table 5. Summary of transportation system activities

Proposed Action	Forest System Roads	Non-System Roads
Reconstruction	2.3 mile	
Construction	0.55 mile	0.3 mile
Re-classification		1.5 miles

Source: Eagle Lake Ranger District GIS
Note: The Champs Project Roads Analysis Process is hereby incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.


Champs Project
Proposed Action
Road Management / Transporation System Activities
Lassen National Forest
Eagle Lake Ranger District
Figure 3
Legend
Roads_proposed_activity.shp
Construction
Reclassify
Reconstruction
Townships
Sections
Project Boundary
Roads
Ownership
Pvt.
U.S.
1 0 1 2 Miles
Scale = 1:55,000
Note: Map feature locations are approximate.
5/22/06
T34N
T33N
T32N
R8E
R9E
R10E
Source: Eagle Lake Ranger District GIS Shop
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Integrated Design Features (IDFs):

Integrated Design Features are elements of the project design that are applied in treatment areas and are developed to reduce or avoid adverse environmental effects of the proposed action to forest resources. IDFs are located in the section titled "Integrated Design Features (IDFs) Common to All Action Alternatives (except as noted in bold for Alternative 3)".

Decision Framework

Given the purpose and need, the Responsible Official reviews the proposed action and the other alternatives in order to make the following decisions:

The decision to be made is: 1) whether to implement the Proposed Action as described above, 2) whether to implement an alternative which better responds to the Purpose and Need for Action, as well as significant issues, or 3) whether the No Action Alternative should be implemented.

A decision on DFPZ maintenance would not be made at this time. Treatments of stand structures are designed to be effective for a minimum of 10 years, with a desired target efficacy of approximately 20 years. Some stands or portions of stands may require maintenance within ten years of the initial treatment. Maintenance treatments of surface fuels are not expected to be necessary for the first five years following the initial treatment. Therefore, DFPZ maintenance would be analyzed as a reasonably foreseeable action in cumulative effects, during the analysis of this project. Future maintenance actions would be analyzed separately and site-specifically, in compliance with NEPA.

Public Involvement

The proposal was listed in the LNF's Schedule of Proposed Actions (SOPA) starting in October 2005, and has been listed in the SOPA continuously since that time. It was also listed in the SOPA as part of a larger project (Champs/Gooch) starting in March of 2002. The Proposed Action was provided to the public and other agencies for scoping in a letter dated January 23, 2006. Responses to the Proposed Action were requested by February 27, 2006; however, responses were received into March 2006. Approximately 45 letters were mailed to agencies, tribal governments, groups, and individuals requesting comments on the Proposed Action and Purpose and Need. In addition, as part of the public scoping process, the Eagle Lake Ranger District presented the Proposed Action to the Pit River Tribe on March 1, 2006, on April 12, 2006, on July 5, 2006, and then again on July 3, 2007, and to the Susanville Indian Rancheria on February 14, 2006 and November 7, 2007. The Proposed Action was also presented to the Lassen County Fire Safe Council on February 6, 2006.

A site visit tour to the Champs Project area was offered to the public on May 21, 2007. The objective of this tour was to show interested individuals the project area, project proposed actions, and answer any questions they may have. Six members from the public attended this tour. (See also the section titled "30-Day Comment Period for the Draft Champs Project EA" under "Alternatives" below for a description of additional public involvement in the Champs Project planning process.)

Twelve letters were received during the scoping period. A summary of comments received from the public is located in the project record and is hereby incorporated by reference (Public Scoping Issue Analysis and Alternative Development, Champs Project Record, ELRD office). Using the comments from the public, other agencies, tribal governments, groups, and individuals, the interdisciplinary team developed a list of issues to address.

Issues

The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council for Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

The Forest Service identified the following significant issues during scoping:

Issue 1: The Proposed Action would not provide adequate retention of attributes for California spotted owl habitat and may negatively affect owl viability on the Lassen NF, where these populations may be declining. Concerns include the amount of suitable habitat at various scales surrounding an owl activity center, loss of foraging, dispersal and breeding habitat, and reduction of project area habitat within an Area of Concern (AOC). Habitat attributes as described by the commenters for, (a) foraging and dispersal habitat which consists of ≥40 percent canopy cover and large trees ≥20 inches dbh, and (b) breeding habitat as 70 percent or greater canopy cover. Table 6 below summarizes the indicator and measures for this issue.

Table 6. Summary of indicator and measures for Issue 1.

Indicator	Measure
The amount of suitable habitat at various scales surrounding an owl activity center.	Change in CWHR structural classes
California spotted owl foraging, dispersal, and breeding habitat attributes.	**Change in foraging and dispersal habitat attributes**
	Canopy cover ≥40 percent
	Number of trees ≥20 inches dbh
	CWHR structural class
	Prey base
	Change in breeding habitat attributes
	Canopy cover ≥70 percent
	CWHR structural class
Reduction of habitat within mapped Area of Concern.	Change in suitable habitat of project area within AOC

Source: Public Scoping Issue Analysis & Alternative Development, Champ project record

Issue 2: Large old trees, 20 inches dbh or greater, in eastside pine, are already scarce on the landscape. The commenter perceives that most of the 20 to 30 inch dbh pines would be logged and that we cannot justify the removal of 20 inch pine or 25 inch cedar ecologically, and there is no retention provision for non-pine old growth. The proportion of old growth pine trees greater than 200 years that are likely to be logged should be disclosed, and the adverse impacts and cumulative effects of the loss of these old growth eastside pines should be analyzed. Table 7 below summarizes the indicator and measures for this issue.

Table 7. Summary of indicator and measures for Issue 2.

Indicator	Measure
Scarcity of trees ≥ 20 inches dbh on the landscape	The numbers of trees ≥ 20 inches dbh removed.

Source: Public Scoping Issue Analysis & Alternative Development, Champ project record

A list of non-significant issues and reasons regarding their categorization as non-significant may be found at the Eagle Lake Ranger District office in the project record.

Alternatives

Three alternatives where considered in detail in the Draft Champs Project EA. These include the Proposed Action (Alternative 1), No Action (Alternative 2), and Alternative 3. Alternative 3 was developed based on significant issues identified during the public scoping period. The public also provided additional comments and suggestions during the public scoping period that generated an additional five alternatives to the Proposed Action. These alternatives were eliminated from detailed study for reasons established by the Responsible Official or not meeting the Purpose and Need for the project (Public Scoping Issue Analysis and Alternative Development, Champs Project Record, ELRD office). Alternatives that were eliminated from detailed study are discussed in the section titled *Alternatives Considered but Eliminated from Detailed Study*.

The Responsible Official has established criteria for alternatives to be studied in detail for the Champs Project. These criteria include:

- Alternatives must substantially implement the resource objectives of the HFQLG Act as discussed in the Purpose and Need statement #1 for this project.
- DFPZ treatments must be effective in reducing the potential size of wildfires and provide personnel safe locations for fire suppression as discussed in Purpose and Need statement #2. At 90th percentile fire weather, an effective DFPZ treatment would have a predicted surface flame length of less than four feet, forest structure that would not allow transition of a surface fire to a crown fire and would not allow an approaching crown fire to persist in the canopy of the DFPZ.
- Thinning activities must improve health and vigor of treated stands by substantially maintaining SDI to approximately 60 percent or less of maximum for a period of 20 years (RO letter, 2004) as discussed in Purpose and Need statement #3.
- Alternatives must implement cost effective treatments such that cost/benefit ratios are equal to or larger than 1.0 as discussed in Purpose and Need statement #5.

- Alternatives must address significant issues.

30-Day Comment Period for the Draft Champs Project EA

The Draft Champs Project EA was presented to the public for a 30-day comment period on June 12, 2007. Based on comments to the Draft Champs Project EA, and a Champs Project site visit with representatives of the Sierra Forest Legacy group and the Lassen Forest Preservation Group on August 22, 2007, Alternative 9 was developed to address comments which suggest that Alternative 3 did not fully address concerns with regards to the significant issues of project effects to suitable California spotted owl habitat and large trees within the project area. A timber industry field tour to the Champs Project area was provided on July 17, 2007; approximately eight industry representatives attended. Seven individuals, tribes, and/or organizations provided comments to the draft EA. A summary of comments received from the public to the draft Champs Project EA is located in the project record and is hereby incorporated by reference (Champs Project, 30-day Notice and Comment, Public Comments and Forest Service Responses, Champs Project Record, ELRD office)

Alternatives Considered in Detail

Alternative 1 - The Proposed Action

Alternative 1 is the Proposed Action, as described starting on page 14.

Alternative 2 -No Action

The proposed action would not be implemented.

Alternative 3

This alternative was developed to address significant issues which include potential loss of California spotted owl foraging, dispersal and breeding habitat, reduction of project area habitat within an Area of Concern (AOC), and the amount of suitable habitat at various scales surrounding an owl activity center. Alternative 3 was also developed to address the retention of old trees which are perceived to be scarce on the landscape.

Based on significant issues raised from public scoping, and the suggested alternatives that address these issues, components of the 2001 SNFPA ROD direction are incorporated into Alternative 3 (i.e., 20 inch dbh upper diameter limit, 40 percent canopy cover retention, and no group selection harvests). Therefore, Alternative 3, which includes integrated design features, is similar to the direction found in the 2001 SNFPA ROD.

Alternative 3 is designed to reduce the impacts to suitable California spotted owl habitat within eastside mixed conifer CWHR classes 4M, 4D, and 5D, and reduce impacts to suitable spotted owl habitat outside of Home Range Core Areas (HRCAs) by retaining a minimum of 40 percent canopy cover and trees 20 inches dbh and greater. Alternative 3 would also retain trees that are 20 inches dbh and larger outside of suitable spotted owl habitat.

Figure 4, Champs Project, Alternative 3 (Vegetation Treatment Activities), displays the locations of DFPZs and area thinning, and Figure 5, Champs Project, Alternative 3 (Road Treatment Activities), displays the road management / transportation system activities proposed under Alternative 3. Map feature locations are approximate. Table 8, Summary of Alternative 3 Vegetative Treatments, displays acres of proposed treatments under Alternative 3.

Defensible Fuel Profile Zones (DFPZs):

Defensible Fuel Profile Zones would be developed similar to the Proposed Action (Alternative 1), except RHCAs would be treated the same as adjacent prescriptions (i.e., DFPZ: Thin and Underburn, Thin and Masticate, or Underburn Only, and Area Thinning: Thin and Underburn or Plantation Thin) while still implementing the appropriate Integrated Design Features, and as noted below.

Prescription A. DFPZ, Thin and Underburn:

Trees 20 inches dbh and greater within this prescription type would be retained across all forest types. Within suitable California spotted owl habitat (eastside mixed conifer CWHR classes 4M, 4D, and 5D), a minimum of 40 percent canopy cover would be maintained.

Prescription B. DFPZ, Thin and Masticate:

Trees 20 inches dbh and greater within this prescription type would be retained across all forest types. Within suitable California spotted owl habitat (eastside mixed conifer CWHR classes 4M, 4D, and 5D), a minimum of 40 percent canopy cover would be maintained.

Prescription C. DFPZ, Thin and Underburn within Riparian Habitat Conservation Areas (RHCAs):

Alternative 3 would not implement this prescription.

Prescription D. DFPZ, Underburn Only:

This prescription would be the same as the Proposed Action.

Prescription E. DFPZ, Masticate Only:

This prescription would be the same as the Proposed Action.

Prescription F. Group Selection (GS):

Alternative 3 would not implement group selection harvests.

Area Thinning (individual tree selection):

Area thinning would be implemented similar to the Proposed Action (Alternative 1), except as noted below:

Prescription G. Area Thinning, Thin and Underburn:

Trees 20 inches dbh and greater within this prescription type would be retained across all forest types.

Prescription H: Area Thinning, Plantation Hand Thin

This prescription would be the same as the Proposed Action.

Table 8. Summary of Alternative 3 Vegetative Treatments.

Prescription	Treatment	Mechanized Acres	Hand Thin Acres	Underburn Acres Only	Total Acres
A	DFPZ, Thin and Underburn	5,931			
B	DFPZ, Thin and Masticate	554			
C	DFPZ, Thin and Underburn within RHCAs	0			
D	DFPZ, Underburn Only			3,162	
E	DFPZ, Masticate Only	34			
				Total DFPZ Acres	**9,681**
F	Group Selection	0			
			Total Group Selection Acres		**0**
G	Area Thinning, Thin and Underburn	676			
H	Area Thinning, Plantation Thin		534		
				Total Area Thinning Acres	**1,210**
Total Treatment Acres		**7,195**	**534**	**3,162**	**10,891**

Source: Eagle Lake Ranger District GIS

Road Management / Transportation:

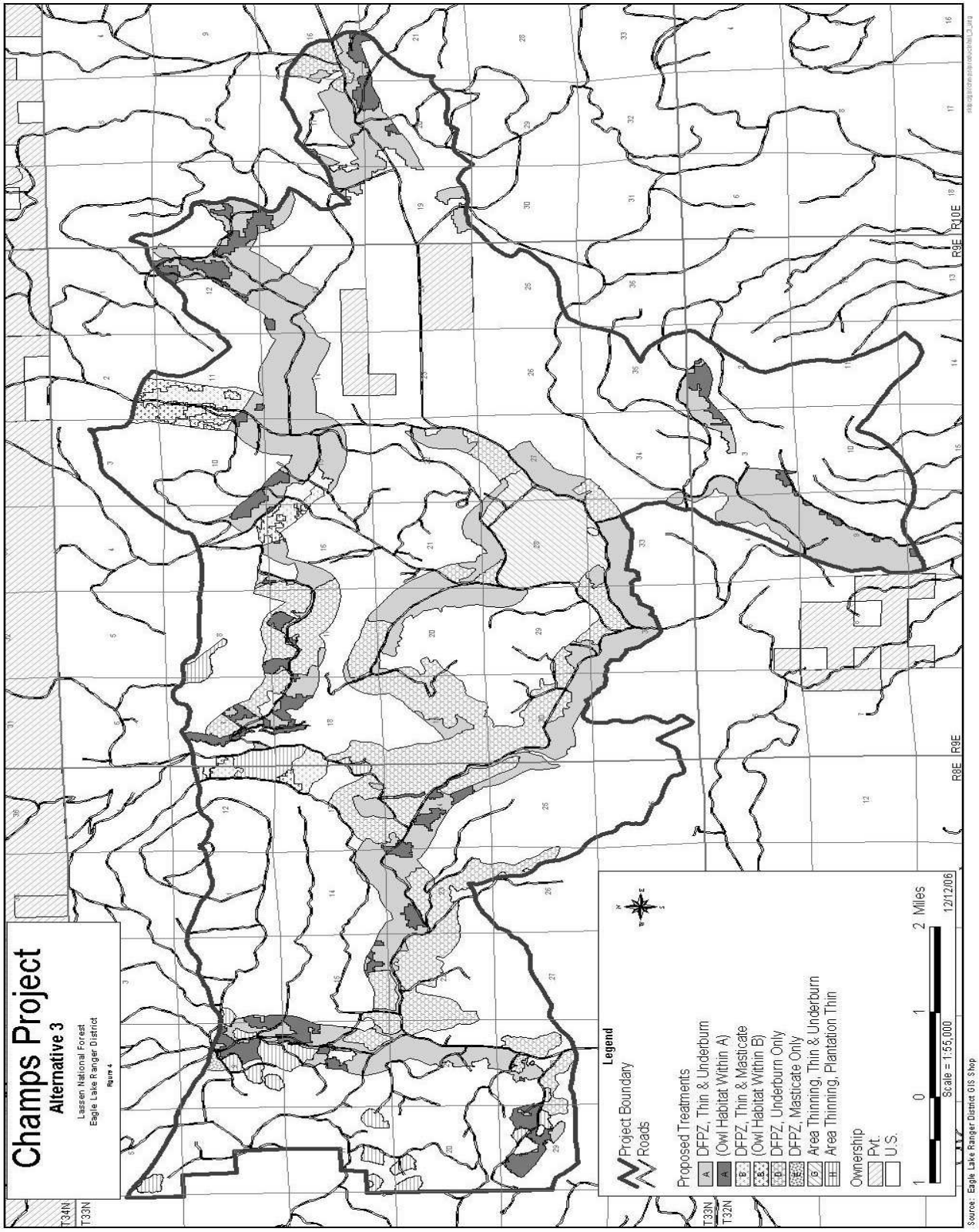
The road management / transportation system would be developed similar to the Proposed Action (Alternative 1), except as noted below:

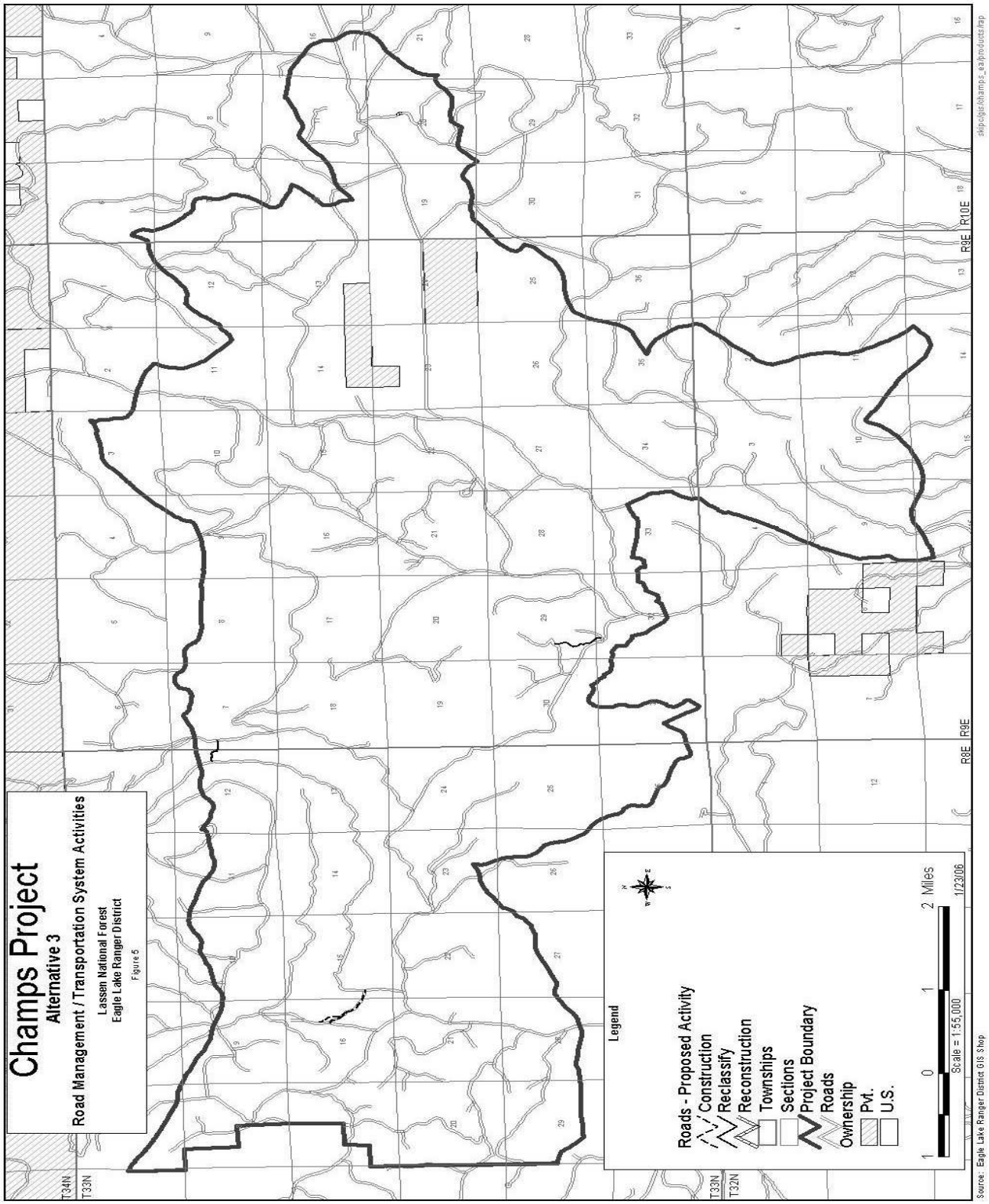
Table 9 below summarizes changes to the transportation system that would be made with this project. Figure 5 shows the location of changes to the transportation system.

Table 9. Summary of transportation system activities under Alternative 3

Alternative 3	Forest System Roads	Non-System Roads
Reconstruction	0.05	
Construction	0.6 mile	0.3
Re-classification		0.8 miles

Source: Eagle Lake Ranger District GIS


Champs Project
Alternative 3
Lassen National Forest
Eagle Lake Ranger District
Figure 4
T34N
T33N
T33N
T32N
R8E
R9E
R9E
R10E
Legend
Project Boundary
Roads
Proposed Treatments
A DFPZ, Thin & Underburn
(Owl Habitat Within A)
B DFPZ, Thin & Masticate
(Owl Habitat Within B)
C DFPZ, Underburn Only
D DFPZ, Masticate Only
E Area Thinning, Thin & Underburn
F Area Thinning, Plantation Thin
Ownership
Pvt.
U.S.
1 0 1 2 Miles
Scale = 1:55,000
12/12/06
Source: Eagle Lake Ranger District GIS Shop


Champs Project
Alternative 3
Road Management / Transportation System Activities
Lassen National Forest
Eagle Lake Ranger District
Figure 5
T34N
T33N
T33N
T32N
R8E
R9E
R9E
R10E
Legend
Roads - Proposed Activity
Construction
Reclassify
Reconstruction
Townships
Sections
Project Boundary
Roads
Ownership
Pvt.
U.S.
1
0
1
2 Miles
Scale = 1:55,000
1/23/06
Source: Eagle Lake Ranger District GIS Shop
skip:c:\gis\champs_ea\products\map

Alternative 9

Alternative 9 was developed to address public comments to the Draft Champs Project EA which suggest that Alternative 3 did not fully address concerns with regards to the significant issues of project effects to suitable California spotted owl habitat and large trees within the project area.

Based on comments, Alternative 9 is designed to further reduce impacts to suitable California spotted owl habitat by:

1) reducing the number of acres thinned within suitable owl habitat within eastside mixed conifer stands by approximately 341 acres,

2) reducing the number of acres treated under the group selection prescription within suitable owl habitat and potential habitat (mixed conifer) within the Area of Concern, or adjacent to California spotted owl PACs, by approximately 228 acres,

3) by retaining a minimum of 40 percent canopy cover within the 731 acres of suitable habitat that would be thinned under this alternative, and

4) retaining all trees 20 inches dbh and greater within all stands to be thinned (except within Prescription C - DFPZ, Thin and Underburn within RHCAs).

As noted in number three above, suitable owl habitat would be thinned and under burned (Prescription A), or thinned and jackpot piled and burned (Prescription B), under Alternative 9. This habitat is located in critical portions of the DFPZs that need to be treated in order to create effective DFPZ segments. These segments are located on Figure 6 and are critical for treatment for the following reasons:

Segment A: This portion of suitable spotted owl habitat falls in a portion of the DFPZ that almost completely breaches the DFPZ. The drainage directly to the northeast is extremely dense with ladder fuels and has a very heavy loading of surface fuels. It is oriented in a southeast to northwest direction and due to predominant wind direction, this would cause a wildfire to move upslope and directly towards Ashurst Lake. Due to public concern to retain more downed logs within suitable spotted owl habitat, Alternative 9 would jackpot pile surface fuels instead of mastication. This would also allow more of the large downed logs to be retained in these areas.

Segment B: This section of the DFPZ has an extremely heavy loading of surface fuels and a dense component of ladder fuels. Treatment (thinning and jackpot piling) of the suitable spotted owl habitat portions of this segment of DFPZ are vital to protect not only the drainage itself but also the suitable spotted owl habitat to the northeast. The drainage, which runs up this section of the DFPZ, is in alignment with the predominant winds in the area and would increase fire behavior to the stand and RHCA. Treatment of the existing surface fuels would be the same as mentioned above.

Segment C and F: These DFPZ segments are almost completely breached by suitable spotted owl habitat and, without treatment, would compromise DFPZ effectiveness. DFPZ thinning and underburning within segment C is critical since it would provide protection to Harvey Mountain (to the northeast of the

segment). Harvey Mountain and adjacent areas contain suitable spotted owl habitat in the area as well as Harvey Mountain Fire Lookout.

Segment D: Treatment of the suitable spotted owl habitat within this segment would provide protection to the RHCA that runs through this area. The drainage, slope, and predominate winds are all in alignment in this area. Additionally, Champs Flat exists to the south and west of Segment D and would increase wind speed. These factors could combine to create extreme fire behavior, in the event of a wildfire, and cause damage to the RHCA.

Segment E: The suitable spotted owl habitat in this segment completely breaches the DFPZ and would decrease its effectiveness. The DFPZ in this segment would provide protection to suitable spotted owl habitat on Logan Mountain.

Segment G: Treatment of the suitable spotted owl habitat within this segment would be similar to Segment D. The slope and predominate winds are all in alignment in this area. Additionally, Champs Flat exists to the west of Segment G and would increase wind speed. These factors could combine to create extreme fire behavior.

Figure 6, Champs Project, Alternative 9, displays the locations of vegetation treatment activities. Road management activities for this alternative are the same as Alternative 1 (Figure 3). Map feature locations are approximate. Table 10, Summary of Alternative 9 Vegetative Treatments, displays acres of proposed treatments under Alternative 9.

Defensible Fuel Profile Zones (DFPZs):

Defensible Fuel Profile Zones would be developed similar to the Proposed Action (Alternative 1) and/or Alternative 3.

Prescription A. DFPZ, Thin and Underburn:

Trees 20 inches dbh and greater within this prescription type would be retained across all forest types. Within suitable California spotted owl habitat (eastside mixed conifer CWHR classes 4M, 4D, and 5D), a minimum of 40 percent canopy cover would be maintained.

Prescription B. DFPZ, Thin and Jackpot Pile and Burn:

Trees 20 inches dbh and greater within this prescription type would be retained across all forest types. Within suitable California spotted owl habitat (eastside mixed conifer CWHR classes 4M, 4D, and 5D), a minimum of 40 percent canopy cover would be maintained. Surface fuels would be jackpot piled and burned instead of mastication in order to address the concern that down logs should be retained at more than three per acre. Jackpot piling and burning would only apply to Alternative 9.

Note: Approximately 341 acres of suitable California spotted owl habitat located within Prescription A and B would not be treated (see No Treatment areas, Figure 6).

Prescription C. DFPZ, Thin and Underburn within Riparian Habitat Conservation Areas (RHCAs):

This prescription would be the same as Alternative 1. However, based on public comments to the Draft Champs Project EA, a monitoring strategy would be included in all action alternatives to evaluate change in understory plant communities as per objectives in Purpose and Need statements 2 and 3.

Prescription D. DFPZ, Underburn Only:

This prescription would be the same as Alternative 1.

Prescription E. DFPZ, Masticate Only:

This prescription would be the same as Alternative 1.

Prescription F. Group Selection (GS):

This prescription would be the same as Alternative 1 except that no group selection harvest units would be located in suitable California spotted owl habitat, or within eastside mixed conifer stands within the AOC for California spotted owls.

Area Thinning (individual tree selection):

Area thinning would be implemented similar to Alternative 1, except as noted below:

Prescription G. Area Thinning, Thin and Underburn:

Trees 20 inches dbh and greater within this prescription type would be retained across all forest types. RHCAs within this prescription area would be thinned using a 20 inch dbh upper diameter limit.

Prescription H: Area Thinning, Plantation Hand Thin

This prescription would be the same as Alternative 1.

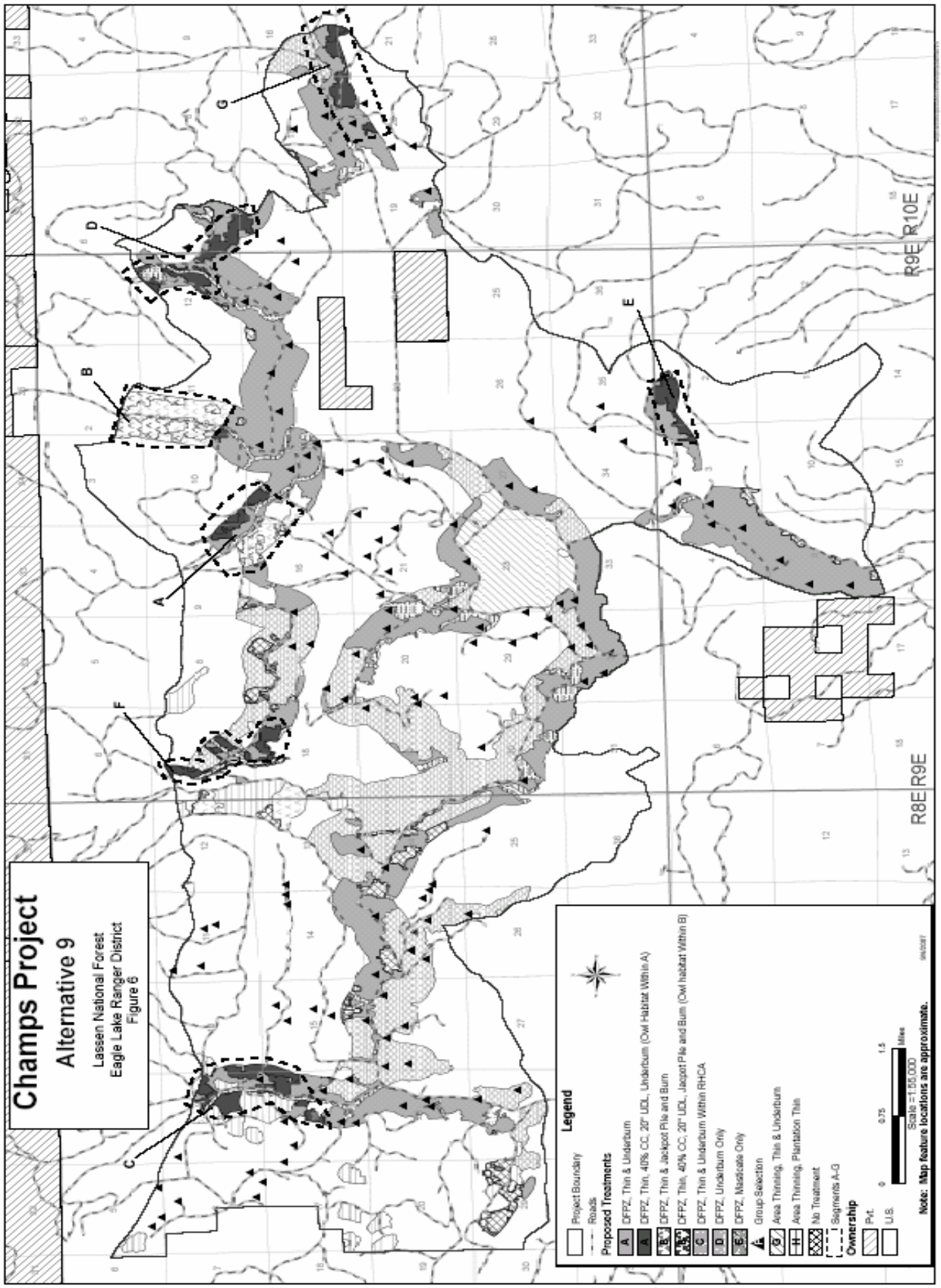
Table 10. Summary of Alternative 9 Vegetative Treatments.

Prescription	Treatment	Mechanized Acres	Hand Thin Acres	Underburn Acres Only	Total Acres
A	DFPZ, Thin and Underburn	4,988			
B	DFPZ, Thin, Jackpot Pile and Burn	531			
C	DFPZ, Thin and Underburn within RHCAs	519			
D	DFPZ, Underburn Only			3,115	
E	DFPZ, Masticate Only	34			
				Total DFPZ Acres	**9,225**
F	Group Selection	261			
				Total Group Selection Acres	**261**
G	Area Thinning, Thin and Underburn	676			
H	Area Thinning, Plantation Thin		534		
				Total Area Thinning Acres	**1,210**
Total Treatment Acres		**7,009**	**534**	**3,115**	**10,658**

Source: Eagle Lake Ranger District GIS

Road Management / Transportation:

The road management / transportation system would be developed the same as Alternative 1 (Figure 3).


Champs Project
Alternative 9
Lassen National Forest
Eagle Lake Ranger District
Figure 6
Legend
Project Boundary
Roads
Proposed Treatments
A OFPZ, Thin & Underburn
A OFPZ, Thin, 40% CC, 20" UDL, Underburn (Owl Habitat Within A)
B OFPZ, Thin & Jackpot Pile and Burn
A,B OFPZ, Thin, 40% CC, 20" UDL, Jackpot Pile and Burn (Owl habitat Within B)
C OFPZ, Thin & Underburn Within RHCA
D OFPZ, Underburn Only
E OFPZ, Masticate Only
Group Selection
G Area Thinning, Thin & Underburn
H Area Thinning, Plantation Thin
No Treatment
Segments A-G
Ownership
Pvt.
U.S.
0
0.75
1.5
Miles
Scale =1:65,000
Note: Map feature locations are approximate.
R8E R9E
R9E R10E
A
B
C
D
E
F
G

Integrated Design Features (IDFs) Common to All Action Alternatives (except as noted in bold for Alternative 3):

The following resource protection measures would be included as part of all action alternatives, except for the noted changes for Alternative 3:

Riparian Habitat Conservation Areas (RHCA)

1. RHCA widths are allocated along all ephemeral, intermittent, and perennial streams, lakes, ponds, wetlands, and wet meadows in accordance with the Scientific Analysis Team (SAT) guidelines. The RHCA widths for known waters and wetlands within the project area are shown in Table 11 below. The RHCAs were developed to fully maintain or improve riparian areas and aquatic resources. They ensure that the characteristics and functions of the aquatic areas would be protected during forest management activities, and provide for current and future aquatic species habitat requirements and overall integrity.

Table 11. Riparian Habitat Conservation Area widths.

SAT RHCA Category	RHCA Width	Waterbody in Champs Project Area
Perennial, fish-bearing stream	300' (each side of channel) or larger to include inner gorge landforms, 100 year floodplain, riparian vegetation, or distance equal to the height of two site-potential trees	None
Perennial, non fish-bearing stream	150' (each side of channel) or larger to include inner gorge landforms, 100 year floodplain, riparian vegetation, or distance equal to the height of one site-potential tree	Unnamed tributary to Pine Creek in Burgess Meadow
Lake	300' or larger to include extent of seasonally saturated soil, unstable areas, riparian vegetation, or distance equal to the height of two site-potential trees	None
Pond/wetland > 1 acre	150' or greater to include, the extent of seasonally saturated soil, unstable areas, riparian vegetation, or distance equal to the height of one site-potential tree	86 wet meadow areas ranging from 1-195 acres in size, totaling 1,245 acres
Pond/wetland < 1 acre	100' or greater to include inner gorge landforms, landslide-prone areas, riparian vegetation, or distance equal to the height of one site-potential tree	Burgess, Dixie, Lost, and Stanford Springs, 30 unnamed wet meadows from .1-.9 acres in size
Seasonally flowing streams *(intermittent and ephemeral)*	100' (each side of channel) or greater to include inner gorge landforms, landslide-prone areas, riparian vegetation, or distance equal to the height of one site-potential tree	30+ miles within project area

Source: HFQLG FEIS (1999) and ROD (1999)

2. No mechanical treatments would take place within any perennial RHCAs.

3. Treatments would be applied to reduce the potential for high intensity fire within intermittent and ephemeral RHCAs. Proposed activities would meet Riparian Management Objectives.

In RHCAs with intermittent or ephemeral, well-defined channels, such as the Gordon Well drainage in T33N, R10E, Sections 8, 17, and 18, the following IDFs would be implemented in order to meet RMOs:

- Soils must be dry at the 10-inch depth (15-bars of tension) before heavy equipment can be operated in these areas.
- Landings would be located outside of the RHCAs.
- Conifers would be harvested with low-ground-pressure rated feller-bunchers that have 24-inch or greater track widths.
- Skid trails would be kept to a minimum and no waterbars would be installed after treatment. Stream crossing locations would be agreed to by the Forest Service and designated on the ground prior to use.
- All machinery would be kept off of slopes greater than 20 percent within the RHCAs.
- Ground-based equipment would be used to remove timber using one-end suspension.
- Skid trails within RHCAs would require 90 percent ground cover on bare soil on the trails. Insuring placement of this cover after treatment would require spreading slash over these open areas. Areas within the RHCAs that are masticated would also require 90 percent ground cover on bare soil.
- All conifers within 10 feet of stream banks would be retained to provide bank stability, except in cases where Forest Service fisheries or watershed specialists have determined exactly which trees would be retained for this purpose.

4. No group selection harvest units would be placed within RHCAs. **(NOTE: Group selection harvest is not included in Alternative 3.)**

5. Where prescribed burning would take place within RHCAs, the following IDFs would be implemented in order to meet RMOs:

- Prescribed fire would not be ignited within RHCAs, although fire would be allowed to back into the RHCA.
- Slash piles would not be created within RHCAs.

6. In RHCAs with wet meadows, such as the Little Harvey Valley vicinity in T32N, R9E, Sections 29 and 32 and Shoestring Draw in T33N, R9E, Sections 19 and 30 and T33N, R8E Section 25, the following IDFs would be implemented in order to meet RMOs:

- Soil must be dry at the 10-inch depth (15-bars of tension) before heavy equipment can be operated in these areas.
- Landings would be located outside of the RHCAs.
- Conifers would be harvested with low-ground-pressure rated feller-bunchers that have 24-inch or greater track widths.
- Skid trails would be kept to a minimum and no waterbars would be installed after treatment. Meadow crossing locations would be agreed to by the Forest Service and designated on the ground prior to use.
- All machinery would be kept off slopes greater than 20 percent within the RHCAs.

- Ground-based equipment would be used to remove timber using one-end suspension.
- Skid trails within RHCAs would require 90 percent ground cover on bare soil on the trails. Insuring placement of this cover after treatment would require spreading slash over these open areas. Areas within the RHCAs that are masticated would also require 90 percent ground cover on bare soil.
- All conifers within 10 feet of stream banks within meadows would be retained to provide bank stability, except in cases where Forest Service fisheries or watershed specialists have determined exactly which trees would be retained for this purpose.

7. A dust abatement plan would be developed and implemented. Logging and vegetation management activities would be dust abated where rubber-tired vehicles are operating on haul routes. There are no water sources identified within the project area. Water for dust abatement would be trucked-in, or a dust palliative may be approved which may include magnesium chloride, calcium chloride, lignin sulfate, or an approved equal. The dust palliative would not be used within 25 feet of water bodies.

8. Effectiveness monitoring is needed to evaluate if treatments within RHCAs and Area Thinning (Thin and Underburn, Prescription G) (Factors Influencing Understory Vegetation for Champs EA, Champs project record) were effective in achieving desired outcomes. As discussed in the Purpose and Need for the Champs Project, a Riparian Management Objective (RMO) objective was identified to promote and enhance understory vegetation within RHCAs. The specific RMO states, "Maintain or restore the diversity and productivity of native and desired non-native plant communities in the riparian zone". The principal objective of this monitoring is to evaluate the response in understory species composition, richness, diversity, and similarity to: 1) thinned and fenced to exclude livestock grazing, 2) thinned and open to livestock grazing, 3) not thinned and fenced to exclude livestock grazing, and 4) not thinned and open to livestock grazing. As part of this monitoring strategy, temporary fencing is needed to exclude livestock grazing and trailing within the monitoring plots during the monitoring effort (approximately 5 - 10 years). A minimum of five intermittent stream reaches would randomly be selected in areas within Prescription C and Prescription G. Within each randomly selected area, four 33 ft. x 66 ft. would be established of which two would need to be fenced. (Monitoring to evaluate change in understory plant communities due to treatment would apply to Alternatives 1, 3, and 9.)

Soil Quality Standards and Best Management Practices

Soil quality standards and appropriate Best Management Practices (BMPs) that protect water quality and soils would be implemented for the entire project. BMPs are described in *Water Quality Management for Forest System Lands in California, Best Management Practices* (2000) and the 2004 SNFPA ROD. The following are specific measures that would be implemented to protect soil and water resources.

- In treatment units outside of RHCAs, soil moisture conditions would be evaluated using Forest established visual indicators before equipment operations proceed.
- Landings utilized during operations would be evaluated by the Forest Service on a site specific basis to determine if subsoiling would be required. A winged ripper would be used for subsoiling to lift and fracture the soil in place leaving it loose and friable to a minimum depth of 18 inches. Where landing construction involves cut and fill, the feature would first be subsoiled, then re-contoured to

match the existing topography. Slash would be scattered to provide ground cover and prevent re-entry. Slash would consist of organic material (logs, branches, and duff) and rocks/boulders. Slash would be scattered in such a manner as to resemble a natural appearance similar to the surrounding landscape. Following treatment, a minimum of 60 percent ground cover consisting of rocks and organic material would be maintained.

- To the extent possible, existing landings and skid trails would be utilized thus minimizing any new disturbance within the project area.
- Post treatment areas, such as skid trails, etc., lacking suitable ground cover necessary to preclude sediment delivery to surface water would be slashed/mulched with native material so that a minimum of 60 percent ground cover is maintained.

Silviculture

- No DFPZ, group selection, and area thinning treatments would occur within CWHR classes 5M, 5D, and 6. **(NOTE: Group selection harvest is not included in Alternative 3.)**
- DFPZ and area thinning treatments would be designed to retain at least 30 percent of existing basal area, generally comprised of the largest trees. No canopy cover requirements would apply (2004 SNFPA ROD, page 68). Vegetative cover in the Champs Project Area is comprised of eastside pine types. **(NOTE: Alternative 3 would retain a minimum of 40 percent canopy cover within suitable California spotted owl habitat.)**
- Cut stumps 14 inches diameter and greater of live conifer trees would be treated with an EPA registered borate compound (Sporax) which is registered in California for the prevention of annosus root disease. Sporax would be applied to conifer stumps within four hours of creation. No Sporax would be applied within 25 feet of known Sensitive and Special Interest Plants. No Sporax would be applied within 25 feet of standing water.
- Healthy sugar pine that show minimal signs of blister rust in the branches would be favorably retained in all treatment units. Additional precautions described in the Sugar Pine Action Plan (March 1, 2006, hereby incorporated by reference) prepared by the R-5 Genetics Group for northern California forests, would also be taken to protect rust resistant sugar pines in all treatment units.
- Healthy shade intolerant species would be favorably retained over shade tolerant species. Shade intolerant species include ponderosa pine, Jeffrey pine, sugar pine, lodgepole pine, and Douglas-fir. Shade tolerant species include white fir, red fir, and incense cedar. Components of all species occurring within DFPZ and area thinning units would be retained.
- Mechanized harvest treatments would be conducted using ground-based systems, employing whole tree yarding as much as possible. All DFPZ, group selection, and area thinning treatments would occur on ground with less than 35 percent slopes.
- Live trees 30 inches dbh or greater, also referred to as legacy trees, would be retained, except as necessary for operability, which includes trees removed to create landings and skid trails or which are identified as hazards per OSHA requirements for mechanized harvest operations. This is

consistent with the 2004 SNFPA ROD (page 68). **(NOTE: Alternative 3 would retain all trees 20 inches dbh and greater except as necessary for operability.)**

- With the exception of other legacy trees, radial thinning would occur within a 30-foot radius from the bole of legacy tree individuals, generally removing competing trees from the root system, which would increase individual tree health and vigor.

Wildlife

- California Spotted Owl Protected Activity Centers (PACs): All proposed project activities are restricted from spotted owl PACs. There are no Spotted Owl Habitat Areas (SOHAs) in the project area.
- Limited Operating Periods (LOPs), spotted owl activity centers: LOPs would be observed within ¼ mile of activity centers from March 1 through August 15, unless surveys confirm the spotted owls are not nesting.
- LOPs, northern goshawk nest sites: LOPs would be observed within ¼ mile of the nest site during the breeding season (February 15 through September 15), unless surveys confirm that northern goshawks are not breeding.
- LOPs, sandhill crane nest sites: LOPs would be observed within ½ mile of nesting sites from April 1 through August 1, unless surveys confirm that sandhill cranes are not breeding.
- LOPs, for the pallid bat maternity roost located off the NW corner of Champs Flat: LOPs would be observed for an area extending 1/8 mile (660 ft) from the nest tree, and would restrict timber harvest from the dates of March 15 to August 31.
- Northern goshawk surveys to existing protocols would be conducted as appropriate, and the majority of surveys would be timed post-NEPA and prior to advertisement of timber sales or other contracted projects. Nests documented during these surveys would be provided protected activity centers as per direction in the 2004 SNFPA ROD (p. 38). LOPs would be observed in unsurveyed suitable nesting habitat as per direction from the 1999 HFQLG FEIS (p. 2-8). Northern goshawk survey results would be made available to the public upon request.
- Trees less than 30 inches dbh that meet all three of the following criteria, also referred to as legacy trees, would generally be retained within DFPZs, GS, and ITS harvests: 1) platy yellow bark characteristics on all four panels; 2) downward or outward sweeping branches (branches not angled upwards); 3) a rounding or flat top. **(NOTE: Alternative 3 would retain all trees 20 inches dbh and greater except as necessary for operability.)**

Threatened, Endangered, Sensitive (TES) and Special Interest Plant Species

- Locations of prostrate buckwheat (*Eriogonum prociduum*) in Harvey Valley would be flagged and avoided during ground-disturbing activities, including prescribed burning.
- Location of sweet marsh ragwort (*Senecio hydrophiloides*) in Squaw Valley and vicinity would be flagged and avoided during ground-disturbing activities. If these sites are burned in the fall,

the occurrences would be protected with a "wet" fire control line. No protections are required for spring burning.

- Locations of hillside arnica (*Arnica fulgens*) and Liddon's sedge (*Carex petasata*) north of Little Harvey Valley would be fagged and avoided during ground-disturbing activities. If these sites are burned in the fall, the occurrences would be protected with a "wet" fire control line. No protections are required for spring burning.
- Where pygmy monkeyflower (*Mimulus pygmaeus*) occurs in mechanical treatment units, mechanical ground-disturbing activities would occur after June 30, or over a minimum of two feet of snow.
- New occurrences of TES plant species discovered before or during ground-disturbing activities would be protected through flag and avoid methods.
- Mechanical and hand treatments designed to achieve fuels reduction goals would not select riparian hardwoods (cottonwood, aspen, willow, and alder) for removal. Hardwood stands would be flagged and avoided from all project activities.

Noxious Weeds

- All equipment would be weed-free prior to entering the Forest. Staging of equipment would be done in weed-free areas.
- Known noxious weed infestations would be identified, flagged, and mapped for this project. Identified noxious weed sites within or adjacent to the project area containing isolated patches with small plant numbers would be hand pulled or dug prior to ground-disturbing activities. Any larger or unpullable infestations would be avoided by equipment to prevent spreading weeds within the project.
- New small infestations identified prior to ground-disturbing activities would be evaluated and treated according to the species present and project constraints. If larger infestations were identified prior to ground-disturbing activities, they would be isolated and avoided with equipment.
- Post-project monitoring for implementation and effectiveness of weed treatments and control of new infestations would be conducted as soon as possible and for multiple years after completion of the project.
- If project implementation calls for mulches or fill, they would be certified weed-free. Seed mixes used for revegetation of disturbed sites would consist of locally adapted native plant materials to the extent practicable.

Fuels/Fire

- Burning would only be conducted on permissive or marginal burn days as defined by the California Air Resources Board.
- The daily acreage burned may be limited by the Smoke Management Plans for burning projects.

- Restrictions on wind direction for burn days would be in place to protect the air quality of smoke sensitive areas [i.e. Class I air sheds (Caribou Wilderness) and communities (Susanville, Spalding, Chester, Westwood)].
- Dust abatement of designated hauling routes would be required in order to reduce the introduction of particulate matter into the atmosphere.
- Firelines would be constructed for prescribed fire operations around segments where existing roads, skid trails, or natural barriers would not serve as prescribed fire control lines.

Heritage Resources

- All historic properties eligible, or potentially eligible for listing on the National Register of Historic Places (i.e., Class I and Class II properties) within areas of DFPZ construction, area thinning, and group selection harvest or other project related activities would be protected by employing Standard Resource Protection Measures (SRPM) as defined in the Regional Programmatic Agreement and Interim Protocol. Heritage site boundaries would be flagged as non-entry zones for project activities (flag and avoid). Continual coordination between planning, implementation, and heritage resource staffs would occur to ensure protection of heritage resources, and to ensure that no harvest activities would occur within site boundaries.
- Linear sites such as historic roads, ditches, and prehistoric quarries, etc. could be crossed on a limited basis in areas previously disturbed. All crossings would be made perpendicular to the site and the site would be returned to its original design at project completion. All crossings would be designated by the Forest Service.
- Hauling on Forest system roads that bisect heritage sites would continue. Maintenance, reconstruction, or decommissioning of these roads would not take place within site boundaries. Vehicles and/or equipment using these roads would remain on the road prism while traversing through a heritage site; exiting the road prism while within site boundaries would not occur. One mile of the Lassen Trail bisects or is adjacent to proposed treatment areas. Road improvements, including use of heavy and tracked equipment, and hauling of forest products would be prohibited along trail segments that resemble the historic character of the feature. In addition, any motorized use of the trail would be prohibited during inclement weather resulting in wet road conditions.
- If used, temporary roads would not be located on or bisect heritage sites. Sites crossed by existing non-system roads could be evaluated for significance (National Register eligibility) to determine if protection or further management is necessary. Archaeological sites within treatment areas or on roads would be monitored during and after project completion.
- If heritage resources are encountered during project activities, all work would immediately stop in the vicinity of the find until an assessment of the situation is made.

Range

- Fences, water developments, and cattle guards would be protected.

- Repair of damage to range improvements due to project activities would be the responsibility of the contractor.
- If necessary, livestock grazing would be deferred for two growing seasons after site preparation and planting within group selection harvest units.

Safety

- Snags located near roads, main skid trails, landings, and prescribed fire implementation may require felling during project implementation to meet safety concerns. If felled, such snags would be left in place, and not included as product within the sale.
- During project implementation, the public would be alerted to potential hazards through signing along Forest system roads.
- Temporary closures of roads may occur for safety reasons.
- Safety provisions would be included in project contracts.

Alternatives Considered but Eliminated from Detailed Study

The analysis for alternatives considered but eliminated from detailed study is contained in the document titled "Public Scoping Issue Analysis & Alternative Development" and is hereby incorporated by reference and is located in the Champs project record at the Eagle Lake Ranger District office.

Alternative 4: Increase sawlog to biomass ratio

This alternative is proposed to remove more sawlog size trees to make the project more economically viable. Some suggestions were to increase the ratio of sawlog to biomass material by removing more sawlog size trees, and /or to remove 24 to 30 inch trees to provide more volume. This alternative addresses comments concerning timber sale economics which call for an increased amount of sawlogs offered within the timber sales that would implement the DFPZs, group selection harvests, and area thinning from the Champs project in order to make the timber sales themselves more economically viable. This alternative was not considered in detail because it is a duplication within the range of reasonable alternatives showing the project with a positive economic return.

The proposed DFPZs and area thinning prescriptions would utilize a "thinning from below" treatment where the healthiest, largest trees are retained. This tends to concentrate harvesting trees in the smaller dbh groups where most trees removed would tend to be less than 20 inches dbh. However, thinning from below has been used extensively on the ELRD and has proven to produce economical timber sales (Silviculture Report, Champs project record). For example, from the start of the HFQLG pilot project (1999), the ELRD has sold numerous timber sales that included DFPZ and group selection implementation at positive values. With positive revenues, the ELRD is able to implement other resource enhancement projects within the respective project areas, in addition to the fuels reduction work done through the timber sale. These sales included both sawlogs and biomass material down to a diameter of three inches dbh. ELRD records indicate that these sales have ranged from approximately 17 to 67 gross tons per acre sold, with an approximate average of 40 gross tons per acre sold. The approximate mix of

sawlogs to biomass material sold has been 40 percent sawlog to 60 percent biomass. Empirical estimates from the Champs project area indicate that this project would generate volumes within the average and range of volumes successfully sold in the past on the ELRD. Alternative 1 has a benefit/cost ratio of 1.95:1 and Alternative 3 has a benefit/cost ratio of 1.19:1. Another alternative showing a more aggressive positive return is not warranted since the benefit/cost ratio of Alternative 4 would also be positive.

Alternative 5: Alternatives to SPORAX® use

This alternative is proposed to a) apply SPORAX® (Sporax) to stumps 18 inches and greater, b) apply Sporax only within one mile radius of annosus infection centers, c) let annosus root disease alter stand composition by not treating shade tolerant species (white fir), d) conduct thinning operations in cold winter or hot dry summer months when basidiospores of annosus root disease are at a minimum, e) implement two pre-thin prescribed burns (one at least six months before thinning) and one or more post-thinning prescribed burns to reduce annosus amounts, f) remove annosus infected stumps, and g) apply a fungus (*Phlebiopsis gigantean*) as a competitor to annosus. These alternatives were suggested as alternatives to Sporax because of the contention that the application of Sporax is controversial and has inherent hazards and risks.

These alternatives were not considered in detail because of the following reasons:

Proposal “a”, is to only apply Sporax to stumps 18 inches and greater, and “b”, is to apply Sporax only within one mile radius of annosus infection centers. Annosus root disease (*Heterobasidion annosum* [*H. annosum*]) is known to exist within and adjacent to the Champs project area in both pine and white fir. The application of Sporax is an approved fungicide in Region 5 for annosus root disease prevention and control. The current recommendations in the Forest Service Handbook (FSH 3409.11) for annosus root disease prevention and control is to apply Sporax on all conifers in recreation and high value areas, and on all conifers eight inches and larger if cut mechanically, and 12 inches and larger if cut by chainsaw, in eastside pine and mixed conifer areas. However, based on recent studies from the Plant Pathology group (Forest Health Protection [FHP]) for the Pacific Southwest Region, a recommendation has been made for eastside pine and eastside mixed conifer types to apply Sporax on cut conifer stumps 14 inches and larger (Report No. R04-01, June, 2004). Plant Pathology studies indicate that Sporax application on stumps 14 inches and larger are an effective treatment.

Historically pine-annosus root disease has been active within the Champs Project area. Eastside conifer forests in the Lassen National Forest are reported to have high levels of annosus root disease (Forest Service Handbook R5 Supplement 3409.11). Therefore, treating newly created 14 inch and larger stumps with Sporax is recommended to prevent annosus root disease from infecting stumps and spreading to and killing a number of adjacent conifers. Infection with *H. annosum* could result in killing some large old-growth conifers in the project area over several decades.

It is impossible to predict the number of stumps that would become infected if not treated with Sporax. Past studies on the Shasta Trinity and Modoc National Forests have found between three percent and 17 percent of untreated 18 to 22 inch ponderosa pine stumps and between eight percent and 35

percent of untreated 22 to 26 inch ponderosa pine stumps infected with *H. annosum* decades after the stumps were exposed. Pine stumps smaller than 14 inches did not appear to support *H. annosum* infections.

Raising the diameter limit above the eight or 12 inches in FSH 3409.11 or the 14 inches supported by Kliejunas and Woodruff (2004) increases the risk of infection and is not supported by research conducted within California.

In a FHP study on the LNF in eastside pine, it has taken about 30 years for annosus root disease to die off in overstory removal units where ponderosa pine roots became infected through stump infections. In these studies, natural pine regeneration near infected stumps began to become re-established about 30 years after seedlings around infected stumps were initially killed, indicating that most of *H. annosum* in the roots died. Now that the residual understory pine trees in the study area have grown to maturity, it is very important to treat freshly cut stumps with Sporax during future thinning projects. This is because the uniformly distributed large stumps remaining after the thinning would present ideal entry courts for *H. annosum* into an interconnected network of large roots which would be favorable for the survival and spread of *H. annosum*. Many large residual trees could be killed in the decades following a thinning as the disease spreads stump-to-tree and then tree-to-tree.

In the Champs Project area, it is recommended to Sporax treat all the freshly-cut pine stumps, 14 inches and larger, where the roots of those stumps contact other host trees. This is true for all p-type *H. annosum* hosts, including juniper and incense cedar. Once a ponderosa or Jeffrey pine tree is infected with p-type annosus, the tree would most likely die within few years, either directly from the infection or by subsequent bark beetle attack. If stumps are not treated with Sporax, mortality in post-thinning residual trees would be delayed by the time it takes for *H. annosum* to grow through the stumps and roots of cut trees to the roots and bole of adjacent trees. This process can take more than a decade, depending on many factors. Residual pine tree mortality can continue to occur as long as it takes for the pathogen to decompose all the roots; at least 30 years or more for ponderosa pine, depending on the root pathways present. Annosus root disease can continue spreading tree-to-tree in a mature pine forest indefinitely, as long as there are uninfected pines connected by root contacts to infected pines.

Treating uninfected stumps with Sporax is advised, since a stump surface is an ideal pathway to the roots for *H. annosum*; a pathway that is uncommon in nature. Choosing not to treat stumps would probably not totally decimate a conifer stand. Choosing not to Sporax treat 14 inch and larger stumps when thinning an old growth pine or mixed conifer stand would result in killing some of the large leave trees. The number killed depends on the size and species of the stumps and the distribution of s-type and p-type hosts.

Past experience with harvesting pine in California has shown annosus root disease to be more damaging in partial cuts than in clearcuts. This is because in clearcuts *H. annosum* can consume all available roots (nutrients) and die out before the planted trees reach maturity and make root contact with actively infected roots. Losing a few seedlings per acre to annosus root disease during the interim may not significantly impact the future stand. However, in selectively thinned stands of large pine trees, survival

of the residual pine trees is much more critical since there are much fewer remaining after the thinning. A stand of mature pine could be extensively impacted by annosus root disease after a thinning where the 14 inch and larger pine stumps were not treated with Sporax. This is because each large stump is connected to an extensive root system which has a high probability of contacting one or more leave trees, thereby transmitting *H. annosum* if the stumps become infected.

Therefore, these alternatives do not meet current Regional recommendations for the prevention and control of annosus root disease.

Alternative proposal "c", to let annosus root disease alter stand composition by not treating shade tolerant species (white fir), was not considered in detail because this alternative does not meet Purpose and Need statement numbers 2, 3, and 4. Annosus root disease is known to exist within and adjacent to the Champs project area in both pine and white fir. This alternative is not consistent with the Purpose and Need to retain all components of all species existing within the project area. By not treating white fir stumps with Sporax, residual white fir, desired within the thinned stands is placed at risk. Also, by not treating white fir stumps, subsequent mortality in the white fir due to annosus root disease would add to ground fuels which would reduce the effectiveness and purpose of the DFPZs.

Proposal "d", to conduct thinning operations in cold winter or hot dry summer months when basidiospores of annosus root disease are at a minimum, was not considered in detail because there are no data or studies to support the efficacy of such a treatment in California. Morrison (1999) determined there was no significant difference in season of cutting in coastal British Columbia. Schmitt et al (2000) state that restricting cutting to summer months may reduce potential of stump and wound colonization, but give no data to evaluate, nor do they state that this would eliminate the need for Sporax. Ammon and Patel (2000) recommend thinning during dry, hot months in the southeast US or during winter months in the northeast US, but also give no data to evaluate, nor do they state that this would eliminate the need to treat the stumps otherwise. Phelps et al (undated) demonstrated that in the southeast US, summer thinning only slightly reduced infection over controls and that borax treatment was much more effective. Filip and Morrison (1998) and Stambaugh (1989) report that cutting in the summer (April thru August) in the southeast US, south of latitude 34°N, appears to reduce losses caused by annosus root disease. Filip and Morrison (1998) state that seasonal logging has not been demonstrated in the interior west to be effective. In Russell et al (1973), monthly spore patterns in Washington and Oregon peaked in the fall, with a lesser peak in the spring, but airborne spores were present in large numbers nearly year-round. In James and Cobb (1984), spores are produced in the Stanislaus and San Bernardino National Forests throughout the year. In their summary, Filip and Morrison (1998) state that although many materials have been tested, in the western US only borax is recommended and used operationally. Based on the data in James and Cobb (1984) and Russell et al (1973), it is likely that in the relatively mild climate of California where spores are produced throughout the year, restricting logging to a certain season would not be effective in reducing annosus root disease infection.

Proposal "e", to implement two pre-thin prescribed burns (one at least six months before thinning) and one or more post-thinning prescribed burns to reduce annosus amounts, was not studied in detail

because there is no literature supporting prescribed burning as a control of annosus in California ecosystems. In a study by Froelich et al, (1978), underburns were set in 10-24 year old loblolly and slash pine plantations in the southeast US. Two pre-harvest burn prescriptions were tested: a fall burn, about a year before thinning, followed by either a late summer/early fall burn about a month before thinning, or a winter burn about nine months before thinning. Post-thinning fires were in the winter. Results showed that in most plots, there was a reduction in infected trees as a result of burning. Many plots still showed substantial infection levels after burning, although lower than the controls.

Ammon and Patel (2000) and USDA Forest Service (1977) recommend the particular sequence of burning as tested in Froelich et al (1978), but they don't state that this would eliminate the need to treat the stumps otherwise. Filip and Morrison (1998) reference the study by Froelich et al (1978) yet they make no mention of prescribed fire for annosus disease prevention anywhere else in North America. Otrosina et al (2002) found no significant difference in annosus levels in a 40-year old longleaf pine plantation underburned during the winter. Schmitt et al (2000) recommends prescribed burning as a treatment to reduce white fir in mixed conifer stands that naturally would have been dominated by ponderosa pine, but say nothing about prescribed burning as a prevention treatment for annosus root disease.

There is no literature supporting prescribed burning as a control of annosus in California ecosystems. In the Western US, annosus conks are most often found inside stumps or under the bark. In the southeast US, where the burning method was developed, conks are formed in the duff at the base of trees and could be killed by prescribed fire. Prescribed burning would not be feasible as a control method for annosus because of the need to destroy the stumps. In 1994, a field trial was attempted in which fire would be used to destroy infected stumps (Pronos 1994). This trial was unsuccessful because the stumps were still too wet to burn, even three years after harvest.

Proposal "f", to remove annosus infected stumps, was not studied in detail because its efficacy has not yet been demonstrated. Forest Service 3409.11 states that, "Stump Removal. Removal of stumps and roots infected with *H. annosum* would reduce the amount of inoculum of the fungus on the site, and allow for earlier successful revegetation of the site with susceptible conifers. Stump removal as a suppressive method is being tested in several recreation sites, and its efficacy has not yet been demonstrated." Stump removal would be overkill in areas away from known centers, where we are trying to prevent new centers. Stump removal would also have concerns from the soil scientists and others. Kliejunas et al (2005), and other references on stump removal, state that stump removal is expensive and disruptive to the site. Kliejunas et al (2005) states that "although direct control appears feasible in some situations, prevention remains the preferred and least costly method of annosus root disease management in recreation areas."

Proposal "g", to apply a fungus (*Phlebiopsis gigantea*) as a competitor to annosus, was not studied in detail because it is not registered as a biopesticide either with US EPA or California, and there are no efficacy data for California forest conditions. The use of *Phlebiopsis gigantea* (*P. gigantean*) as a biocontrol for annosus root disease has been known since the mid-1950's, based on experiments conducted in England on Scots pine and Corsican pine by John Rishbeth. This particular agent is not as

consistent as borax; in Rishbeth (1963) and Rose et al (1980), there are discussions of how *P. gigantea* is not as effective on some conifer species, including western hemlock and Douglas fir. Work by Laflamme and others in red pine in Ottawa, Canada shows promising results (Roy et al 2003). There is experience with this fungus in Europe on Scots pine, Norway spruce, and Corsican pine (Annesi et al 2005; Pratt 1999; Pratt et al 2000), and it was recommended to and used by private forest landowners and the USDA Forest Service in the past in the southeast US (USDA Forest Service 1977), but its use was discontinued when US EPA determined it needed to be registered (Cram, undated). That it is still showing up on cooperative extension websites such as Ammon and Patel (2000) is interesting, considering that its use would not be legal (it is noted that the use of borax is strongly supported in Ammon and Patel (2000), and is described as "inexpensive, effective, safe, and easy to apply"). Treating with *P. gigantea* is not feasible at this time as it is not registered as a biopesticide either with US EPA or California, and there are no efficacy data for California forest conditions. There are data suggesting that *P. gigantea* would not be efficacious in California because it is too dry in summer and fall (Rishbeth 1963; Blakeslee and Stambaugh, 1974).

Streptomyces griseoloalbus is not currently available for use (neither registered, nor marketed). The study by Rose et al (1980) involved western hemlock, and contained no quantitative data concerning the effectiveness of *S. griseoloalbus* as a preventive treatment on wood substrates. A follow-up study by Nelson and Li (1980) showed that although the *S. griseoloalbus* protected western hemlock stumps better than the controls (31% infected stumps vs. 75%), it wasn't as effective as borax (0% infected stumps). There is no efficacy data from California that supports its use. There is a currently registered biopesticide that is related to the *S. griseoloalbus* considered in Rose et al (1980) - *Streptomyces griseoviridis* Strain K61, commercially available as Mycostop. This product is registered for seed rot, root and stem rot, and wilt caused by various fungi in ornamentals and forest seedlings. It is not registered as a stump treatment for annosus root disease. It is unknown whether Mycostop would be effective against annosus root disease.

Either of these materials, *P. gigantea* or *S. griseoloalbus*, would be considered a biopesticide and would need both US EPA and California pesticide registration. This method of control may be feasible in the future if efficacy can be demonstrated in California and if they are registered as biopesticides by both US EPA and California. Until such time as both efficacy and registration are met, these two biological agents remain untenable options.

Alternative 6: 8 to 12 inch upper diameter limit

This alternative is proposed to implement an eight to 12 inch dbh upper diameter limit for tree harvest to address comments that studies have shown that catastrophic wildfire could be prevented by thinning at lower diameter limits (i.e., 8 to 12 inch dbh).

This alternative includes an eight inch and 12 inch upper diameter limit. Because of upper diameter limits, this alternative does not include group selection harvesting (Prescription F, Alternative 1), or a separate thinning prescription within RHCAs (i.e., Prescription C, Alternative 1). With a lower upper

diameter limit, the assumption is that the RHCAs would be treated the same as adjacent prescriptions as is described in Alternative 3.

Fire behavior modeling (Fuels Report, Champs project record) indicates that DFPZ thinnings with an eight inch or 12 inch upper diameter limit could be effective in producing flame lengths of less than four feet, and forest structure that would not allow transition of a surface fire to a crown fire or an approaching crown fire to persist in the canopy of the DFPZ. Modeling indicates that this alternative would probably result in surface fire conditions that would allow for direct attack using ground crews for fire suppression. These findings are similar to studies that have shown that thinning from below (8 to 12 inch upper diameter limits) can reduce the probability of crown fire initiation to acceptable levels within a stand.

Even though this alternative does meet Purpose and Need statement number 2 from a fuels prospective, it does not meet the stand density component of Purpose and Need statements numbers 2 and 3. Stocking densities in the stands proposed for treatment are moderate to heavy. Desired stand density is to maintain SDI to not exceed 60 percent of maximum for a period of 20 years. Post treatment under an eight inch upper diameter limit, 54 percent of the eastside pine stands would meet the desired SDI values, and 93 percent of eastside pine stands thinned to a 12 inch upper diameter limit would meet desired SDI values. None of the eastside mixed conifer stands would meet desired SDI values for an eight and 12 inch upper diameter limit post-treatment. At 20 years post treatment under an eight inch upper diameter limit, 0 percent of the eastside pine stands would meet the desired SDI values, and only 64 percent of eastside pine stands thinned to a 12 inch upper diameter limit would meet desired SDI values at 20 years. None of the eastside mixed conifer stands would meet desired SDI values at 20 years (Silviculture Report, Champs project record).

At densities above 60 percent of maximum, tree growth and vigor is severely impacted by inter-tree competition. As stands exceed 60 percent of maximum SDI, they grow at increasingly slower rates as trees are stressed for resources, thus potentially affecting stand and forest health. Desirable stand densities for the DFPZ would range from 35 to 50 percent of maximum SDI. Fuel reduction treatments, such as thinning from below by removing most of the saplings and poles and some of the small and medium sized trees, are needed in order to develop the desired stand conditions, and to ensure that stand densities do not exceed an upper limit of 60 percent of maximum SDI. Also, thinning treatments need to ensure that this level would be maintained for at least 20 years after thinning so that the number of treatment entries in the stand is reduced. Otherwise, multiple entries would be needed and could result in the potential to increase impacts to watershed and soil conditions.

ELRD experience has shown that tree spacing in the range of 18-20 feet between residual trees is the minimal range for harvest operability. Where the average residual tree spacing is less than this range, equipment operability would be more restricted and there is an increased risk of residual tree damage from mechanical equipment (bole scars that expose the cambium). Where the average residual tree spacing is above this range, there is a low risk of residual tree damage. White fir is especially susceptible to damage because of its thin bark. Within the eastside pine and eastside mixed conifer types, there is an increased risk of residual tree damage with an eight inch upper diameter limit, as would be the case with a

12 inch upper diameter limit in the eastside mixed conifer type. Under a 12 inch upper diameter limit within the eastside pine type, there would be a low risk of residual tree damage (Silviculture Report, Champs project record).

Purpose and Need statement number 5 also describes the need to implement economically efficient treatments to reduce hazardous fuels and to contribute to community stability. An alternative with a 12 inch upper diameter limit would have a negative benefit/cost ratio at -0.35:1 (Public Scoping Issue Analysis & Alternative Development, Champs project record). Without offering material of economic value and without adequate spacing to effectively operate equipment within the stands, costs of treatments become increasingly prohibitive. Assuming that desired SDIs could be achieved at eight to 12 inch dbh upper diameter limits (which they can not as stated above), thinning treatments would most likely need to be done by hand felling or with small machinery. This activity would need to be done through a service contract whereby the government would pay a contractor to thin these stands. Eagle Lake Ranger District records indicate that these costs range from $300 to $550 per acre. No revenues would be realized through service contracts. Because a 12 inch upper diameter limit has a negative economic value, an eight inch upper diameter limit would as well, thus was not modeled.

Due to the fact that it does not meet Purpose and Need numbers 2 and 3 for SDI, and Purpose and Need number 5, this alternative was not analyzed in detail.

Alternative 7: No group selections on Dunning sites 4 thru 6, and in CWHR classes 4M, 4D, 5P, 5S, 5M, 5D, and 6

These two alternatives are combined and discussed together. These alternatives are proposed to include the same treatments as Alternative 1 with the following exception, a) place no group selection units on soils with Dunning site productivity classes of 4, 5, or 6, including site Categories 105, 104, 17 (Klicker), 108, 107, 55, and 48; and b) place no group selection in CWHR classes 4M, 4D, 5P, and 5S, in addition to no group selection in 5M, 5D, and 6. These alternatives were suggested to address concerns that soils within the Champs project area are, a) perceived to be “non-productive” and b) to reduce impacts to late seral habitat.

GIS mapping indicates that after avoiding the aforementioned Dunning sites and CWHR classes, only 15 acres of group selection harvesting would occur under this alternative.

Modeling indicates (Fuels Report, Champs project record) that this alternative would probably result in surface fire conditions that would allow for direct attack using ground crews for fire suppression, and would create effective DFPZ conditions, and would meet Purpose and Need statement number 2 for fuels.

This alternative would have a positive benefit/cost ratio of 1.75:1 and would meet Purpose and Need statement number 5. Within the eastside pine type, thinning would allow sufficient spacing between trees for efficient equipment operability with little damage to residual trees. Within the eastside mixed conifer type, stands contain smaller trees and would need to be thinned through a service contract with smaller machines or by hand (Silviculture Report, Champs project record).

The commenter suggests that a reduction of late seral qualities would occur if groups were placed in CWHR classes 4M, 4D, 5P, 5S, 5M, 5D, and 6. In development of placing group selections, a majority were placed in 4M and 4D because these particular strata are the most predominant on the landscape within the Champs Project area and offer the best potential to increase structural diversity, both vertically and horizontally. In addition, wildlife integrated design features were included to retain trees within 4D and 4M CWHR classes with old tree characteristics. There were no groups proposed in 5M and 5D as described in the Silviculture integrated design features, and there are no 5S, 5P, or 6 CWHR classes within the Champs Project area (Table 47, Existing CWHR Classes).

The commenter suggests that for group selections, low site productivity and low seedling survival ratings, could mean permanent or very long term loss of forest in such groups. The Eagle Lake Ranger District has extensive experience and success in establishing plantations within the soil complexes and site-productivity classes that the commenter suggests a long term or permanent loss of the forest would occur (Silviculture Report, Champs project record and Eagle Lake RD records). In the placement of group selections under Alternative 1 soil characteristics and soil productivity were considered.

Group selections are proposed where soils are plantable and capable of supporting conifer regeneration. Based on the Soil Survey of LNF Area (1982), there are approximately 12 soil map units in the Champs project area. Each of these map units are classified and rated based on a variety of factors including timber regeneration potential. The timber regeneration potential interpretations are divided into two parts. The first is plantability, which was verified at the time the groups were identified on the ground. The second is seedling survival potential which is a relative rating of the potential for survival of bare root seedlings the first season following planting. A rating from very low to high is identified for each map unit based on moisture supply and demand in that portion of the soil profile utilized by the seedling root system during its first growing season. Soil map units are an association of up to three different soil types. Each soil type within an association may have a different rating for each soil property. Some map units containing proposed groups are identified as having a very low rating for seedling survival potential in one soil type and low or moderate in another; approximately four percent of all proposed groups are located on these map units. Approximately 74 percent of proposed groups are identified as having a low to moderate rating for seedling survival potential, and approximately 22 percent are identified as having a moderate rating for seedling survival potential (Silviculture Report, Champs project record).

Even though these ratings appear to be low, the ELRD has had little or no difficulty in establishing plantations on the soil types in question. Experience with reforesting areas on the District resulting from past wildfires and timber harvest in these particular soil families indicate that survival and stocking levels are acceptable, ranging from 74 to 96 percent for survival and 100 percent for stocking. Based on first and third year survival and stocking exams (Eagle Lake RD reforestation records), these plantations are very healthy and vigorous, distribution is good, and trees are growing extremely well. These plantations are such that pre-commercial and commercial thinnings as needed for timber stand improvement could be implemented.

Generally, the soil types with a very low-to-low seedling survival potential were the areas avoided when groups are identified on the ground (rocky areas, brushfields, barren areas, etc.). Groups are located in forested stands with plantable soils. Tree planting would be accomplished to augment natural regeneration. Adjacent trees combined with up to four to six seed trees left in each two acre group would maintain a constant seed source. The combination of tree planting and seed trees would ensure regeneration of these sites with conifers over time.

This alternative was not considered in detail because, as shown above, not proposing groups in 4M and 4D and the removal of groups in the soil classes identified essentially eliminates all but 15 acres of groups from this alternative and would be duplication within the range of alternatives analyzed since it is so similar to Alternative 3. In addition, the contention about soil productivity is speculative since the District has found that these sites grow trees.

Alternative 8: 2001 SNFPA ROD direction

This alternative proposes to implement the project using the 2001 SNFPA ROD. In his decision for the 2004 SNFPA ROD, the Regional Forester stated that the 2004 SNFPA ROD replaced the 2001 SNFPA ROD in its entirety (2004 SNFPA ROD, page 3).

Even though the decision has previously been made to replace the 2001 ROD, this alternative was modeled with an upper diameter limit of 12 inches dbh within old forest emphasis areas (OFE) and a 20 inch upper diameter limit within general forest areas (2001 SNFPA). This alternative does not include group selection harvesting, or a separate thinning prescription within RHCAs (i.e., Prescription C, Alternative 1). RHCAs would be treated the same as adjacent prescriptions (i.e., DFPZ: Thin and Underburn, Thin and Masticate, or Underburn Only, and Area Thinning: Thin and Underburn or Plantation Thin).

Approximately 4,194 acres, or 65 percent of DFPZ thinning acres (Prescription A and B) would be treated under the Old Forest Emphasis Area prescription with an 12 inch upper diameter limit. Modeling indicates that this treatment would probably result in surface fire conditions and would allow for direct attack using ground crews for fire suppression; this would create an effective DFPZ and would meet Purpose and Need Statement number 2. Approximately 2,289 acres, or 35 percent of DFPZ thinning acres (Prescription A and B) would be treated under the General Forest Area prescription with essentially a 20 inch upper diameter limit. Modeling indicates that this treatment would probably result in surface fire conditions that would allow for direct attack using ground crews for fire suppression; this would create an effective DFPZ and would meet Purpose and Need Statement number 2 (Fuels Report, Champs project record).

Even though this alternative does meet Purpose and Need statement number 2 from a fuels prospective, it does not fully meet the stand density component of Purpose and Need statements numbers 2 and 3. Stocking densities in the stands proposed for treatment are moderate to heavy. Desired stand density is to maintain SDI to not exceed 60 percent of maximum for a period of 20 years. Post treatment under a 12 inch upper diameter limit, 93 percent of eastside pine stands would meet desired SDI values,

and all of the eastside pine stands would meet SDI values for a 20 inch upper diameter limit. None of the eastside mixed conifer stands would meet desired SDI values for a 12 inch upper diameter limit post-treatment, and 33 percent meet SDI values for a 20 inch upper diameter limit. At 20 years post treatment under a 12 inch upper diameter limit, 64 percent of the eastside pine stands would meet the desired SDI values and 85 percent of eastside pine stands thinned to a 20 inch upper diameter limit would meet desired SDI values at 20 years. None of the eastside mixed conifer stands would meet desired SDI values at 20 years for either diameter limit (Silviculture Report, Champs project record). As was noted under Alternative 6, Alternative 8 would endure the same effects to tree growth when densities exceed 60 percent.

With a 12 and 20 inch upper diameter limit within the eastside pine types, tree spacing would probably result in a low risk of residual tree damage. With a 12 and 20 inch upper diameter limit within the eastside mixed conifer types, there would be an increase risk of residual tree damage (Silviculture Report, Champs project record).

Purpose and Need statement number 5 also describes the need to implement economically efficient treatments to reduce hazardous fuels and to contribute to community stability. An alternative with a 12 and 20 inch dbh upper diameter limit would have a negative benefit/cost ratio at 0.15:1 (Public Scoping Issue Analysis & Alternative Development, Champs project record). Without offering material of economic value and without adequate spacing to effectively operate equipment within the stands, specifically in the 4,870 acres of Old Forest Emphasis Area, costs of treatments become increasingly prohibitive. Thinning treatments would most likely need to be done by hand felling or with small machinery. This activity would need to be done through a service contract whereby the government would pay a contractor to thin these stands. Eagle Lake Ranger District records indicate that these costs range from $300 to $550 per acre. No revenues would be realized through service contracts. Even though 2,289 acres of DFPZ thinnings with a 20 inch upper dbh would offer material of economic value, this value is off-set by the larger number of acres that would require a service contract.

Due to the fact that it does not meet Purpose and Need numbers 2 and 3 for SDI, and Purpose and Need number 5, this alternative was not analyzed in detail.

Comparison of Alternatives

Tables 12, 13, and 14 below provide summaries of the effects of implementing Alternative 1, 2, and 3. Information provided focuses on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives. Detailed discussions of environmental affects for all resources analyzed can be found in the Planning Record located at the Eagle Lake Ranger District office.

Table 12. Summary of treatment acres by alternative

Treatment Summary		Alternative 1	Alternative 2	Alternative 3	Alternative 9
Acres of DFPZ	Rx A, Thin and Underburn	5,245	0	5,931	4,988
	Rx B, Thin and Masticate	535	0	554	531 (Mastication changed to Jackpot Pile and Burn)
	Rx C, Thin and Underburn w/in RHCAs	519	0	0	519
	Rx D, Underburn Only	3,103	0	3,162	3,115
	Rx E, Masticate Only	34	0	34	34
Acres of GS	Rx F, Group Selection	489	0	0	261
Acres of ITS	Rx G, Thin and Underburn	676	0	676	676
	Rx H, Plantation Thin	534	0	534	534

Source: Eagle Lake Ranger District GIS

Table 13. Summary of how each alternative meets Purpose and Need elements

Purpose and Need Elements		Alternative 1	Alternative 2	Alternative 3	Alternative 9
1. Implements the HFQLG Forest Recovery Act (1998)		Yes	No	Yes, except no group selection harvest	Yes
2. Implement DFPZs that are effective in reducing size of wildfires and provide safe location for suppression personnel to take action.	Predicted flame lengths - desired is ≤4 feet	EP =2.1 ft. EMC = 3.0 ft	EP =8.6 ft EMC = 78.6 ft	EP =2.1 ft EMC (w/in 20" UDL and 40% CC stands) = 3.0 ft.; EMC(w/in 20" UDL) = 3.0 ft.	EP =2.1 ft. EMC (w/in 20" UDL and 40% CC stands) = 3.0 ft.; EMC(w/in 20" UDL) = 3.0 ft.
	Torching Index (TI) - desired is >11	EP = 74 EMC = 29	EP = 0 EMC = 0	EP =74 EMC(w/in 20" UDL and 40% CC stands) = 29; EMC(w/in 20" UDL) = 29	EP =74 EMC(w/in 20" UDL and 40% CC stands) = 29; EMC(w/in 20" UDL) = 29
	Crowning Index (CI) - desired is >11	EP = 26 EMC = 17	EP = 17 EMC = 10	EP =26 EMC(w/in 20" UDL and 40% CC stands) = 17; EMC(w/in 20" UDL) = 14	EP =26 EMC(w/in 20" UDL and 40% CC stands) = 17; EMC(w/in 20" UDL) = 14
3. Implement ITS to promote forest health and provide structural diversity.	Percent of stands that meet ≤ 60% maximum SDI 20 years post treatment	EP = 85%	EP = 0%	EP = 85%	EP = 85%
		EMC = 0%	EMC = 0%	EMC = 0%	EMC = 0%
4. Implement group selection to move toward an all age-multi story forest	Percent of land base desired = 5.7 %	2.19%	0%	0%	1.17%
5. Implement economically efficient treatments to reduce hazardous fuels and to contribute to community stability.	Benefit / cost ratio ≥ 1:1	1.95 : 1	0:0	1.19 : 1	1.31 : 1
6. Provides access for project implementation	Re-construct. (miles)	2.3	0	0	2.3
	Construct. (miles)	0.85	0	Approx. 0.4	0.85
	Re-classify(miles)	1.5	0	1.5	1.5

Source: Champs Project resource effects analysis, Planning Record located at the Eagle Lake Ranger District office
Note: EP = eastside pine forest type, EMC = eastside mixed conifer forest type; UDL = upper diameter limit

Table 14. Comparison of alternatives by the significant issues post treatment.

Indicator	Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 9
California spotted owl suitable habitat at various scales	Change in CWHR structural classes	No activities within spotted owl habitat, in PACs, 1,062 circles, or HRCAs, therefore no change.	No activities in PACs, 1,062 circles, or HRCAs, therefore no change.	No activities within spotted owl habitat, in PACs, 1,062 circles, or HRCAs, therefore no change.	No activities within spotted owl habitat, in PACs, 1,062 circles, or HRCAs, therefore no change.
California spotted owl foraging, dispersal, and breeding habitat by CWHR structural class:	Acres of canopy cover ≥40%	5,785 out of 6,816 acres would remain ≥40%	6,816 out of 6,816 acres would remain ≥40%	6,816 out of 6,816 acres would remain ≥40%	6,738 out of 6,816 acres would remain ≥40%
	Number of trees remaining ≥20 inches dbh (Rx A and B)	12	16	16	16
	Acre reduction in Moderate reproductive & foraging (CWHR 4M & 4D)	1,031 out of 6,805 acres reduced	0 out of 6,805 acres reduced	0 out of 6,805 acres reduced	78 out of 6,805 acres reduced
	Acre reduction in High reproductive & foraging (CWHR 5M & 5D)	0 out of 11 acres reduced	0 out of 11 acres reduced	0 out of 11 acres reduced	0 out of 11 acres reduced
	Percent prey base reduction – flying squirrels mixed-conifer habitat	15%	0%	4%	5%
California spotted owl habitat within mapped Area of Concern	Acre reduction of suitable habitat of project area within AOC	380 out of 3,446 acres reduced	0 out of 3,446 acres reduced	0 out of 3,446 acres reduced	41 out of 3,446 acres reduced
Scarcity of trees ≥ 20 inches dbh on the landscape	The numbers of trees ≥ 20 inches dbh removed	DFPZs (Rx A, B, C) = up to 4/acre GS = up to 8/acre	0	0	DFPZs (Rx C only) = up to 4/acre GS = up to 8/acre

Source: Champs Project resource effects analysis, Planning Record located at the Eagle Lake Ranger District office. Note: EMC = eastside mixed conifer forest type

Environmental Consequences

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for the comparison of alternatives.

Environmental Effects of the Significant Issues

This section analyzes the effects from the significant issue indicators and measures as was shown in Tables 6 and 7. Because the focus of Issue 1 is about the California spotted owl, this sensitive species is discussed in full here, including cumulative effects and a determination for the owl.

The Biological Evaluation (BE) for Terrestrial Species (Issue 1) and the Silviculture Report (Issue 2) for the Champs Environmental Assessment is hereby incorporated by reference and is located in the Champs project record, Eagle Lake Ranger District.

Issue 1

The Proposed Action would not provide adequate retention of attributes for California spotted owl and may negatively affect owl viability on the LNF, where these populations may be declining. Concerns include loss of foraging, dispersal and breeding habitat, reduction of project area habitat within an Area of Concern (AOC), and the amount of suitable habitat at various scales surrounding an owl activity center. Habitat attributes as described by the commenters for, (a) foraging and dispersal habitat which consists of ≥40 percent canopy cover and large trees ≥20 inches dbh, and (b) breeding habitat as 70 percent or greater canopy cover. Table 6 summarizes the indicator and measures for this issue.

A California spotted owl demographic study has been conducted on the Lassen NF since the early 1990s, and in California three other demographic study areas have existed at Sequoia-Kings Canyon National Park, and on the Eldorado and Sierra National Forests. Population trends of California spotted owls and the demographic data was fully reviewed by the USFWS's 12-month finding for a petition to list the California spotted owl as threatened or endangered (USFWS 2006, p. 29892-29894). As per the USFWS review, the latest meta-analysis of demographic data from four Sierran study areas provided more positive, overall indications of population trends for spotted owls than did earlier analyses. The USFWS summarized the findings of the most recent meta-analysis by stating (p. 29894):

- adult spotted owl survival increased through time (an important finding due to spotted owl population growth being most sensitive to changes in adult survival [p. 29893]);
- most of the study populations demonstrated an increasing or stationary trend;
- there was no strong evidence for decreasing linear trends in lambda on any of the study areas;
- modeling of four study areas combined demonstrated that total hypothetical spotted owl numbers did not decrease over time.

However, the USFWS further stated that, "We find that with the exception of the LAS [Lassen NF] study area, California spotted owl populations in the Sierras show little evidence of a decline, and attempts to model future population trends are too imprecise to provide an accurate projection." As indicated, demographic data for the Lassen continued to indicate the possibility of a declining population, with a mean lambda estimate of 0.973, which, being less than 1.0 indicated a declining trend. Because values for lambda (the finite rate of population change) are estimates, confidence intervals were calculated to, "provide an understanding of how close the estimated mean was to the true mean" (USFWS 2006, p. 29893). In other words, if the upper end of 95 percent confidence intervals includes the value of 1.0 (which indicates a stable or stationary population trend), then the conclusion would be that there was a 95 percent chance that the true lambda value was not statistically different from a stationary population. Confidence intervals for all four study areas did indeed include 1.0, indicating that statistically the populations were not different from stationary populations. Again, values for the Lassen NF study area,

"barely included 1.0, however, suggesting that the spotted owls in that study area may have been declining" (USFWS 2006, p. 29893). Of the four Sierran study areas, the Lassen study area was the one still indicating a possibility of decline (USFWS 2006, p. 29907).

Alternative 1

Indicator 1. The amount of suitable habitat at various scales surrounding an owl activity center.

Direct and Indirect Effects

The analysis area contains portions of delineated areas surrounding three spotted owl activity centers; Table 15 provides occupancy status for each site. One activity center is located on Logan Mountain within the project area boundaries; this is the only territory of the three at which reproduction has been documented. A second site is located on Ashurst Mountain to the north of the project area boundary. The third activity center is within the Blacks Mountain Experimental Forest (BMEF), to the west of the project area boundary (See Figure 7).

Table 15. Status of California spotted owl activity centers within or adjacent to the Champs project area.

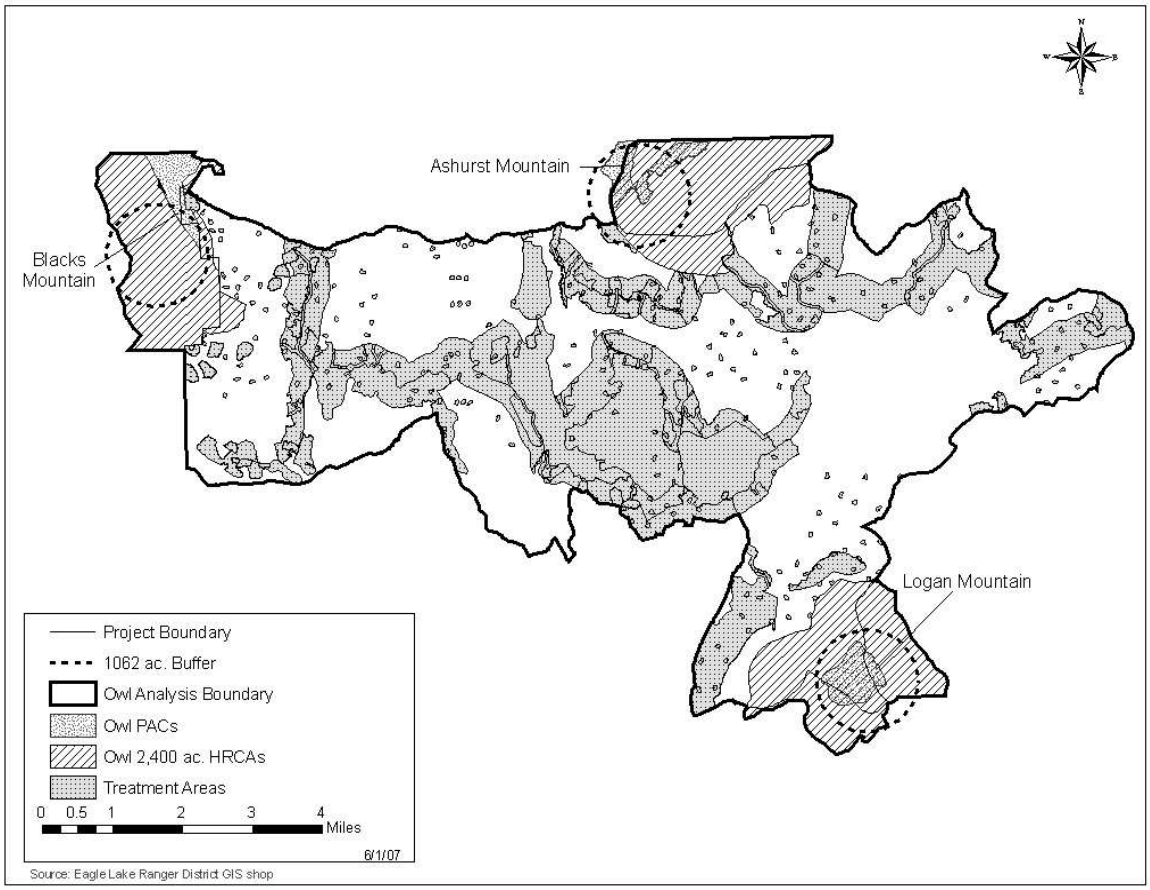
Territory Name (State Number)	Activity center w/in or adjacent to Champs project?	Best Status	Occupancy status by year
Logan Mountain (LS021)	Within	Nest	1988: single; 1989: male; 1990: pair; 1993: pair; 1994: male; 1996: male; 1997: pair; 1998: nest; 1999: nest; 2000: pair; 2001: vacant; 2002: vacant; 2003: female*; 2004-2006: unsurveyed
Ashurst Mountain (LS029)	Adjacent	Pair	1989: male; 1990 male; 1993: pair; 1994: unknown single; 1995: male**
Blacks Mountain (LS039)	Adjacent	Pair	1994: Pair

Source: Spotted owl demographic crew annual reports, ELRD wildlife records
* Female was relocated at Crater Mountain in 2005, ** Male was relocated at Logan Mountain in 1996.

This analysis of direct and indirect effects includes an analysis of potential effects to spotted owl habitat at three spatial scales surrounding each of the spotted owl activity centers. These scales, as described on the next few pages, are 1) delineated, 300 acre PAC polygons, 2) circles approximately 1,062 acres in size, centered on the activity center location, and, 3) delineated, 2,400 acre HRCA polygons.

Potential effects at each of these scales are addressed below. Blakesley (2003) also analyzed a 203 ha (about 502 acre) "nest area". This scale is intermediate in size between the 300 acre PAC and the 1,062 acre circle scales discussed above. Because this scale was intermediate in size, and because there were no proposed project activities within spotted owl habitat within the two larger-scale area of analyses (the 1,062 acre or 2,400 acre areas) for any of the three sites, this analysis did not assess effects to a 502 acre area.

Figure 7. Location of California spotted owl Protected Activity Centers (PACs), Home Range Core Areas (HRCAs) and cumulative effects analysis area boundary for the Champs project in relation to proposed actions for Alternative 1.



Source: Eagle Lake Ranger District GIS Shop

300 acre PACs

In compliance with the 1999 HFQLG ROD and the 2004 SNFPA ROD, no proposed activities would take place within the PACs delineated for the three territories included in this assessment. The entire PAC associated with the Ashurst Mountain activity center is located outside the project area, while approximately 221 acres (72%) of the Logan Mountain PAC and 42 acres (14%) of the Blacks Mountain PACs are located within the Champs project area boundaries. CWHR habitat class 4D comprises the majority of each activity center; very little size class 5 exists (Table 16).

The function of the 300 acre PAC is to provide high quality nesting, roosting and foraging habitat adjacent to the nest site. The 300 acre size is based on an assessment of nest stands and stands adjacent to the nest stand, the average cumulative size being approximately 300 acres (Verner et al 1992). Also, about half of nightly foraging locations occurred in an area of about 317 acres around nest stands on the Sierra NF (Verner et al 1992). Since none of the proposed activities would take place within the three

PACs, the habitat of the 300 acre PACs associated with the three owl sites would not be directly impaired or altered by project activities.

Table 16. Acres of Forest habitat per CHWR habitat within the Ashurst Mountain, Logan Mountain, and Blacks Mountain spotted owl protected activity centers.

	EMC 3P	EMC 3D	EMC 4S	EMC 4P	EMC 4M	EMC 4D	EMC 5M	EMC 5D	Total Acres
Ashurst Mountain	0	3	5	3	52	227	13	11	314
Logan Mountain	0	86	0	0	8	212	0	0	306
Blacks Mountain	5	28	0	6	23	236	0	0	298

Source: GIS files and CalVeg data prepared for the Champs project analysis

Codes used: Forest type: EMC = eastside mixed conifer

Size Class: 3 = poles (6-10.9" dbh); 4 = small (11-23.9" dbh); 5 = medium/large (≥24")

Canopy: P = 25-39%; M = 40-59%; D = ≥60%M

1,062 acre circles

The 1,062 acre circle scale was based upon radio telemetry data from the Sierra National Forest, which found that this area represented 90 percent owl use areas (Hunsaker et al 2002). Using canopy cover estimates provided by satellite imagery, Hunsaker et al (2002), estimated that owl sites that consistently produced young were characterized by 82 percent of the 1,062 acre circle being in canopy cover of >50 percent, and 85 percent of the circle being in canopy cover of ≥ 40 percent. These results are appropriate to the Champs project analysis due to similar source data (satellite imagery) used by Hunsaker et al and the Champs project GIS files.

Table 17 displays the current habitat structure (using satellite imagery) within 1,062 acre circles centered on the activity centers associated with each of the three territories in this analysis. As shown in Table 17, only Logan Mountain currently contains greater than 50 percent suitable habitat, the amount of habitat determined by Hunsaker et al (2002) to characterize owl sites that consistently produce young. Although there are not many years of survey data for Ashurst and Blacks (five years for Ashurst, 1 year for Blacks), Logan is indeed the only one of the three in which nesting has been documented.

Table 17. Amount of suitable habitat (acres) by CWHR habitat class within approximate 1,062 acre circles centered on spotted owl activity centers at Ashurst Mountain, Logan Mountain, and Blacks Mountain.

	EMC 4M	EMC 4D	EMC 5M	EMC 5D	Total suitable	Percent suitable
Logan Mountain	40	853	0	0	893	84
Ashurst Mountain	203	278	15	9	505	48
Blacks Mountain	224	155	0	0	379	36

Source: Champs project GIS files.
Codes used: Forest Type Size Class Canopy:
EMC = eastside mixed-conifer4 = small (11-23.9" dbh) M = 40-59%
5 = medium/large (≥24") D = ≥60%

No project activities are proposed within spotted owl habitat within any of the 1,062 acre circles reported in Table 14. The only proposed action within the three circles is one area of pine plantation thinning within the south edge of the Ashurst Mountain circle. This plantation does not represent spotted owl habitat. Therefore, the Champs project would result in no direct change to the existing spotted owl habitat condition within any of the three 1,062 acre circles.As stated earlier, the 1,062 acre circle represented 90 percent owl use areas using radio telemetry data from the Sierra National Forest. Although no data exists to indicate what a comparable home range size would be for spotted owls on the eastside of the Lassen NF, the potential value and function of an owl use area of this size, which is consistent with the size of owl use areas in mixed-conifer on the Sierra NF, would not be directly affected by project activities.

2,400 acre HRCAs

Table 18 displays the current habitat status within the three HRCAs addressed in this analysis. This 2,400 acre scale is similar to the 814 ha (approximately 2,011 acre) area of analysis used by Blakesley (2003). Blakesley (2003) utilized a 814 ha "core area" based on an estimated size of spotted owl breeding season core areas on the Lassen NF. Blakesley found that 78 percent of the spotted owl core areas were composed of forested stands dominated by trees ≥30 cm dbh and with >40 percent canopy closure (equivalent to CWHR habitat class 4M, 4D, 5M or 5D), and that site occupancy was negatively associated with the amount of non-forested areas and forest cover types not used for nesting or foraging.

Of the three territories, the Logan Mountain HRCA contains the most suitable habitat (78%) within the 2,400 acre HRCA. Both Blacks Mountain (58%) and Ashurst Mountain (63%) contain less than the average of 78 percent as found by Blakesley (2003). Again, as indicated in the 1,062 acre analysis, these data indicate that Logan is the territory of highest value in terms of current reproductive habitat value to spotted owls.

Table 18. Suitable spotted owl mixed-conifer habitat (acres) within the Ashurst Mountain, Logan Mountain, and Blacks Mountain spotted owl home range core areas.

	EMC 4M	EMC 4D	EMC 5M	EMC 5D	% Suitable
Logan Mtn (2500 ac)	53	1904	0	6	78
Ashurst Mtn (2496 ac)	575	995	15	11	63
Blacks Mtn* (2188 ac)	554	725	0	0	58

Source: GIS and CalVeg data files prepared for the Champs project.
* = Blacks Mountain HRCA also contains 308 acres of plantations not included in the analysis.
Codes used: Forest Type Size Class Canopy:
EMC = eastside mixed-conifer 4 = small (11-23.9" dbh) M = 40-59%
5 = medium/large (≥24") D = ≥60%

All proposed actions in the Champs project were located to avoid the delineated HRCAs. Therefore, the Champs project would not directly alter the existing condition within these delineations. The "home range core area" is a subset of an owl's entire home range, and represents an area of concentrated use within the home range. The size of HRCAs is based upon a mean home range core area (as determined by radio-telemetry) plus one standard error. The prescribed HRCA size for the ELRD (as per the 2004 SNFPA ROD) was extrapolated from a radio-telemetry study done within high elevation red fir forests, the results of which may not be applicable to other forest types (Zabel et al 1992, p. 174), including mixed-conifer forests on the eastside (east of the Sierra Nevada or South Cascade crest). No data exists to indicate the size of spotted owl home ranges in the eastside mixed-conifer type. However, because the high elevation red fir home range estimates were quite larger than estimates of spotted owl ranges within other forest types in California, the 2,400 acre HRCA is likely adequate in size, or possibly larger than necessary for a eastside mixed-conifer type. No proposed activities would take place within any of the three HRCAs associated with these owl sites, therefore, the function of the three 2,400 HRCAs to provide an area of concentrated use within an owl's home range would not be directly affected by this project.

Indicator 2. California spotted owl foraging, dispersal and breeding habitat attributes.

Direct and Indirect Effects

The CWHR structural class pertinent to the Champs project that provide moderate or high suitability ratings for spotted owl reproductive habitat are:

- Sierran Mixed-Conifer high reproductive habitat values = 5M, 5D
- Sierran Mixed-Conifer moderate reproductive habitat values = none listed. However, given the above data from Verner et al (1992), for this analysis eastside mixed-conifer 4M and 4D were considered to provide "moderate" reproductive habitat value.

The CWHR structural class pertinent to the Champs project that provide moderate or high suitability ratings for spotted owl foraging habitat are:

- Sierran Mixed-Conifer high foraging habitat values = 5M, 5D, 6
- Sierran Mixed-Conifer moderate foraging habitat values = 4M, 4D

Eastside pine is unsuitable for spotted owls (USDA 1993, page III-4, 1999 HFQLG ROD, p. 8); however, spotted owls have been located in areas of eastside pine which contain off-site white fir in the understory and/or overstory. Less than 1 percent of known owl sites in California were estimated to occur in these eastside habitats (Verner et al 1992, p. 40). These habitats correspond to areas within Champs that have been identified by the CalVeg remote sensing as being "eastside mixed-conifer". Areas that have been identified as "eastside pine" are not considered owl habitat due to no or an insufficient white fir component. On the Lassen's eastern side, eastside pine strata with a white fir inclusion is typically found in more mesic areas, such as the tops and north and east slopes of mountains and buttes.

Table 19 indicates that within the Champs project area there are currently 6,816 acres of forested stands identified by CalVeg as being suitable spotted owl habitat (eastside mixed-conifer 4M, 4D and 5D). This represents about 27 percent of the 25,344 acres of forested land within the analysis area. Approximately 18 percent (1,227 acres) of this suitable habitat is located within portions of delineated home range core areas (HRCAs) and would not be entered. Of the 6,816 suitable acres within the project area, 1,602 would receive DFPZ treatments, 106 acres would receive group selection treatments, and zero would receive area thinning treatments.

Table 19. CWHR habitat class of moderate or high reproductive habitat value for California spotted owls and pre- and post-project acres for Alternative 1.

	EMC 4M	EMC 4D	EMC 5M	EMC 5D	Total
High (H) or Moderate (M)	M	M	H	H	
Pre-project acres	4,109	2,696	0	11	6,816
Post-project acres	3,564	2,210	0	11	5,785
Change in acres	- 545	- 486	0	0	- 1,031

Source: CWHR 8.0, GIS and silvicultural files developed for the Champs Project. Note: EMC= eastside mixed conifer
Codes used: Size Class Canopy:
4 = small (11-23.9" dbh)M = 40-59%
5 = medium/large (≥24")D = ≥60%

Thinnings to create the proposed DFPZs would result in canopy closures of 30-40 percent within approximately 925 acres of the DFPZs proposed within eastside mixed-conifer 4M and 4D. Canopy closures below 40 percent are considered unsuitable for spotted owls. Therefore, as a result of the proposed DFPZs within Alternative 1, suitable mixed-conifer spotted owl habitat is predicted to be reduced by a total of 925 acres.

Stand modeling (Silviculture Report, Champs project record) indicates that the majority of DFPZ stands thinned to less than 40 percent canopy closure would regain 40 percent or greater closure by 20 years post-treatment, with the remaining stands being just under 40 percent canopy at 20 years post-

treatment. Therefore, the reduction in spotted owl habitat due to canopy cover reductions would primarily be a 20-year effect, after which stands would regain minimum attributes for spotted owl foraging habitat. The proposed action would leave approximately 10 percent of the acres in DFPZs as unthinned patches, ranging in size from about ¼ acre to about five acres. The purpose of these patches includes providing, 1) within-stand structural diversity, 2) areas of high inter-tree competition relative to the surrounding thin that should promote snag recruitment through time as living trees succumb to drought, insects or disease, 3) areas of high log numbers as snags topple, and, 4) cover patches for a variety of wildlife species. These unthinned areas may reduce the effects of thinning on species which prefer dense canopied conditions, including spotted owls and prey species such as northern flying squirrels. The retention of 10 percent of DFPZ acres in unthinned patches would likely enhance overall suitability at this time by providing denser patches of habitat within the DFPZ.

Group selection harvests would affect an additional 106 acres (61 acres of eastside mixed-conifer 4M and 45 acres of 4D) of suitable spotted owl habitat. Within each 2 acre area, group selection harvests would result in much reduced canopy closure due to the removal of essentially all trees smaller than 30 inches dbh (except for those that meet an integrated design feature (IDF) common to both Alternative 1 and 3 that would retain ponderosa pines <30 inches dbh that have platy yellow bark characteristics on all four sides, downward or outward sweeping branches, and a rounding or flat top). This reduced canopy closure would result in these group selection acres no longer meeting criteria for spotted owl habitat.

Together, the proposed DFPZs and group selection harvests in Alternative 1 would result in a reduction of approximately 1,031 acres (925 + 106) of suitable spotted owl habitat (Table 19). Alternative 1 would retain about 5,785 acres of suitable habitat within the project area, of which approximately 1,227 acres are located within the three existing HRCAs that overlap the project area, and 4,558 acres would remain within the project area outside of HRCAs. While neither the quality nor juxtaposition of the 4,558 acres of habitat within the project area is such that this habitat could be expected to provide habitat for a fourth activity center, it would continue to provide dispersal habitat within the project area. While studies have revealed the distances that dispersing owls may move, little is apparently known about the habitat requirements for dispersing owls prior to their becoming “settled” on a territory (USFWS 2003). Dispersal habitat may be the current, primary value of the Ashurst Mountain and Blacks Mountain sites, both of which fail to meet the threshold level of habitat that Hunsaker et al (2002) indicated characterized sites that consistently produced young, and both are also below the average suitable habitat as found by Blakesley (2003) (see Indicator 1 discussion). Therefore, despite short-term reductions in the amount of habitat, post-treatment, Alternative 1 would still provide 85 percent (5,785 acres) of owl habitat in this eastside landscape.

The 676-acre area identified for area thinning is located entirely within eastside pine, a vegetation type unsuitable for spotted owls, and thus there would be no effects to spotted owls from this prescription. Also, prescriptions to create DFPZs utilizing only prescribed burning or mastication were not proposed within existing spotted owl habitat, therefore these prescriptions would have no direct effects to existing

habitat areas. Area thinning within plantations would also have no direct effects to spotted owl habitat, since the plantations are too young to represent suitable habitat for spotted owls.

Other Suitable Habitat Attributes

Large Trees

A large tree component is often cited as a structural attribute of spotted owl habitat. For instance, Blakesley (2003) found that 56 percent of spotted owl nests were located within timber type size class 4 (equivalent to a CWHR size class 5), even though size class 4 represented just 16 percent of her study area. Large trees are important as nest trees (Gutierrez et al 1992); Blakesley (2003) found that just four of 92 nest trees were less than 76 cm in dbh (30 inches dbh). The lack of CWHR size class 5 identified within the overall Champs project area, with just 25 acres identified in the 25,344 acres of forested lands within the project area, indicates that forested stands characterized by large tree are rare on this eastside landscape. This lack of a large tree component further indicates that the Champs project area may be of greatest value to spotted owls as dispersal habitat, not as reproductive habitat.

However, scattered, remnant trees >30 inches dbh exist within proposed DFPZs. Stand exam data indicate that trees >30 inches dbh currently exist at a density of about 1 per acre (see the Champs Silviculture Report). These data also indicate that approximately five trees per acre are between 24-30 inches dbh, and approximately 10 trees per acre are between 20-24 inches dbh. Therefore, the existing density of trees >20 inches dbh is about 16 per acre.

Given the 30 inch dbh upper diameter limit for this project, trees >30 inches dbh would be retained, except in rare instances of felling as required for operability reasons or for safety. Therefore, Alternative 1 would not substantially affect trees >30 inches dbh. Modeling of the thinning prescriptions within DFPZs indicates that about 1 tree per acre would be removed in the 24-30 inches dbh range, and approximately three trees per acre would be removed within the 20-24 inch dbh range. Overall, Alternative 1 could reduce the population of all trees >20 inches dbh from about 16 per acre to 12 trees per acre, an approximate 25 percent reduction.

Within group selection harvests units, modeling indicated that approximately eight trees per acre in the 20-30 inches dbh range would be removed (Silviculture Report, Champs project record). Approximately 106 acres of group selection harvests are proposed within spotted owl habitat. These groups would result in about eight trees between 20-30 inches dbh per acre potentially being harvested.

Residual trees within the DFPZs would increase tree growth due to the thinning and resulting reduction in inter-tree competition. Therefore, there is a trade-off: although about 25 percent of trees >20 inches dbh may be harvested, the thinnings would also promote the recruitment of additional large trees.

Also, per project design, trees less than 30 inches dbh that have, 1) platy yellow bark characteristics on all four panels; 2) downward or outward sweeping branches (branches not angled upwards); and 3) a rounding or flat top, would generally be retained. These are characteristics of mature to over-mature trees (Dunning 1928), and would help insure that trees with mature to over-mature characteristics, not just trees over a certain diameter, would be retained.

The decreased flame lengths and fire line intensity that would result from the DFPZ treatments would give firefighters a better chance to halt the progress of a wildland fire and to minimize the final amount of acres burned (Fuels Report, Champs project record). The implemented DFPZs would therefore confer some protection against widespread loss of spotted owl habitat due to wildfire. Therefore, although some spotted owl habitat would be reduced due to DFPZ thinnings, the trade-off is that those same thinnings would help prevent more widespread and severe loss of spotted owl habitat.

Snags and Downed Logs

Snags and downed logs are important habitat components for spotted owls and their prey. Alternative 1 would not substantially affect the existing snag density within the project area, as snags would generally only be felled as hazards along roads, at landing locations, and other cases where human safety is endangered by the snags. All snags felled for safety reasons would remain on the ground as logs, and would not be removed. There may be some loss of snags due to prescribed burning (Landram et al 2005), but there would also be some recruitment of snags through fire-induced mortality of living trees. The recruitment is expected to offset the loss of snags to a large extent, resulting in little change in habitat capability. Also, Alternative 1 would retain approximately 10 percent of DFPZ acres within unthinned patches in order to maintain within stand diversity. Left unthinned, trees within these areas would remain subject to inter-tree competition, and would be expected to experience a higher mortality rate than trees within the surrounding thinned area. These unthinned groups would therefore help provide for snag recruitment over time. In addition, any trees that remain in the group selections, due to integrated design features, could eventually add to this recruitment.

Alternative 1 would retain approximately three logs per acre, where existing. Given the small number of existing logs per acre, the three logs per acre retention standard would likely result in essentially all logs over 12 inches at the large end being retained. Therefore, Alternative 1 should not substantially reduce the existing downed log component. Mastication of surface fuels would likely have little to no effect on existing levels of large logs, since mastication of these logs would not be part of the mastication contract. Approximately 224 acres of DFPZs within owl habitat were identified to have mastication as a post-thinning treatment, representing about 14 percent of the DFPZs identified within spotted owl habitat.

Approximately 943 acres of DFPZs in spotted owl habitat were identified to have underburning as a post-thinning treatment, representing about 60 percent of the total DFPZ acres (1,558 acres) identified for owl habitat. As noted above, although prescribed fire may consume downed logs, prescribed fire may also accelerate the fall rate of snags (Landram et al 2005). Therefore, recruitment of additional logs may occur to help replace those consumed. Unthinned patches and trees left in groups, would help promote the recruitment of snags which would promote the recruitment of downed logs as they topple with time.

Prey Species

The 1999 HFQLG FEIS included an assessment of the potential effects of DFPZ and group selection harvests on prey species (Appendix I of the FEIS). For each treatment assessed (DFPZs and groups) at the programmatic level within the 1999 HFQLG FEIS, suitability values for northern flying squirrels, an

important prey species for spotted owls, were reduced from high to moderate. In the Champs project area, CWHR habitat class that provide moderate or high reproductive habitat for flying squirrels include eastside pine 3D, 4D, 5M and 5D, and mixed-conifer 3M, 3D, 4M, 4D, 5P and 5D. Pre-project, approximately 10,745 acres exist within these strata, of which 1,713 acres are eastside pine and 9,032 is mixed-conifer (Silviculture Report, Champs project record). Post-project, as a result of thinning and group selection, Alternative 1 would result in a reduction of about 2,017 acres of this existing habitat, to a total of 8,728 acres. Of this decrease, 674 acres would be within the eastside pine type, and about 1,343 would be reduced from eastside mixed-conifer, representing a 39 percent and 15 percent reduction, respectively, from the currently existing amount of habitat in each forest type.

Within eastside pine, there would be a 674 acre decline in suitable flying squirrel habitat. However, Lehmkuhl et al (2006) suggest that dry ponderosa pine type forests are a "population sink" for northern flying squirrels, and that spotted owls avoid these same forest types. Therefore, reduction in flying squirrel habitat in eastside pine is likely of little consequence to spotted owls because this habitat type may be a sink (not a source) for flying squirrel populations, and spotted owls would avoid this habitat type. Lehmkuhl et al (2006) also point out that though thinnings may result in stand-scale impacts to flying squirrels, this is balanced by potential long-term stability in dry-forest landscapes and avoidance of large scale habitat loss due to wildfire. They conclude that dry-forest restoration would be unlikely to significantly impact the viability of flying squirrel populations or their ecological webs. Of greater consequence to spotted owls would be the 15 percent reduction in mixed-conifer flying squirrel habitat. However, Alternative 1 would retain 85 percent of the existing flying squirrel mixed-conifer habitat, while still providing a measure of long-term stability suggested by Lehmkuhl et al (2006) to be important in dry forests.

As per the Silviculture Integrated Design Feature within the proposed action, Sporax (borax) would be applied to cut stumps >14 inches in diameter of live conifer trees for the control of annosus root disease. No Sporax would be applied within 25 feet of known Sensitive or Special Interest Plants, nor within 25 feet of standing water. Use rates would be approximately one pound to 50 square feet of stump surface as per label direction, and thus the number of cut stumps >14 inches diameter per acre would dictate the actual rate of application on a per acre basis within thinned areas. The use of Sporax in the control of annosus root disease is considered to not present a significant risk to wildlife species under most conditions of normal use (USDA 2006). The greatest risk of toxicity to wildlife species would result from direct consumption of Sporax applied to tree stumps; however, there appears to be very little risk to mammals or birds from a direct consumption scenario (USDA 2006). The "hazard quotients" of Sporax to small mammals, and small and large birds were below the level of concern by factors of about 12 to 25,000 (USDA 2006). Risk was further reduced by project design that avoided silvicultural treatments within the 2,400 acre HRCAs delineated for each of the known spotted owl activity centers. Therefore, the proposed application of Sporax should not represent a concern to California spotted owls or their prey.

Indicator 3. Reduction of habitat within California spotted owl Area of Concern

Direct and Indirect Effects

The Champs project area is located within or immediately north of an Area of Concern (AOC) identified within the California spotted owl technical report (AOC number 1, Verner et al 1992, p. 47). This AOC was located in Lassen County, and the reason for concern was, "Habitat in this area is discontinuous, naturally fragmented, and poor in quality due to drier conditions and lava-based soils" (Verner et al 1992, USFWS. 2006). Due to the xeric nature of the area, the large amount of eastside pine, and large, non-forested openings, this area was naturally and historically fragmented in terms of spotted owl habitat.

Approximately 20,773 acres of the mapped AOC occur within the Champs project area. This portion of the AOC includes approximately 3,446 acres of spotted owl habitat. The remaining acres are open valleys such as Champs Flat, eastside pine, or other non-habitat types. Within the 3,446 acres of owl habitat, Alternative 1 proposes thinnings to create DFPZs within approximately 565 acres of this existing habitat. Thinnings to create the proposed DFPZs would result in canopy closures of 30-40 percent within approximately 58 percent (328 acres) of these proposed DFPZs, while the remainder, 237 acres (42%), would remain at or above the 40 percent canopy cover threshold. Therefore, DFPZs would result in an approximate 328 acre reduction in suitable habitat within the AOC. There are also 52 acres of group selection harvests proposed in spotted owl habitat within the AOC. Therefore, the total acres of spotted owl habitat reduced in the AOC would be approximately 380 acres of the existing 3,446 acres.

Existing habitat used by California spotted owls appears to be vulnerable to stand-replacing catastrophic fire, and one of the challenges in assessing the effects of fire management in the habitat of California spotted owls is the need to weigh long-term benefits of reducing the risk of catastrophic fire against any potential short-term effects on the quality or quantity of spotted owl habitat (USFWS 2006). As stated by the USFWS (2006, p. 29900), "…fuels reduction activities can have short-term adverse effects, but they can also reduce the greater risk of catastrophic wildfire in the long term which effectively ameliorates the short-term effects". Wildfire effects, especially those associated with large, stand replacing wildfires, are considered a major source of risk to spotted owl populations due to loss and degradation of habitat, creation of habitat gaps, and lengthy time periods for habitat reestablishment (USDA 2004, Vol. 1, p. 277).

The implemented DFPZs would confer some protection against widespread habitat loss due to wildfire. Potential loss of habitat due to wildfire represents a greater potential to exacerbate the concern over the "discontinuous nature of habitat" in this AOC than would the actions proposed in Alternative 1. Therefore, although approximately 380 acres of the existing owl habitat would be reduced, this loss would be balanced by potential long-term stability in this dry-forest landscape through greater protection from large scale habitat loss due to wildfire that would result from the DFPZs. Stand modeling (see the Silviculture Report for Champs) indicates that the majority of DFPZ stands thinned to less than 40 percent canopy closure would regain 40 percent or greater closure by 20 years post-treatment, with the remaining stands being just under 40 percent canopy at 20 years post-treatment. Therefore, the reduction in spotted owl habitat due to canopy cover reductions would primarily be a 20-year effect, after which

stands would regain minimum attributes for spotted owl foraging habitat. The retention of 10 percent of DFPZ acres in unthinned patches would likely enhance overall suitability at this time by providing denser patches of habitat within the DFPZ.

Locating proposed actions outside of the 2,400 acre HRCAs avoided altering existing habitat in areas of importance to known owl sites, and prevented increasing habitat discontinuity in these specific areas. On the other hand, perpetuation of these conditions is likely a perpetuation of conditions outside the historical range of variability of this eastside region.

Alternative 1 Cumulative Effects

Because portions of the three HRCAs are included within the project area, the cumulative effects analysis area boundary for spotted owls was expanded from the Champs analysis area to include the entire HRCA and associated protected activity center (PAC) for each of the three activity centers (see Figure 7). The cumulative effects analysis area totals 38,602 acres, and was not expanded further beyond this due to, 1) large expanses of eastside pine surrounding the analysis area, which is unsuitable habitat for spotted owls, as well as large areas of private land to the north of the analysis area, 2) large, non-forested valleys located adjacent to the analysis area, such as Harvey, Little Harvey, and Pine Creek valleys, and, 3) the large distances to the next nearest activity centers (the nearest, on Crater Mountain, is about 2 miles west of the analysis area boundary).

An overview of historical reference conditions and cumulative effects of past land uses, including changes to vegetation and wildlife habitat values, was provided for the Champs EA in a report entitled “Eastside Historical Assessment” (Champs project record). That report is an overall assessment of the cumulative effects of past land uses and their effects on vegetative pattern, structure and composition. A summary of the conclusions of that report most specific to spotted owl habitat include,

- Reduction of ecologically important understory vegetation and non-coniferous vegetation types has occurred (e.g.., shrub fields, aspen) due to historical grazing, fire suppression and increasing dominance of the growing space by conifers.
- Loss of old-growth trees has occurred due to timber harvest and other mortality factors, and an almost complete loss of old-growth forests.
- Reduced size class of forested stands, and increasing canopy cover has occurred relative to historical conditions.

Within the described cumulative effects analysis area for spotted owls, there have been many past activities, as well as those on-going and those foreseeable in the future. These projects were identified in the document entitled "Past, Ongoing, and Reasonably Foreseeable Future Actions - List of Cumulative Actions" (Appendix B). Activities include timber harvests of various types and intensities, livestock grazing, fire suppression, prescribed fire, dispersed recreation, noxious weed abatement, and others. Future projects include potential for DFPZ maintenance, aspen restoration and road decommissioning. Of these, noxious weed abatement and dispersed recreation likely have no measurable direct effects to California spotted owl habitat. There are only three small population areas for noxious weeds in this cumulative effects area, and the treatment has been and would continue to be hand-pulling of plants. This

control of noxious weeds would likely provide an ecological benefit to spotted owls and other species by preventing the further spread of these species within the analysis area.

Past timber harvest within the analysis area has included salvage harvests, overstory removals, clear cuts, biomass thinning and DFPZs. Most of the timber harvest on the Forest prior to about 1992 involved the removal of large sawtimber, and much of the ELRD's old-growth was removed during this historical period of timber harvest. Annual timber harvest began to decline in the 1990s, not only did total volume drop, but beginning in the early 1990s the type of harvest also changed with the adoption of interim spotted owl management guidelines (USDA 1993). Prior to these guidelines, harvest commonly focused on overstory removals and extraction of high quality sawtimber. Since adoption of the 1993 interim guidelines, harvest has primarily been thinning from below, with retention of the largest trees in the harvested stands. Another result of past timber harvest has been loss of snags due to routine felling as fire hazards during historical timber harvests, and also due to the harvest of dead and dying trees during the salvage sales. These harvests have lead to cumulative loss of large trees, snags and subsequent large downed logs across the Champs project area. Also, preferential harvesting of ponderosa and Jeffrey pine, relative to the less valuable white fir, may have lead to changes in species composition (Smith 1994, Norman 2002), leading to a greater proportion of white fir within stands.

Due to historical timber harvest, most of the existing old-growth trees (Dunning Class 5 trees, Dunning 1928) have been removed from eastside forests; average tree dbh and size class are smaller than the historical. Proposed DFPZ thinnings in Alternative 1 would harvest approximately 25 percent of the existing population of trees >20 inches, including about 20 percent of the trees between 24 and 30 inches dbh. This harvest would further reduce the density of trees of this size within the treated areas. In addition, the approximate 106 acres of group selection harvests proposed within spotted owl habitat are projected to result in the harvest of about eight trees per acre between 20 to 30 inches dbh..

Some DFPZ segments have been constructed within the spotted owl cumulative effects analysis area within the last three to five years. These DFPZs have the same basic characteristics as the DFPZs proposed by Alternative 1. In addition, ladder fuels within the analysis area have been reduced within past biomass thinning units that removed most trees between three and nine inches dbh. These past projects would confer some protection to habitat within the known owl territory at Logan Mountain, which has existing DFPZs on its east and west boundaries, and biomass units to the north and south. However, these past projects would provide only limited protection for the owl site at Ashurst Mountain, nor are they positioned or designed to provide protection to the bulk of spotted owl habitat outside of the delineated HRCAs. The past DFPZs would also not provide potential protection for the owl site at Blacks Mountain. However, this site is on the extreme western edge of the Champs project area, and given the general trend in fires to travel from the southwest to the northeast, due to prevailing wind patterns, neither the past nor the proposed DFPZs would be expected to provide much protection for this site due to its location relative to the Champs project. Past biomass units tended to be in discreet units and do not provide a linear, contiguous area of reduced fuels as do DFPZs. As such, these past biomass units were designed more as forest health projects than DFPZs, and would not be expected to effectively reduce fire risk as would a

DFPZ. The proposed DFPZs within the Champs project would interconnect many of these past biomass units as well as past DFPZ units to create a cohesive DFPZ network.

Within the spotted owl cumulative effects analysis area, approximately 46 group selection units totaling 101 acres have been implemented in past years, all in the Harvey Mountain vicinity in the Champs project area. Eighteen (39%) of these groups wholly or largely overlap spotted owl habitat. These groups removed approximately 40 acres of owl habitat. Combined with the estimated 106 acres of owl habitat that would be removed by Alternative 1, group selection would remove a cumulative total of approximately 146 acres of owl habitat within the Champs spotted owl cumulative effects analysis area. Although these acres were removed from habitat status, none of these groups have been located within the delineated 2,400 acre HRCAs identified for the three owl sites within the analysis area.

The increasing white fir component, as well as increasing overall canopy cover relative to historical conditions due to fire suppression, may have led to an increase in the extent of spotted owl habitat within the analysis area than what was historically present. In the relatively xeric landscape within the Champs area, large expanses of forested habitat with 60 percent canopy cover or greater were historically not present, and are likely not sustainable due to the likelihood of drought-induced mortality events or fire loss (M. Ritchie, pers. comm. 2006, C. Skinner, pers. comm. 2006) As Smith (1994) stated, "…recent drought mortality events suggest that many sites may not support white fir to mature stand development. This is especially true of overstocked stands". Such "overstocked stands" are generally those that represent spotted owl habitat in eastside conditions.

Past, present and on-going dispersed recreation is sufficiently limited in the project area to also have a non-measurable effect to spotted owl habitat. A short segment of groomed snowmobile trail exists in the eastern portion of the analysis area, outside of spotted owl PACs and HRCAs. Also, a special use permit for game bird dog trials is held for an area on the western edge of Harvey Valley, again outside of spotted owl PACs and HRCAs, and in unsuitable, non-coniferous habitat. Neither of these two uses would have measurable direct, indirect or cumulative effects to spotted owls. The primary recreation use within this analysis area comes during the annual deer hunting season. The primary potential for effects from this use would be escapes of unattended campfires or other ignitions of wildfire by deer hunters. The DFPZs proposed as part of this project would provide some level of protection against wildfire, and reduce the potential for widespread habitat loss due to hunter-induced ignitions by providing firefighters a better chance of halting the progress of a wildland fire and keeping the final amount of acres burned to a minimum. This effect would result in increased protection for areas outside of the DFPZ network including important wildlife habitat areas.

Approximately 162 acres of aspen restoration treatment opportunities have been identified within the spotted owl cumulative effects analysis area. These treatments would include both conifer removal, and, where needed, fencing to control excessive browsing of sprouts by livestock, deer or elk. These treatments would affect approximately 68 acres of spotted owl habitat (eastside mixed-conifer CWHR classes 4M and 4D). This represents just 1 percent of the acres of suitable spotted owl habitat that are projected to be available post-project. Since aspen in the west are considered second only to riparian areas

in terms of biodiversity (Kay 1997), these restoration treatments would be important ecologically within the project area. Also, marking guidelines are designed to retain old-growth trees within the aspen treatment units, reducing the impacts to owls. Therefore, there should be no substantive negative cumulative effects from these treatments.

Livestock grazing has been a widespread past, present and future activity within the analysis area. Most of this use is within the large valleys located within the cumulative effects analysis area, such as Champs Flat, and Squaw, Harvey and Little Harvey valleys where the primary feed and watering sources are located. Less use occurs within forested habitats due to reduced availability of feed and water. Therefore, most use occurs within non-owl habitat associated with open valleys and adjacent eastside pine stands. Due to this, and because forested stands with a white fir component usually occur at upper slopes where relatively little grazing occurs, there is likely no direct effect to spotted owl habitat from this use.

Personal fuelwood gathering is an annual activity within the analysis area, in which permits allow the removal of downed logs as well as snags less than 20 inches dbh for home fuelwood use. However, in the areas in Champs that owls inhabit (higher mountain slopes, fir-dominated forests, distant from communities, and with a lack of the preferred fuelwood species, lodgepole pine), fuelwood harvest is likely rarely encountered, and fuelwood harvests are not allowed within Blacks Mountain Experimental Forest. Thus fuelwood harvests are likely not an issue in spotted owl habitat within the analysis area.

Alternative 1 Determination

There would be no direct effect to foraging, dispersal and breeding habitat at the 300 acre, 1,062 acre or 2,400 acre scales for any of the three owl sites within this analysis area; no proposed projects are located within spotted owl habitat within these areas. Therefore, there would be no direct effects to the three PACs, HRCAs or the approximate 1,062 acre circles used as a scale of analysis intermediate in size between the PACs and HRCAs.

Within the project area, about 15 percent (1,031 acres) of the currently available spotted owl habitat outside the HRCAs would be reduced to non-habitat status by Alternative 1, while approximately 5,785 acres of suitable habitat would be retained. Stand modeling indicated that the reduction in spotted owl habitat due to canopy cover reductions would primarily be a 20-year effect, after which stands would regain minimum attributes for spotted owl foraging habitat. Although there would be a decline of habitat in the short term, the actions proposed within Alternative 1 would likely not forfeit the ability of dispersing spotted owls to access the activity centers at Blacks Mountain and Ashurst Mountain, and should not forfeit the ability of owls to access or disperse from Logan Mountain. Also, approximately 15 percent of northern flying squirrel mixed-conifer habitat would be reduced to non-habitat status by Alternative 1.

Cumulatively, project activities would reverse some long-term vegetative trends within the project area, and the proposed DFPZs combined with past DFPZs would confer some protection against widespread habitat loss due to wildfire, which would be important in this “area of concern” for spotted owls. Also, thins to create DFPZs would help maintain the health of remnant old-growth trees (Dunning

Class 5 trees, Dunning 1928) as well as increase the recruitment of a large tree component currently deficient in the project area.

However, historical timber harvest and other mortality factors have through time reduced the numbers of large diameter trees within the analysis area; it is estimated there would be an additional 25 percent reduction in trees >20 inches dbh as a result of the proposed DFPZs within Alternative 1, including a 20 percent reduction of the trees 24-30 inches dbh, plus an additional harvest of about eight trees between 20-30 inches dbh per acre as a result of group selection harvests within spotted owl habitat.

Given the results of the above analyses, the determination from the proposed activities within Alternative 1 of the Champs project is "may affect individuals of California spotted owls, but is not likely to result in a trend towards federal listing or loss of species viability."

Alternative 2

Indicator 1. The amount of suitable habitat at various scales surrounding an owl activity center.

Direct and Indirect Effects

As with Alternatives 1 and 3, Alternative 2 would not directly affect habitat at the 300 acre, 1,062 acre of 2,400 acre scales around the three spotted owl activity centers. The current status of spotted owl habitat at each of these scales would be the same as provided under Alternative 1.

Indirect effects to spotted owl habitat within these scales would be similar to those discussed below under Indicator 2.

Indicator 2. California spotted owl foraging, dispersal and breeding habitat attributes.

Direct and Indirect Effects

The no action alternative would result in continuation of current vegetative trends that have been a result of a long history of past land uses and associated vegetative change (see the Eastside Historical Assessment, Champs project record). These trends include increased densification of forests, continued risk of remnant old-growth trees to competition-related mortality, vulnerability of widespread loss of forested habitats to wildfire, continued increase in white fir composition in what were once pine-dominated forests (Smith 1994), decreased habitat values for many wildlife species that inhabitat eastside pine forests, and loss of understory vegetation. The past vegetation management projects that have occurred have caused a reduction in large tree component directly through timber harvest. This history of timber harvest has collectively resulted in loss of the majority of old-growth forests and old-growth trees (Dunning Class 5 trees, Dunning 1928) within the analysis area. The large tree component has also been reduced indirectly through fire suppression and resulting densification of stands, which has lead to increased inter-tree competition and mortality. Increased densification of stands since heavy historical livestock grazing and fire suppression has predisposed stands to increased mortality during periods of

drought (Savage 1994, 1997, Guarin and Taylor 2005), and old pines are more susceptible to competition-induced mortality than are young trees (Biondi 1996).

The no action alternative would have little immediate or short-term impacts to spotted owls, their habitat, or their prey habitat within the project area. Alternative 2 would result in no direct effect on existing canopy closure, CWHR structural class or snag and downed log densities. Indirectly, continuation of dense stand conditions may result in increased tree mortality and high levels of future snag and downed log recruitment, which could benefit some aspects of habitat for spotted owls and their prey. However, old trees may be more vulnerable to competition-related mortality than young trees (Biondi 1996). Therefore, increased snag recruitment could come at the expense of the remnant, living old-growth trees (Dunning Class 5 trees, Dunning 1928). Because Alternative 2 would not result in any thinning around remnant old-growth trees, those old-growth trees still on the landscape would continue to be vulnerable to competition-related mortality. Dolph et al (1995), in eastside pine stands within Blacks Mountain Experimental Forest, observed a decline in old-growth trees in unharvested plots over a 50-year time frame due to inter-tree competition. The authors conclude that the decline had reached a point where the number of trees larger than 21 inches dbh threatened to decline below the minimum (13 per acre, citing Smith 1995) considered typical of old-growth stands in northeastern California. Due to this decline, the authors state that, given the effects of increasing stand densities, characteristics or functions of old-growth stands cannot be guaranteed in perpetuity by simply preserving existing old-growth tracts, and that old-growth must be managed for desired attributes. Lack of thinning and a continuation of heavily stocked stands would also result in slower growth of individual trees and a prolonging of time before a large tree component is returned to the landscape (Silviculture Report, Champs project record). Therefore, although there would be no direct effects of this alternative to spotted owl habitat, long term vegetative trends may improve some components of owl habitat, while degrading other components.

Indicator 3. Reduction of habitat within California spotted owl Area of Concern

Direct and Indirect Effects

There would be no direct affect to spotted owl habitat within the AOC under Alternative 2. Alternative 2 would not create DFPZs, and thus would not confer a level of protection to widespread loss of owl habitat from wildfire as would DFPZ creation as in Alternative 1. Such widespread habitat loss would be an important factor within this AOC (Verner et al 1992) for California spotted owls.

Indirect effects to spotted owl habitat within the AOC would be similar to those discussed above under Indicator 2.

Cumulative Effects

The no action alternative would avoid direct manipulation of current vegetative conditions in the project area and would retain the status quo in regards to habitat structure and availability for spotted owls. However, in the long-term the No Action alternative may not be in the best interest in terms of the ecology of the planning area (Eastside Historical Assessment, Champs project record), nor in the maintenance of a large tree component important to spotted owls. For instance, Biondi (1996) found that

old trees may be more vulnerable to competition-related mortality than young trees, and Dolph et al (1995) documented a rate of mortality in old pines that was in excess of their rate of recruitment within Blacks Mountain Experimental Forest, adjacent to the west edge of the project area. Due to this decline, the authors state that, given the effects of increasing stand densities, characteristics or functions of old-growth stands cannot be guaranteed in perpetuity by simply preserving existing old-growth tracts, and that old-growth must be managed for desired attributes. In today's fire-suppressed, dense stands, thinning the competing in-growth of young trees is important if the remnant old-growth trees are to be maintained and perpetuated on the landscape. Such overstocked stands are generally those that provide sufficient canopy to be considered suitable spotted owl habitat. This alternative would not provide for thinning which would help reverse some of these long-term vegetative trends.

As stated under Alternative 1, DFPZ segments previously constructed within the Champs cumulative effects boundary would not offer any protection to California spotted owl habitat.

The no action alternative would not provide the additional DFPZs that would provide the connectivity between past DFPZ segments and many of the past biomass units, and which would increase the effectiveness of the entire DFPZ network, which would result in increased protection for areas outside of the DFPZ network including the spotted owl HRCA delineated for the Ashurst Mountain owl site and spotted owl habitat outside of the three HRCAs. Wildfire effects, especially those associated with large, stand replacing wildfires, are a major source of risk to spotted owl populations due to loss and degradation of habitat, creation of habitat gaps, and lengthy time periods for habitat reestablishment (USDA 2004, Vol. 1, p. 277). Much of the existing owl habitat within the Champs project area would remain at risk of wildfire under this no action alternative.

Alternative 3

Indicator 1. The amount of suitable habitat at various scales surrounding an owl activity center.

Direct and Indirect Effects

As in Alternative 1, no projects proposed by Alternative 3 would be located within suitable spotted owl habitat within the 300 acre owl PACs, 1,062 acre circles surrounding owl activity centers, or within the delineated HRCAs for these owl sites. Therefore, there would be no direct or indirect effects to spotted owl habitat within these areas under Alternative 3, and the analysis for Alternative 1 would also apply here.

Indicator 2. California spotted owl foraging, dispersal and breeding habitat attributes.

Direct and Indirect Effects

Alternative 3 was designed to reduce effects to spotted owl habitat even further than Alternative 1 by addressing the significant issue regarding owl viability. The differences between Alternatives 3 and 1 are related to, 1) retention of ≥20 inches dbh trees under Alternative 3 versus 30 inches dbh trees in

Alternative 1, 2) dropping of group selection harvests outside of DFPZs, and thinning those located within DFPZs, and, 3) maintenance of ≥40 percent canopy cover within mixed-conifer spotted owl habitat under Alternative 3. No group selection harvests are proposed in Alternative 3.

Effects of Alternative 3 to existing CWHR structural class are summarized below in Table 20. As indicated, there would be a reduction of about 461 acres of the structural class 4D. However, post-project, these thinned acres would retain >40 percent canopy cover, the lower canopy cover levels of spotted owl foraging habitat (structural class 4M). Therefore, Alternative 3 would result in no net loss of CWHR structural classes providing spotted owl habitat.

Table 20. CWHR habitat class of moderate or high reproductive habitat value for California spotted owls, and pre- and post-project acres for each.

	EMC 4M	EMC 4D	EMC 5M	EMC 5D	Total
High (H) or Moderate (M)	M	M	H	H	
Pre-project acres	4,109	2,696	0	11	6,816
Post-project acres	4,570	2,235	0	11	6,816
Change in acres	+ 461	- 461	0	0	0

Source: CWHR 8.0, GIS and silvicultural files developed for the Champs Project. Note: EMC= eastside mixed conifer

Although spotted owl foraging habitat includes stands with more open canopy than characteristic of nesting and roosting habitat, the quality of foraging habitat appears to decrease with decreasing canopy. For instance, on the Sierra NF spotted owls tended to forage in sites with >50 percent canopy more than predicted based on the availability of that habitat, and foraged in stands with 40-50 percent canopy cover at a rate about equal to the availability of that habitat (USDA 2001, Vol. 3, p. 73). However, while it is recognized that 40 percent canopy cover may provide lower quality foraging habitat than would denser canopied habitat, 40 percent canopy cover is still considered to be a lower threshold for suitable foraging habitat (USFWS 2003, USFWS 2006, USDA 2001, Verner et al 1992).

As with Alternative 1, retention of 10 percent of the DFPZ acres as unthinned patches would likely enhance the value of the DFPZs as suitable habitat by providing areas of unaltered canopy closure within the larger DFPZ units. Such unthinned patches may provide roost or foraging sites for dispersing owls, and may possibly allow greater population levels of prey species such as northern flying squirrels than would be provided if the entire DFPZ unit was uniformly thinned.

Other Suitable Habitat Attributes

Large Trees

The other primary difference between Alternative 3 relative to Alternative 1 is a 20 inch dbh upper diameter limit versus the 30 inch upper diameter limit in Alternative 1. A large tree component is often

cited as a structural attribute of spotted owl habitat, either at a stand scale (Blakesley 2003) or as individual trees used for nesting (Gutierrez et al 1992, Blakesley 2003). As discussed under Alternative 1, the current population of trees that are >20 inches dbh is approximately 16 trees per acre. While stand exams indicate approximately four (25%) of the 16 trees per acre >20 inches dbh may be harvested under Alternative 1, all such trees would be retained by Alternative 3. The trees between 20-24 inches dbh would likely be the first additional trees to be recruited post-treatment into a size class 5, a size class rare on the eastside landscape, and one that currently makes up just 11 acres (0.2%; Table 20) of the 6,816 acres of existing spotted owl habitat in the project area. Also, Alternative 3 would avoid the harvest of trees >20 inches dbh within group selection harvests, which are not proposed in this alternative.

DFPZs created under the standards of Alternative 3 (retention of >20 inch trees and 40 percent canopy closure within spotted owl habitat) would not be any less effective as DFPZs created under Alternative 1 (see the Champs fuels report). Therefore, retention of trees >20 inches dbh would result in no difference in risk of widespread spotted owl habitat loss due to wildfire between the two alternatives, and no reduced ability for Alternative 3 DFPZs to provide for firefighter safety and wildfire defense than would Alternative 1 DFPZs. However, as noted under Issue 2, Alternative 3 has more potential for loss of large trees where stocking levels remain high because of the 20 inch upper diameter limit.

Snags and Downed Logs

Retention standards for snags and downed logs would be the same between both Alternative 1 and 3, therefore there should be no substantial difference in the effects of Alternative 3 to snags and logs as were already discussed for Alternative 1. The potential effects of Sporax application would also be the same as described under Alternative 1.

Prey Species

In the Champs project area, CWHR habitat class that provide moderate or high reproductive habitat for flying squirrels include eastside pine 3D, 4D, 5M and 5D, and mixed-conifer 3M, 3D, 4M, 4D, 5P and 5D. Pre-project, approximately 10,745 acres exist within these strata (Table 47), of which 1,713 acres are eastside pine and 9,032 is mixed-conifer. Post-project, Alternative 3 would result in a reduction of about 1,041 acres, to a total of 9,704 acres (Table 50), due to canopy cover reductions. Of this decrease, 654 acres would be within the eastside pine type; only 387 acres would be within eastside mixed-conifer, representing a four percent decrease of this habitat type.

As described under Alternative 1, Lehmkuhl et al (2006) suggest that dry ponderosa pine type forests are a “population sink” for northern flying squirrels, and that spotted owls avoid these same forest types. Therefore, reduction in flying squirrel habitat in eastside pine is likely of little consequence to spotted owls because this habitat type may be a sink (not a source) for flying squirrel populations, and spotted owls would avoid this habitat type. Therefore, Alternative 3 would greatly reduce potential impacts to northern flying squirrels relative to Alternative 1, resulting in just a four percent decrease in flying squirrel habitat located within mixed-conifer types. Lehmkuhl et al (2006) also points out that though

thinnings may result in stand-scale impacts to flying squirrels, this is balanced by potential long-term stability in dry-forest landscapes and avoidance of large scale habitat loss due to wildfire.

Indicator 3. Reduction of habitat within California spotted owl Area of Concern

Direct and Indirect Effects

The Champs project area is within or adjacent to an "area of concern" for California spotted owls (Verner et al 1992, p. 48), due to the discontinuous nature of the habitat in this area of concern. Due to the xeric nature of the area, the large amount of eastside pine, and large, non-forested openings, this area was historically and naturally fragmented in terms of spotted owl habitat.

Within the 3,446 acres of spotted owl habitat within the project area that are also located within the AOC, Alternative 3 proposes thinnings to create DFPZs within approximately 565 acres of this existing habitat; no group selections would be implemented. Post-project, these thinned acres would retain >40 percent canopy cover, the lower canopy cover levels of spotted owl foraging habitat (structural class 4M). Therefore, Alternative 3 would result in no net loss of CWHR structural classes providing spotted owl habitat within this AOC. While it is recognized that 40 percent canopy cover may provide lower quality foraging habitat than would denser canopied habitat, 40 percent canopy cover is still considered to be a lower threshold for suitable foraging habitat (USFWS 2003, USFWS 2006, USDA 2001, Verner et al 1992). Retention of 10 percent of the DFPZ acres as unthinned patches would likely enhance the value of the DFPZs as suitable habitat by providing areas of unaltered canopy closure within the larger DFPZ units. Such unthinned patches may provide roost or foraging sites for dispersing owls, and may possibly allow greater population levels of prey species such as northern flying squirrels than would be provided if the entire DFPZ unit was uniformly thinned.

The implemented DFPZs would confer some protection against widespread habitat loss due to wildfire. Potential loss of habitat due to wildfire represents a greater potential to exacerbate the concern over the "discontinuous nature of habitat" in this area (Verner et al 1992, p. 48) than would the actions proposed in Alternative 3. Therefore, although approximately 380 acres of the existing owl habitat would be thinned to a minimum canopy cover level for spotted owl foraging habitat, this would be balanced by potential long-term stability in this dry-forest landscape through greater protection from large scale habitat loss due to wildfire that would result from the DFPZs. The retention of 10 percent of DFPZ acres in unthinned patches would likely enhance overall suitability by providing denser patches of habitat within the DFPZ. Also, locating proposed actions outside of the 2,400 acre HRCAs avoided altering existing habitat in areas of importance to known owl sites.

Achieving no net loss of spotted owl habitat would avoid further loss of owl habitat within this AOC. On the other hand, perpetuation of current conditions is likely a perpetuation of conditions outside the historical range of variability for this area, and unthinned areas would remain susceptible to drought-induced causes of mortality. As Smith (1994) stated in regards to eastside pine/fir stands, "…recent drought mortality events suggest that many sites may not support white fir to mature stand development.

This is especially true of overstocked stands". Such "overstocked stands" are generally those that represent spotted owl habitat in eastside conditions.

Cumulative effects

Cumulative effects to spotted owl habitat under Alternative 3 are very similar to Alternative 1. In avoiding loss of spotted owl habitat, Alternative 3 would result in reduced thinning as a means of creating DFPZs relative to Alternative 1, and thus would do less to reverse some of the post-settlement trends in the project area. For instance, fire suppression in the project area has promoted the establishment and increase of fire-susceptible, shade-tolerant white fir in what historically were ponderosa and Jeffrey pine dominated forests (Smith 1994), and has given white fir a competitive edge in eastside forest communities that have a strong potential for white fir (those sites that favor higher moisture) (Smith 1994). Therefore, there is likely a greater proportion of white fir within this cumulative effects area now than historically, due to fire suppression and timber harvest that has preferentially selected for pine species. As Smith (1994) stated, "Many thousands of acres of formerly pine-dominated forest stands in the Eastside Pine region have succumbed to white fir dominance in the last 100 years". By retaining a greater density of trees in Alternative 3, there would likely be a greater retention of white fir than in Alternative 1, reducing the degree to which pines could be returned as the dominant tree type.

Due to historical timber harvest, most of the existing old-growth trees have been removed from eastside forests; average tree dbh and size class are smaller than the historical. By retaining trees >20 inches dbh, Alternative 3 would avoid harvest of approximately 25 percent of the existing population of trees of this size, as estimated to occur under Alternative 1. Harvest of trees >20 inches dbh would be further reduced relative to Alternative 1 due to the elimination of groups under Alternative 3. This greater retention would avoid causing further cumulative reduction in the density of trees of this size within the treated areas. DFPZs created under the standards of Alternative 3 (retention of >20 inch trees and 40 percent canopy closure) would not be any less effective as DFPZs created under Alternative 1. Therefore, there would be no difference in risk of loss of large trees due to wildfire between the two alternatives, and no reduced ability for Alternative 3 DFPZs to provide for firefighter safety and wildfire defense than would Alternative 1 DFPZs. Potential loss of habitat due to wildfire represents a greater potential to exacerbate the concern over the "discontinuous nature of habitat" in this area (Verner et al 1992, p. 48) than would the DFPZs proposed in Alternative 3.

Other cumulative effects discussed under Alternative 1 would also apply to Alternative 3.

Alternative 3 Determination

As in Alternative 1, there would be no effects to spotted owl foraging, dispersal or breeding habitat located within 300 acre PACs, 1,062 acre home range circles, or 2,400 acre HRCAs associated with the three activity centers addressed in this report.

Alternative 3 would result in no net loss of existing spotted owl habitat within the Champs project area, and would reduce effects to northern flying squirrel habitat to just a four percent reduction within mixed-conifer habitats.

Cumulatively, project activities would reverse some long-term vegetative trends within the project area, and the DFPZs would confer some protection against widespread habitat loss due to wildfire, which may be important in this "area of concern" for spotted owls.

Also, thins to create DFPZs would help maintain the health of remnant old-growth trees as well as increase the recruitment of a large tree component currently deficient in the project area.

Historical timber harvest and other mortality factors have through time reduced the numbers of large diameter trees within the analysis area. Alternative 3 would avoid further reducing the density of trees >20 inches dbh by implementing a 20 inch upper diameter limit within DFPZ thinnings, and by dropping group selection harvests. However, as noted in Issue 2, Alternative 3 may leave some larger diameter trees at risk of density related mortality because this alternative is less effective at stocking control with the 20 inch upper diameter limit.

Therefore, Alternative 3 would reduce effects to spotted owl habitat relative to Alternative 1. Also, DFPZs created by Alternative 3 would have no reduced effectiveness relative to those created under Alternative 1. Thus the greater retention of spotted owl habitat components would not reduce the potential protection of habitat at larger scales.

Given the results of the above analyses, the determination that the proposed activities within Alternative 3 of the Champs project is "may affect individuals of California spotted owls, but is not likely to result in a trend towards federal listing or loss of species viability."

Alternative 9

Indicator 1. The amount of suitable habitat at various scales surrounding an owl activity center.

Direct and Indirect Effects

As in Alternative 1, no projects proposed by Alternative 9 would be located within suitable spotted owl habitat within the 300 acre owl PACs, 1,062 acre circles surrounding owl activity centers, or within the delineated HRCAs for these owl sites. Therefore, there would be no direct or indirect effects to spotted owl habitat within these areas under Alternative 9, and the analysis for Alternative 1 would also apply here.

Indicator 2. California spotted owl foraging, dispersal and breeding habitat attributes.

Direct and Indirect Effects

Differences between Alternatives 9 and 1 include, 1) dropping DFPZ thinning treatments from 341 acres of eastside mixed-conifer spotted owl habitat, 2) changing post-treatment fuels treatments from mastication to jackpot pile and burn on 531 acres of DFPZ treatment, 3) reduction of 228 acres of group selection harvests, and, 4) an overall 261 acre reduction in DFPZ treatments (Prescriptions A and B).

Effects of Alternative 9 to existing CWHR structural class are summarized below in Table 21. As indicated, there would be a reduction of about 374 acres of the structural class 4D, 296 acres of which would be classified post-treatment as a 4M strata, and would maintain minimum habitat attributes for spotted owl foraging habitat. As discussed under Alternative 3, while it is recognized that 40 percent canopy cover may provide lower quality foraging habitat than would denser canopied habitat, 40 percent canopy cover is still considered to be a lower threshold for suitable foraging habitat (USFWS 2003, USFWS 2006, USDA 2001, Verner et al 1992). Due to opening of the canopy to less than 40 percent canopy cover in some treatment areas, there would be an overall reduction of 78 acres of spotted owl habitat as a result of Alternative 9.

Table 21. CWHR habitat class of moderate or high reproductive habitat value for California spotted owls, and pre- and post-project acres for each.

	4M	4D	5M	5D	Total
High (H) or Moderate (M)	M	M	H	H	
Pre-project acres	4,109	2,696	0	11	6,816
Post-project acres	4,405	2,322	0	11	6,738
Change in acres	+ 296	- 374	0	0	- 78

Source: CWHR 8.0, GIS and silvicultural files developed for the Champs Project.

As with Alternative 1, retention of 10 percent of the DFPZ acres as unthinned patches would likely enhance the value of the DFPZs as suitable habitat by providing areas of unaltered canopy closure within the larger DFPZ units. Such unthinned patches may provide roost or foraging sites for dispersing owls, and may possibly allow greater population levels of prey species such as northern flying squirrels than would be provided if the entire DFPZ unit was uniformly thinned.

Other Suitable Habitat Attributes

Large Trees

The other primary difference between Alternative 9 relative to Alternative 1 is a 20 inch dbh upper diameter limit within DFPZs versus the 30 inch dbh upper diameter limit in Alternative 1. A large tree component is often cited as a structural attribute of spotted owl habitat, either at a stand scale (Blakesley 2003) or as individual trees used for nesting (Gutierrez et al 1992, Blakesley 2003). As discussed under Alternative 1, the current population of trees within DFPZs that are ≥20 inches dbh is approximately 16 trees per acre. While stand exams indicate approximately 4 (25 percent) of the 16 trees per acre ≥20 inches dbh may be harvested under Alternative 1, all such trees would be retained by Alternative 9. The trees between 20-24 inches dbh would likely be the first additional trees to be recruited post-treatment into a size class 5, a size class rare on the eastside landscape, and one that currently makes up just 11

acres (0.2 percent; Table 8 in the BE for Terrestrial Species) of the 6,816 acres of existing spotted owl habitat in the project area.

As described under Alternative 1, group selection harvests would result in much reduced canopy closure due to the removal of essentially all trees smaller than 30 inches dbh and those not meeting the IDFs. Stand modeling indicated that approximately 8 trees per acre in the 20-30 inch dbh range could be removed within group selection units (Silviculture Report, Champs project record). However, of the 261 acres of group selections within Alternative 9, all but 27 acres are within eastside pine, which is not a suitable forest type for spotted owls. Of the 27 other acres, none of them occur within suitable spotted owl habitat (CWHR 4M or 4D eastside mixed-conifer structural classes), and none occur in mixed-conifer within the spotted owl Area of Concern. Of the 27 acres within eastside mixed-conifer, 1 acre was within 4P (canopy cover too open to be spotted owl habitat) and the rest were in CWHR size class 3 (too small to be spotted owl habitat). Therefore, there would be no effect to spotted owl habitat by the group selection harvests proposed within Alternative 9, and no effect to the habitat status or mixed-conifer status within the Area of Concern.

DFPZs created under the standards of Alternative 9 would not be any less effective as DFPZs created under Alternative 1 (see the Champs Fire and Fuels Report). Therefore, retention of trees ≥20 inches dbh, and avoidance of some inclusions of spotted owl habitat within the DFPZs, would result in no difference in risk of widespread spotted owl habitat loss due to wildfire between the two alternatives, and no reduced ability for Alternative 9 DFPZs to provide for firefighter safety and wildfire defense than would Alternative 1 DFPZs.

Snags and Downed Logs

Retention standards for snags and downed logs would be the same in Alternative 9 as under both Alternatives 1 and 3. Therefore, there should be no substantial difference in the effects of Alternative 9 to snags and logs within treatment areas as was already previously discussed for the other alternatives. However, Alternative 9 would result in 477 fewer treatment acres than Alternative 1, and 233 fewer acres than Alternative 3 (Table 6 in the BE for Terrestrial Species). Of these acres, 341 acres are located within eastside mixed-conifer spotted owl habitat that typically has more snags per acre than eastside pine due to white fir mortality. Therefore, the net effects to existing snag and downed log levels under Alternative 9 would likely be less than the other two alternatives due to fewer treatment acres. Similarly, the potential effects of Sporax application in the treatment areas would also be the same as described under Alternative 1, with less Sporax application under Alternative 9 due to reduced treatment acres.

Prey Species

In the Champs project area, CWHR habitat class that provide moderate or high reproductive habitat for flying squirrels include eastside pine 3D, 4D, 5M and 5D, and mixed-conifer 3M, 3D, 4M, 4D, 5P and 5D. Pre-project, approximately 10,745 acres exist within these strata (Table 8 in the BE for Terrestrial Species), of which 1,713 acres are eastside pine and 9,032 is mixed-conifer. Post-project, Alternative 9 would result in a reduction of about 1,126 acres, to a total of 9,619 acres (Table 11 in the BE for

Terrestrial Species), due to canopy cover reductions. Of this decrease, 659 acres would be within the eastside pine type, while 467 acres would be within eastside mixed-conifer, representing a 5percent decrease of this habitat type.

As described under Alternative 1, Lehmkuhl et al (2006) suggest that dry ponderosa pine type forests are a "population sink" for northern flying squirrels, and that spotted owls avoid these same forest types. Therefore, reduction in flying squirrel habitat in eastside pine is likely of little consequence to spotted owls because this habitat type may be a sink (not a source) for flying squirrel populations, and spotted owls would avoid this habitat type. Lehmkuhl et al (2006) also point out that though thinnings may result in stand-scale impacts to flying squirrels, this is balanced by potential long-term stability in dry-forest landscapes and avoidance of large scale habitat loss due to wildfire. Therefore, the primary effect to northern flying squirrels as a result of Alternative 9 would be the 5 percent decrease in flying squirrel habitat located within mixed-conifer types, while the implemented DFPZs would help provide the long-term stability discussed by Lehmkuhl et al (2006). Due to the design of Alternative 9 to reduce effects to spotted owl habitat, this 5 percent reduction in flying squirrel habitat is less than the estimated 15 percent reduction as a result of Alternative 1, and about 80 acres more than Alternative 3.

Indicator 3. Reduction of habitat within California spotted owl Area of Concern

Direct and Indirect Effects

As discussed under Alternative 1, the Champs project area is located partially within an AOC identified within the California spotted owl technical report (Verner et al 1992, p. 47). This AOC was located in Lassen County, and the reason for concern was, "Habitat in this area is discontinuous, naturally fragmented, and poor in quality due to drier conditions and lava-based soils" (Verner et al 1992, p. 48). Due to the xeric nature of the area, the large amount of eastside pine, and large, non-forested openings, this area was naturally and historically fragmented in terms of spotted owl habitat.

Within the 3,446 acres of spotted owl habitat within the project area that are also located within the AOC, Alternative 9 proposes thinnings to create DFPZs within approximately 444 acres of this existing habitat, but would defer DFPZ thinning within 94 acres of habitat that were proposed for thinning in Alternative 1. These acres of habitat were located within critical portions of the DFPZs and were considered necessary to thin in order to create effective DFPZ segments (see the Champs Fire and Fuels Report).

Post-project, these 444 acres of DFPZ thinning would retain ≥40 percent canopy cover, the lower canopy cover levels of spotted owl foraging habitat (CWHR structural class 4M). Therefore, DFPZs in Alternative 9 would result in no net loss of CWHR structural classes providing spotted owl habitat within this AOC, while deferring treatment in 94 acres that were proposed under Alternative 1. While it is recognized that 40 percent canopy cover may provide lower quality foraging habitat than would denser canopied habitat, 40 percent canopy cover is still considered to be a lower threshold for suitable foraging habitat (USFWS 2003, USFWS 2006, USDA 2001, Verner et al 1992). Retention of 10 percent of the DFPZ acres as unthinned patches would likely enhance the value of the DFPZs as suitable habitat by

providing areas of unaltered canopy closure within the larger DFPZ units. Such unthinned patches may provide roost or foraging sites for dispersing owls, and may possibly allow greater population levels of prey species such as northern flying squirrels than would be provided if the entire DFPZ unit was uniformly thinned.

Existing habitat used by California spotted owls is vulnerable to stand-replacing catastrophic fire, and one of the challenges in assessing the effects of fire management in the habitat of California spotted owls is the need to weigh long-term benefits of reducing the risk of catastrophic fire against any potential short-term effects on the quality or quantity of spotted owl habitat (USFWS 2006). As stated by the USFWS (2006, p. 29900), "…fuels reduction activities can have short-term adverse effects, but they can also reduce the greater risk of catastrophic wildfire in the long term which effectively ameliorates the short-term effects". Wildfire effects, especially those associated with large, stand replacing wildfires, are considered a major source of risk to spotted owl populations due to loss and degradation of habitat, creation of habitat gaps, and lengthy time periods for habitat reestablishment (USDA 2004, Vol. 1, p. 277).

The implemented DFPZs would confer some protection against widespread habitat loss due to wildfire. Potential loss of habitat due to wildfire represents a greater potential to exacerbate the concern over the "discontinuous nature of habitat" in this area (Verner et al 1992, p. 48) than would the actions proposed in Alternative 9. Therefore, although approximately 444 acres of the existing owl habitat in the AOC would be thinned to a minimum canopy cover level for spotted owl foraging habitat, this would be balanced by potential long-term stability in this dry-forest landscape through greater protection from large scale habitat loss due to wildfire that would result from the DFPZs.

Within the AOC, there would also be 41 acres of RHCA thinning (Prescription C) within DFPZs that occur within spotted owl habitat, and 180 acres of prescribed fire only (Prescription D) within spotted owl habitat. These 180 acres of prescribed fire would occur within previously thinned areas, and thus would result in little change to the existing stand structure, and are not expected to measurably decrease the existing canopy cover. These underburn only areas would remain spotted owl habitat after this treatment. The RHCA thinning would result in canopy closures of less than 40 percent, resulting in these acres no longer being suitable spotted owl habitat post-treatment. These 41 acres represent just 1 percent of the total suitable spotted owl habitat currently within the AOC within the project boundaries.

Cumulative effects

Cumulative effects to spotted owl habitat under Alternative 9 are very similar to those already discussed under Alternatives 1 and 3. In reducing loss of spotted owl habitat, Alternative 9 would result in reduced thinning as a means of creating DFPZs relative to Alternative 1, and thus would do less to reverse some of the post-settlement trends in the project area. For instance, fire suppression in the project area has promoted the establishment and increase of fire-susceptible, shade-tolerant white fir in what historically were ponderosa and Jeffrey pine dominated forests (Smith 1994), and has given white fir a competitive edge in eastside forest communities that have a strong potential for white fir (those sites that favor higher moisture) (Smith 1994). Therefore, there is likely a greater proportion of white fir within this cumulative

effects area now than historically, due to fire suppression and timber harvest that has preferentially selected for pine species. As Smith (1994) stated, "Many thousands of acres of formerly pine-dominated forest stands in the Eastside Pine region have succumbed to white fir dominance in the last 100 years". By retaining a greater density of trees in Alternative 9, as well as deferring treatment in 341 acres of this habitat type, there would be a greater retention of white fir than in Alternative 1, reducing the degree to which pines could be returned as the dominant tree type.

Due to historical timber harvest, most of the existing old-growth trees have been removed from eastside forests; average tree dbh and size class are smaller than the historical. By retaining trees ≥20 inches dbh within DFPZs and the area thinning, Alternative 9 (and Alternative 3) would avoid harvest of approximately 25 percent of the existing population of trees of this size, as estimated to occur under Alternative 1. Harvest of trees 20-29 inches dbh would occur within Prescriptions C and F, however only 44 acres (all within Prescription C, the RHCA thinning) would occur in suitable spotted owl habitat; therefore, this potential would be greatly minimized relative to Alternative 1. Relative to Alternative 3, there would be 519 acres of Prescription C, and 261 acres of Prescription F proposed under Alternative 9 (neither prescription was proposed in Alternative 3), however, only 44 acres of these would occur in suitable spotted owl habitat, the remainder is within eastside pine or mixed-conifer stands that do not qualify as spotted owl habitat. Therefore, this potential effect to trees 20-29 inches dbh is minimized and would not meaningfully add to the cumulative reduction of trees of this size across the 6,816 acres of existing spotted owl habitat within the project area.

DFPZs created under the standards of Alternative 9 would not be any less effective as DFPZs created under Alternative 1 (see Champs Fire and Fuels Report). Therefore, there would be no difference in risk of loss of large trees due to wildfire between the two alternatives, and no reduced ability for Alternative 9 DFPZs to provide for firefighter safety and wildfire defense than would Alternative 1 or 3 DFPZs. Potential loss of habitat and large trees due to wildfire represents a greater potential to exacerbate the concern over the "discontinuous nature of habitat" in this area (Verner et al 1992, p. 48) than would the DFPZs proposed in this alternative.

The Champs project area is within or adjacent to an "area of concern" for California spotted owls (Verner et al 1992, p. 48), due to the discontinuous nature of the habitat in this area of concern. Due to the xeric nature of the area, the large amount of eastside pine, and large, non-forested openings, this area was historically and naturally fragmented in terms of spotted owl habitat. The proposed treatments in Alternative 9 would result in the reduction of only 44 acres of habitat currently typed as spotted owl habitat within this AOC, with represents just 1.3 percent of the 3,446 acres of spotted owl habitat estimated to be within the area of overlap between the AOC and the Champs project area. Although this small amount of habitat would be reduced to non-habitat standards, this project would be consistent with the discussion by the USFWS regarding the need to weigh long-term benefits of reducing the risk of catastrophic fire against any potential short-term effects on the quality or quantity of spotted owl habitat (USFWS 2006). As stated by the USFWS (2006, p. 29900), "…fuels reduction activities can have short-term adverse effects, but they can also reduce the greater risk of catastrophic wildfire in the long term

which effectively ameliorates the short-term effects". Wildfire effects, especially those associated with large, stand replacing wildfires, are a major source of risk to spotted owl populations due to loss and degradation of habitat, creation of habitat gaps, and lengthy time periods for habitat reestablishment (USDA 2004, Vol. 1, p. 277).

Minimizing the reduction of spotted owl habitat would help mitigate further loss and fragmentation of owl habitat within this AOC. On the other hand, perpetuation of these habitat conditions is likely a perpetuation of conditions outside the historical range of variability for this area, and unthinned areas would remain susceptible to drought-induced causes of mortality. As Smith (1994) stated in regards to eastside pine/fir stands, "…recent drought mortality events suggest that many sites may not support white fir to mature stand development. This is especially true of overstocked stands". Such "overstocked stands" are generally those that represent spotted owl habitat in eastside conditions.

Other cumulative effects discussed under Alternative 1 would also apply to Alternative 9.

Alternative 9 Determination

As in Alternatives 1 and 3, there would be no effects to spotted owl foraging, dispersal or breeding habitat located within 300 acre PACs, 1,062 acre home range circles, or 2,400 acre HRCAs associated with the three activity centers addressed in this report.

Alternative 9 would result in an approximate 78 acre net loss of existing spotted owl habitat within the Champs project area, and, relative to Alternative 1, would reduce effects to northern flying squirrel habitat to just a 5 percent reduction within mixed-conifer habitats, similar to Alternative 3.

Cumulatively, project activities would reverse some long-term vegetative trends within the project area, and the DFPZs would confer some protection against widespread habitat loss due to wildfire, which is be important in this "area of concern" for spotted owls.

Also, thins to create DFPZs would help maintain the health of remnant old-growth trees as well as promote the recruitment of a large tree component currently deficient in the project area.

Historical timber harvest and other mortality factors have through time reduced the numbers of large diameter trees within the analysis area. Alternative 9 would minimize further reducing the density of trees $\geq$20 inches dbh in spotted owl habitat by implementing a 20 inch upper diameter limit within DFPZ thinnings in spotted owl habitat, and by dropping group selection harvests locating in spotted owl habitat. Potential for harvest of these trees would largely be restricted to Prescriptions C and F.

Therefore, Alternative 9 would reduce effects to spotted owl habitat relative to Alternative 1. Also, DFPZs created by Alternative 9 would have no reduced effectiveness relative to those created under Alternative 1. Thus the greater retention of spotted owl habitat components relative to Alternative 1 would not reduce the potential protection of habitat at larger scales.

Given the results of the above analyses, it is determined that the proposed activities within Alternative 9 of the Champs project "may affect individuals of California spotted owls, but is not likely to result in a trend towards federal listing or loss of species viability."

Issue 2

Large, old trees, 20 inches dbh and greater, in eastside pine, are already scarce on the landscape. The commenter perceives that most of the 20 to 30 inch dbh pines would be logged and that we cannot justify the removal of 20 inch pine or 25 inch cedar ecologically, and there is no retention provision for non-pine old growth. The proportion of old pine trees greater than 200 years that are likely to be logged should be disclosed, and the adverse impacts and cumulative effects of the loss of these old eastside pines should be analyzed. Table 7 summarizes the indicator and measures for this issue.

As was noted in the section "Historic and existing vegetative conditions within the Champs Project area," most of the dominant and codominant trees are approximately 100 years old. These are primarily young, second growth stands. Large, remnant, predominant ponderosa, Jeffrey, and sugar pine trees remain, but they are generally widely scattered and small in number. Large pine stumps are also present, providing evidence of past species composition.

These changes have been thoroughly documented in scientific literature and assessments, forest reconnaissance reports, comparisons of transect data, and Government Land Office (GLO) data. This research indicates that current landscape vegetative conditions within eastside landscapes on the Eagle Lake Ranger District (ELRD) are outside their range of historical variability in terms of vegetative structure.

Due to historic timber harvest and other mortality factors, there are fewer numbers of old-growth or legacy trees, which are aged at 200 years and older, on the landscape than there were historically (USDA, 2001). Remnant, large, old trees are small in number and widely scattered. It is desirable to retain and maintain these existing, remaining old-growth trees within units proposed for treatment. Only a small number of existing trees over 20 inches dbh are 200 years and older. Because tree diameter tends to be a poor predictor of tree age, the Dunning tree classification is considered a more accurate basis for identification of these old-growth trees, and would therefore be referenced to guide in the determination for priority retention of ponderosa and Jeffrey pines, focusing on Dunning overmature tree classes 5 and 7 first, then mature tree classes 3 and 4 (Ritchie and Skinner, 2006; Dunning, 1928). This system cannot be used for other species, so retention standards for white fir and incense cedar would be based on average tree age data provided by PSW Research Station from Blacks Mountain Experimental Forest which is on the District directly west of the project area, again using 200 years as the basis of retention. Data from BMEF indicate that, on average, white fir greater than 29.9 inches diameter, and incense cedars 24 inches diameter and greater, are typically 200 years in age or older.

Indicator. Scarcity of Trees ≥ 20 inches dbh on the landscape.

Alternative 1 – Proposed Action

Direct and Indirect Effects

Empirical data from proposed DFPZ thinning within the Champs project area indicate that approximately four trees per acre (of which, 3 are 20 to 23.9 inches diameter and 1 is 24 to 29.9 inches diameter), or 25

percent, of trees 20 inch diameter and greater could be removed through DFPZ thinning, with possibly up to eight trees per acre removed through group selection harvesting. These would be young, second growth trees. No legacy trees 200 years or older would be cut.

Empirical data indicates that no incense cedar trees >24 inches dbh are being removed. In addition, radial thinning would occur around these legacy trees to reduce competition with younger trees for soil moisture and other site resources. Radial thinning would occur within a 30-foot radius from the bole of legacy tree individuals, generally removing competing trees from the root system, with the exception of other legacy trees, which would increase individual tree health and vigor.

In eastside mixed conifer, maintaining tree stocking levels at a higher range gives way to the potential for higher levels of tree mortality. When higher densities would be retained, competition and stress would be only slightly alleviated for a shorter period of time, if at all. In particular, some of the very trees that are desired for retention in the larger size class, particularly pines, would succumb to competition and stress, and only a percentage would be maintained or transition into larger size classes due to decreased health and vigor. Residual trees would be more susceptible to mechanical damage from harvest operations and fuels treatments because of the higher tree stocking. White fir, which is a heavy component in these strata, is especially susceptible to damage because of its thin bark. These injuries can provide points of entry for heart rot and annosus root disease. Remaining large, predominant, overstory trees would remain at risk of mortality from inter-tree competition.

In thinned eastside pine, trees would be healthy and vigorous as a result of reduced competition and stress, thus diameters would increase faster, and several stands would transition into larger size classes.

Within all DFPZ prescriptions, 9,436 acres, and specifically A, B, and C which primarily involve commercial, mechanical tree removal, predominant, overmature, legacy trees and healthy fire-resilient dominant and codominant overstory trees would typically be retained.

DFPZ Prescription A was modeled using FVS with a representative stands described in the Fuels Report (Champs project record). After thinning, the eastside pine stand was classified as CWHR 4P with an average stand diameter of 19.1 inches (Table 22). After thinning, the eastside mixed conifer stand was classified as CWHR 4P with an average stand diameter of 12.6 inches (Table 23).

Stand development at twenty years (year 2026) was also modeled in FVS. Twenty years after thinning, the treated eastside pine stand still typed out as CWHR 4P with an average stand diameter of 23.2 inches (Table 22). Twenty years after thinning, the treated eastside mixed conifer stand typed out as CWHR 4M with an average stand diameter of 15.3 inches (Table 23).

Table 22. FVS modeling results of Prescription A for eastside pine CWHR 4M stands for existing conditions, post-thinning, and 20 years post-thinning.

EP	CWHR	QMD
Existing Condition	4M	13.5”
Post-thinning	4P	19.1”
20 Years	4P	23.2”

Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter

Table 23. FVS modeling results of Prescription A for eastside mixed conifer CWHR 4M stands for existing conditions, post-thinning, and 20 years post-thinning.

EMC	CWHR	QMD
Existing Condition	4M	5.8”
Post-thinning	4P	12.6”
20 Years	4M	15.3”

Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter

DFPZ Prescription B would be used to treat 535 forested acres to reduce surface, ladder, and canopy fuels. Conditions, treatments, and modeling for Prescription B are comparable to the above discussion pertaining to Prescription A, for large tree retention.

DFPZ Prescription C would be used to treat 519 forested acres to reduce surface, ladder, and canopy fuels in accordance with the 2004 SNFPA ROD guidelines for fuel reduction treatments in RHCAs, and is needed to meet pertinent RMOs. Conditions in areas receiving this treatment are comparable to the above discussion pertaining to Prescription A.

Available soil moisture is another site factor that influences understory plant composition and herb richness, which would increase and be available longer during the growing season in thinned stands. Residual trees would reach larger sizes sooner, increasing the potential for delivery of larger trees to the RHCAs in the long-term.

Due to the nature of thinning from below, removing more of the smaller diameter trees in this restorative treatment, average stand diameters would generally increase by four to 12 inches. Trees less than 30 inches dbh would be removed; however, most trees to be cut would be 20 inches dbh or less. Larger trees could be cut to break up pockets of fuel continuity or to selectively leave an adjacent similar-sized but smaller, healthier tree. Typically, trees considered for removal include primarily encroaching small diameter conifers in the understory, as well as small and medium sized trees where arrangement and densities warrant removal. Most of the overstory trees would be retained to maintain stocking levels in desired tree characteristics.

DFPZ Prescription C was modeled using FVS with the representative stand described above. After thinning, average stand diameter increased to 20 inches dbh. Stand development at twenty years (year 2026) was also modeled in FVS. Twenty years after thinning, average stand diameter increased to 22 inches dbh (Table 24).

Table 24. FVS modeling results of Prescription C for eastside pine CWHR 4M stands for existing conditions, post-thinning, and 20 years post-thinning.

EP	CWHR	QMD
Existing Condition	4M	12.0”
Post-thinning	4S	20.0”
20 Years	4S	22.0”

Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter

Group selection Prescription F would be used on 489 acres of forested stands. Group selection is an uneven-aged method of regenerating an area by establishing a small opening 2 acres or less in size, which

is then regenerated via natural and/or artificial means. Group selections provide structural diversity by creating small patches of vegetation and young trees interspersed in stands of larger trees. Identified areas from ½ to 2 acres in size would have most trees less than 30 inches in diameter cut; however, existing healthy sugar pine and predominant, overmature, legacy trees would generally be retained, as well as all trees 30 inches dbh and greater, regardless of species or condition. Groups would generally contain no more than a maximum of 2 large trees per acre.

As discussed in the Proposed Action, placement of group selections are typically focused in 4M and 4D CWHR strata because this particular strata is the most predominant on the landscape and offers the best potential to increase structural diversity, both vertically and horizontally. In addition, size class 4 strata have diameters ranging from 11 to 23.9 inches, which should assist in producing a minimum of roughly 2.5 mbf of sawlog volume per acre, thus accommodating economic viability for timber sales and contributing to rural community economic stability factors. Because group selections are such small gaps on the landscape and are implemented on much less than 10 percent of a stand, there is no measurable effect they would have on changing overall stand strata. Group selection placement would avoid CWHR strata 5M and 5D.

Groups were located to avoid the largest trees, especially those 30 inches dbh and greater, while still considering commodity outputs and the purpose and need for group selections. Field estimates indicate that, typically, the majority of the volume to be removed would come from trees between 12 to 19 inches dbh, with only about one quarter of the volume coming from trees between 20-29.9 inches dbh. Up to eight trees per acre 20 inches in diameter and greater could be removed with the group selection prescription.

Trees to be cut in Prescription G would predominantly be pines in the understory and midstory, with occasional overstory trees removed to create gaps and to break up canopy fuels. This treatment would remove trees less than 30 inches dbh; however, most trees to be cut would be 20 inches dbh or less. Due to considerable thinning of predominantly smaller diameter trees and retention of lower basal areas, average stand diameters would dramatically increase by about six to nine inches post-treatment (Table 25).

Table 25. FVS modeling results of Prescription G for eastside pine CWHR 4M stands for existing conditions, post-thinning, and 20 years post-thinning.

EP	CWHR	QMD
Existing Condition	4M	11.7”
Post-thinning-60	4S	18.1”
Post-thinning-80	4S	18.0”
20 Years-60	4P	22.5”
20 Years-80	4P	22.2”

Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter

Stands to be treated under Prescription H are young plantations, so trees selected for removal are typically less than eight inches dbh.

Cumulative Effects

Overstory removal focused on removing overstory trees that were damaged, diseased, and/or exhibited low vigor and growth rates, while retaining healthy intermediate and understory trees. These treatments were designed to improve forest health and growth. Where healthy pine were retained or subsequently interplanted, these overstory removal treatments are projected to develop pine and mixed conifer overstories over the next several decades. Removal of predominant overstory trees with this treatment in the past 25 years, combined with historic logging back to the turn of the century, has contributed to the loss of large pine trees that once dominated the landscape and are now slowly disappearing from the project area. Regeneration harvesting (clearcuts, shelterwoods, etc.) also contributed to the loss of large, predominant overstory trees. Salvage harvesting of drought induced, insect killed trees has occurred, removing dead trees of commercial value.

Thinning stands from below with an emphasis on retaining the larger, healthier trees would increase the health and vigor of the remaining trees while improving the long-term sustainability of the forested areas within the project area (Taylor, 1998; Dolph, 1995; Fiddler et al, 1995). Immediately after thinning, stand average diameter would increase and recruitment of future large, old-growth trees would increase. Data collected in the project area and on the District indicate that 24 inch diameter and greater trees are similar between thinned and unthinned stands. However, the real difference in diameter distribution occurs in the 18 to 22 inch range. Thinned stands show an increase over unthinned stands in trees per acre in the 18 to 22 inch dbh range. Also, the periodic annual increment (PAI,) as measured in diameter growth, is much higher for trees in thinned stands over trees in unthinned stands. Again, data indicates that individual tree diameter growth increases over similar sized trees in unthinned stands.

Future maintenance treatments are analyzed within the DFPZ treatment areas on a schedule of five and 10 years. The bulk of these treatments would occur in approximately 10 years and would remove small trees and brush through hand treatment, mechanical treatment, or underburning. These maintenance treatments would maintain relatively open understories with small amounts of regeneration, and would allow for continued vigor and growth of the residual trees.

Alternative 2

Direct and Indirect Effects

Under Alternative 2, no trees would be removed; therefore the 16 trees per acre currently residing on the landscape would remain. Existing stand conditions would persist and develop unaltered by active management.

FVS modeling with the existing conditions of the eastside pine stand include classification as CWHR 4M with an average stand diameter of 13.5 inches. Existing conditions of the eastside mixed conifer stand include classification as CWHR 4M with an average stand diameter of 5.8 inches.

Stand development at twenty years (year 2026) was also modeled in FVS. Twenty years into the future with no treatment, the eastside pine stand typed out as CWHR 4M with an average stand diameter

of 17.3 inches. Twenty years into the future with no treatment, the eastside mixed conifer stand typed out as CWHR 4M with an average stand diameter of 7.6 inches.

These projected attributes are summarized for eastside pine and eastside mixed conifer in Tables 26 and 27.

Table 26. FVS modeling results for eastside pine CWHR 4M stands for existing conditions and 20 years into the future.

EP	CWHR	QMD
Existing Condition	4M	13.5”
20 Years	4M	17.3”

Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter

Table 27. FVS modeling results for eastside mixed conifer CWHR 4M stands for existing conditions and 20 years into the future.

EMC	CWHR	QMD
Existing Condition	4M	5.8”
20 Years	4M	7.6”

Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter

Cumulative Effects

Cumulative effects of no action would primarily impact conditions of forest health.

The No Action alternative would rely on disturbances such as density-related mortality and fire occurrence, or the lack thereof, to shape forest structure. The loss of large, old, predominant trees over 30 inches diameter would continue. Species and structural diversity and a valuable seed source would continue to decline across the project area. For a complete description of these factors, see the Silviculture section of this EA.

Alternative 3

Direct and Indirect Effects

No trees greater than 20 inches diameter would be removed. Therefore the 16 trees per acre currently residing on the landscape would remain. However, more large, predominant overstory trees would remain at risk of mortality from inter-tree competition because of the 20 inch upper diameter limit. This alternative would be less effective at stocking control than Alternative 1.

As with Alternative 1, within all treatments involving mechanical harvesting, specifically A, B, and G, legacy trees would typically be retained where they exist on the landscape, and maintained to the extent possible with radial thinning to reduce competition and increase individual legacy tree health and vigor.

In eastside mixed conifer, maintaining tree stocking levels at a higher range gives way to the potential for higher levels of tree mortality. When higher densities would be retained, competition and stress would be only slightly alleviated for a shorter period of time, if at all. In particular, some of the very trees that

are desired for retention in the larger size class, particularly pines, would succumb to competition and stress, and only a percentage would be maintained or transition into larger size classes due to decreased health and vigor. Residual trees would be more susceptible to mechanical damage from harvest operations and fuels treatments because of the higher tree stocking. White fir, which is a heavy component in these strata, is especially susceptible to damage because of its thin bark. These injuries can provide points of entry for heart rot and annosus root disease. Remaining large, predominant, overstory trees would remain at risk of mortality from inter-tree competition.

In thinned eastside pine, trees would be healthy and vigorous as a result of reduced competition and stress, thus diameters would increase faster, and several stands would transition into larger size classes.

Within all DFPZ prescriptions totaling 9,681 acres, and specifically A and B, which primarily involve commercial, mechanical tree removal, predominant, overmature, legacy trees and healthy fire-resilient dominant and codominant overstory trees would typically be retained.

The only difference between Alternative 3 and Alternative 1 that applies to eastside pine and eastside mixed conifer is an upper diameter limit of 20 inches. Further, in eastside mixed conifer that is currently typed as suitable California spotted owl habitat (CWHR eastside mixed conifer 4M, 4D, and 5D), thinning would be performed at a slightly lower intensity to retain a minimum canopy closure of 40 percent. FVS modeling indicated that adjusting the prescription for the 20 inch upper diameter limit in Alternative 3 would create only minimal differences to overall stand density averages, as compared to Alternative 1, that are not worth noting. Thus, conditions and effects for these strata would be the same as those discussed in Alternative 1. However, it is worth noting, that with the 20 inch upper diameter limit, in areas or clumps where retention of all such trees exceeds the carrying capacity as measured by basal area, trees would be left at risk of mortality due to the stress of inter-tree competition because this alternative would be less effective at stocking control.

DFPZ Prescription A, for owl habitat, was modeled using FVS with the representative stand described above. After thinning, the eastside mixed conifer stand was still classified as CWHR 4M with an average stand diameter of 12.5 inches.

Stand development at twenty years (year 2026) was also modeled in FVS. Twenty years after thinning, the treated eastside mixed conifer stand still typed out as CWHR 4M with an average stand diameter of 15.3 inches.

These projected attributes are summarized for eastside mixed conifer, classifying as owl habitat, in Table 28.

Table 28. FVS modeling results of Prescription A for eastside mixed conifer CWHR 4M stands for existing conditions, post-thinning, and 20 years post-thinning.

EMC	CWHR	QMD
Existing Condition	4M	5.8”
Post-thinning	4M	12.5”
20 Years	4M	15.3”

Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter

Cumulative Effects

In eastside mixed conifer, more large, predominant, overstory trees would remain at risk of mortality from inter-tree competition because the post-treatment SDI is approaching or is above 60 percent of maximum. This alternative would be less effective at stocking control because it is expected that most of these stands would grow back into the zone of imminent mortality in a shorter period of time. Acres of group selection openings to regenerate shade intolerant pine would be forgone. Because of these two factors, opportunities are lost to regenerate shade intolerant pine species and trend these forests closer to their historical species composition and structure.

Alternative 9

Direct and Indirect Effects

Trees 20 inches and greater in diameter could be removed on 780 acres proposed for treatment under Prescriptions C and F. Empirical data from proposed DFPZ thinning within the Champs project area indicate that approximately four trees per acre (of which, 3 are 20 to 23.9 inches diameter and 1 is 24 to 29.9 inches diameter), or 25 percent, of trees 20 inch diameter and greater could be removed through DFPZ thinning (Prescription C), with possibly up to eight trees per acre removed through group selection harvesting (Prescription F). These trees could be removed to reduce stocking to prescribed levels, as measured by basal area, and to remove trees that do not meet prescribed retention criteria. These would be young, second-growth trees. No legacy trees 200 years or older would typically be cut. Empirical data also indicates that no incense cedar trees 24 inches dbh and greater are being removed. In addition, radial thinning would occur around these legacy trees to reduce competition with younger trees for soil moisture and other site resources. Radial thinning would occur within a 30-foot radius from the bole of individual legacy tree generally removing competing trees from the root system, with the exception of other legacy trees, which would increase individual tree health and vigor.

On the remaining acres proposed for treatment, specifically those being treated under Prescriptions A, B, and G, the 16 trees per acre with diameters of 20 inches and greater currently residing on the landscape would remain, because these prescription areas would have a 20 inch upper diameter limit. However, more large, predominant, overstory trees would remain at risk of mortality from inter-tree competition because of the 20 inch upper diameter limit. This alternative would be less effective at stocking control, specifically A, B, and G, legacy trees would typically be retained where they exist on the landscape, and maintained to the extent possible with radial thinning to reduce competition and increase individual legacy tree health and vigor.

In eastside mixed conifer, maintaining tree stocking levels at a higher range gives way to the potential for higher levels of tree mortality. When higher densities would be retained, competition and stress would be only slightly alleviated for a shorter period of time, if at all. In particular, some of the very trees that are desired for retention in the larger size class, particularly pines, would succumb to competition and stress, and only a percentage would be maintained or transition into larger size classes due to decreased health and vigor. Residual trees would be more susceptible to mechanical damage from harvest operations

and fuels treatments because of the higher tree stocking. White fir, which is a heavy component in these strata, is especially susceptible to damage because of its thin bark. These injuries can provide points of entry for heart rot and annosus root disease. Remaining large, predominant, overstory trees would remain at risk of mortality from inter-tree competition.

In thinned eastside pine, trees would be healthy and vigorous as a result of reduced competition and stress, thus diameters would increase faster, and several stands would transition into larger size classes.

Within all DFPZ prescriptions totaling 9,566 acres, and specifically A, B, and C, which primarily involve commercial, mechanical tree removal, predominant, overmature, legacy trees and healthy fire-resilient dominant and codominant overstory trees would typically be retained.

The only difference between Alternative 9 and Alternative 1 that applies to eastside pine and eastside mixed conifer is an upper diameter limit of 20 inches applied under Prescriptions A, B, and G. Further, in eastside mixed conifer that is currently typed as suitable California spotted owl habitat (CWHR eastside mixed conifer 4M, 4D, and 5D), thinning would be performed at a slightly lower intensity to retain a minimum canopy closure of 40 percent. FVS modeling indicated that adjusting the prescription for the 20 inch upper diameter limit in Alternative 9 would create only minimal differences to overall stand density averages, as compared to Alternative 1, that are not worth noting. Thus, conditions and effects for these strata would be the same as those discussed in Alternative 3. However, it is worth noting, that with the 20 inch upper diameter limit, in areas or clumps where retention of all such trees exceeds the carrying capacity as measured by basal area, trees would be left at risk of mortality due to the stress of inter-tree competition because this alternative would be less effective at stocking control.

DFPZ Prescription A, for owl habitat (eastside mixed conifer), was modeled using FVS with the representative stand described under Prescription A for Alternative 1. After thinning, the eastside mixed conifer stand was still classified as CWHR 4M with an average stand diameter of 12.5 inches.

Stand development at twenty years (year 2026) was also modeled in FVS. Twenty years after thinning, the treated eastside mixed conifer stand still typed out as CWHR 4M with an average stand diameter of 15.3 inches (Table 29).

These projected attributes are summarized for eastside mixed conifer, classifying as owl habitat, as follows.

Table 29. FVS Modeling Results of Prescription A for Eastside Mixed Conifer CWHR 4M Stands for Existing Conditions, Post-thinning, and 20 Years Post-thinning

EMC	CWHR	QMD
Existing Condition	4M	5.8”
Post-thinning	4M	12.5”
20 Years	4M	15.3”

Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter

Prescription B surface fuel treatment would change from mastication to jackpot pile and burn in Alternative 9 only, which would allow for greater retention of large, downed woody material.

Cumulative Effects

In eastside mixed conifer, more large, predominant, overstory trees would remain at risk of mortality from inter-tree competition because the post-treatment SDI is approaching or is above 60 percent of maximum. This alternative would be less effective than Alternative 1 at stocking control because it is expected that most of these stands would grow back into the zone of imminent mortality in a shorter period of time. Acres of group selection openings to regenerate shade intolerant pine would be fewer than Alternative 1. Because of these two factors, fewer opportunities are realized to regenerate shade intolerant pine species or trend these forests closer to their historical species composition and structure.

Environmental Effects of Other Resources

A summary of direct, indirect and cumulative effects for each resource by alternative is shown below.

Aquatics

Introduction

This section summarizes the potential affects of the Champs Project on two Forest Service Sensitive aquatic species that may be affected by the project. The following Forest Service Sensitive aquatic species are discussed in this section: Topaz juga (*Juga acutifilosa*) and Eagle Lake rainbow trout (*Oncorhynchus mykiss aquilarum*). A full list of Threatened, Endangered, and Sensitive aquatic species considered for the Champs Project is contained in Appendix A.

No aquatic Management Indicator Species (MIS) would be affected by the Champs Project. A full list of MIS aquatic species considered for the Champs Project is contained in Appendix A.

The Aquatics Biological Evaluation for the Champs Environmental Assessment is hereby incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

The Factors Influencing Understory Vegetation document for the Champs Environmental Assessment is hereby incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

Topaz Juga (Forest Service Sensitive)

This species' range is distributed amongst spring-fed waters within the Klamath, Pit River, Honey Lake, and possibly the Eagle Lake watersheds. Twelve sites in these watersheds have been documented, none of which are in the project watersheds. More populations may be discovered as mollusk surveys continue into the future; however, all surveys for this project have been completed.

For the Champs Project, the cumulative effects analysis area for the topaz juga is the Aspen Well and Burgess subwatersheds. These are the subwatersheds containing perennial springs within the project area where potential suitable topaz juga habitat occur (Burgess Springs in the Burgess subwatershed and Dixie and Lost Springs in the Aspen Well subwatershed). Though Stanford Spring is in the Squaw Valley watershed, it is seasonal, and therefore, can not support topaz juga populations.

Alternative 1

Direct and Indirect Effects

Potential suitable habitat for topaz juga occurs within Burgess, Dixie and Lost Springs in the project area, though surveys have not detected the species. There would be no direct effects to topaz juga since the species have not been detected and no proposed activities would occur in the perennial habitat. Alternative 1 has the potential for short-term increased sediment production which could negatively affect habitat quality. In Burgess and Dixie Springs this risk is from underburning treatments, and in Lost Spring the risk is from hauling and associated road maintenance. The risk of increased sediment production in springs and spring runs is low due to implementation of project integrated design features (which include BMPs), and no mechanical treatments within perennial RHCAs. For Burgess and Dixie Springs, risks are minimized by igniting prescribed fire outside the RHCA, with burn intensities and durations expected to be below levels that would cause soil sterilization or increased erosion (Watershed Report, Champs project record). In Lost Spring, road maintenance BMPs would be followed to protect the spring from roadside ditch runoff.

Cumulative Effects

Past, ongoing and reasonably foreseeable future (Appendix B) cattle watering and grazing at Dixie and Lost Springs has reduced, and would likely continue to reduce, ground cover around these springs. The effects of grazing increases the susceptibility of these two springs to sedimentation. However, proposed treatments are not within the RHCAs of the springs and are unlikely to produce measurable sediment to that which is already occurring (Watershed Report, Champs project record). In the unlikely event that prescribed fire intensities are greater than expected while underburning the area bordering Burgess Springs, and sediment is produced, the meadow enclosures associated with Burgess Springs would trap sediment before it reaches perennial waters. The Watershed Report (Champs project record) has concluded that when considering past, ongoing, proposed, and reasonably foreseeable future activities, no subwatersheds within the Champs project area would exceed the 15 percent threshold of concern (TOC), and that cumulative water quality impacts are not anticipated.

The reduction of fuels within the project area would reduce the risk of future high-intensity wildland fire effects (Fuels Report, Champs project record) and subsequent risk for increased sediment production (Watershed Report, Champs project record). The reduction of fuels would help create the conditions within the landscape that are conducive to natural fire regimes (Fuels Report, Champs project record). This would be a beneficial, long-term effect to the landscape and associated aquatic resources, including the topaz juga potential suitable habitat within the project area.

Determination

From the analysis contained in the Aquatics BE, it is determined that the proposed activities within Alternative 1 “may affect individuals of topaz juga, but is not likely to cause a trend toward federal listing or a loss of viability.”

Alternative 2

Direct, Indirect and Cumulative Effects

There are no direct effects to topaz juga or loss of habitat resulting from Alternative 2.

Increasing fuels within the project area continues to increase the risk of future high-intensity wildland fire effects (Fuels Report, Champs project record) and subsequent risk for increased sediment production (Watershed Report, Champs project record). This increases the potential size and intensity of fires and would be a negative long-term effect to the landscape and associated aquatic resources, including the topaz juga potential habitat within the project area.

The negative effects of fires could be increased in Burgess and Lost Springs due to foreseeable cattle grazing. Negative effects to Burgess Springs would only be compounded if the fence enclosure was destroyed. If the fence was destroyed and was not replaced before grazing resumed, then additional sediment and channel morphology changes would be expected from cattle grazing. A long term effect of fire adjacent to Lost Spring is increased transitory range in the area. This would increase trampling of the spring and decrease water in the spring area.

The treeless, flat topography of Dixie Springs, combined with negative past and ongoing cattle grazing, would cause potential negative fire effects to balance with foreseeable short term decreases of grazing effects.

Alternatives 3 and 9

Direct and Indirect Effects

As with Alternative 1, there would be no direct effects of Alternatives 3 and 9 to the species. There is a potential for short-term increase of sediment production resulting from implementation of Alternatives 3 and 9 which could negatively affect habitat quality. However, the risk in springs and spring runs is low, due to the design of the proposed action (e.g. implementation, BMPs, integrated design features, and limited activities within perennial RHCAs).

Lost Spring is less likely to receive sedimentation in Alternatives 3 and 9 than in Alternative 1 because group selections are not included in Alternative 3, or dropped from this area in Alternative 9; use and maintenance of the road within the Lost Spring RHCA would not be needed.

Cumulative Effects

Cumulative effects from the combination of grazing and Alternative 3 or Alternative 9 would be less than Alternative 1 since these alternatives are less likely to affect potential suitable habitat. Cumulative effects to Dixie and Burgess Springs would be the same as under Alternative 1. The Watershed Report (Champs project record) has concluded that when considering past, ongoing, proposed, and reasonably foreseeable future activities, no subwatersheds within the Champs project area would exceed the 15 percent threshold of concern (TOC), and that cumulative water quality impacts are not anticipated.

There would be no loss of potential suitable habitat resulting from Alternatives 3 or 9. The reduction of fuels within the project area would reduce the risk of future high-intensity wildland fire effects (and subsequent risk for increased sediment production) and would help create the conditions within the landscape that are conducive to natural fire regimes. This would be a beneficial long-term effect to the landscape and associated aquatic resources, including the topaz juga potential suitable habitat within the project area.

Determination

From the analysis contained in the Aquatics BE, it is determined that the proposed activities within Alternative 3 and Alternative 9 "may affect individuals of topaz juga, but is not likely to cause a trend toward federal listing or a loss of viability."

Eagle Lake rainbow trout (Forest Service Sensitive)

The cumulative effects analysis area considered for Eagle Lake rainbow trout is the Aspen Well, Burgess Shoestring, Squaw Valley, Champs, Logan North and Little Harvey Valley subwatersheds. These are the subwatersheds of Pine Creek that contain portions of the project area. The project is in the middle third of Pine Creek. Eagle Lake rainbow trout adults must migrate through this section of the mainstem of Pine Creek to reproduce in the headwaters. Young fish (1-2 years old) must also use the mainstem of Pine Creek when out migrating to Eagle Lake. Subwatersheds containing Pine Creek long distances upstream from this area (miles) are not considered, as the effects of proposed actions in this project area would be artificially diluted by doing so. Subwatersheds immediately downstream from the project area are also not used in this analysis, for the same reason (Watershed Report, Champs project record).

Alternative 1

Direct and Indirect Effects

There would be no direct impact to individuals of Eagle Lake rainbow trout. Specifically, there would no direct effects to Eagle Lake rainbow trout or loss of habitat under Alternative 1 as no activities are proposed within the Pine Creek mainstem. Pine Creek is the only stream in the Champs project area with suitable habitat for migrating Eagle Lake rainbow trout.

The risk for potential indirect effects to Eagle Lake rainbow trout habitat is low and not anticipated to be measurable. Potential indirect effects to habitat for Eagle Lake rainbow trout are limited to potential changes in sediment, water temperature and streamflow.

For sediment, the potential risk is for short-term increases resulting from proposed project activities adjacent to streams. The risk is low for increased sediment production due to implementation of project integrated design features (which include BMPs) for activities taking place within the RHCAs. The distance of proposed project activities from the mainstem of Pine Creek, and the flat nature of the topography before water from upstream project activities enters Pine Creek, also reduce risk of sediment reaching Pine Creek. Therefore, sediment input changes to Pine Creek would not be measurable and resting habitat quality is not expected to be affected by sedimentation.

A potential long-term sediment reduction would be due to increased understory vegetation and reduced fire risk. Increased understory vegetation vigor expected from thinning in RHCAs (Factors Influencing Understory Vegetation for Champs EA, Champs project record) could increase bank stability in those streams. Increased bank stability could lead to a long-term decreased sediment production potential from tributaries to Pine Creek. The reduction of fuels within the project area would reduce the risk of future high-intensity wildland fire effects (Fuels Report, Champs project record) and subsequent risk for increased sediment production (Watershed Report, Champs project record).

The risk to water temperature is associated with thinning of conifers from several miles of headwater (intermittent or ephemeral) stream corridors. No measurable effect on downstream water temperatures in Pine Creek is expected because of the following three reasons: 1) Vegetation retained in the RHCA would continue to provide shade. 2) Tributaries either flow through broad meadows to join Pine Creek or diffuse into overland flow before reaching Pine Creek. Tributary inputs from upland sections have relatively little influence compared to the solar heating that occurs in these meadows. 3) Most of the temperature increases in Pine Creek are caused by the exposure of Pine Creek itself to solar heating as the creek meanders through Pine Creek Valley and Champs Flat. These areas are broad and flat, and have very little streamside vegetation in them. Temperature changes would not be measurable, and therefore, would not affect timing of Eagle Lake rainbow trout migration.

There is a potential benefit to streamflow associated with the reduction of tree density and basal area. Large decreases in basal area at a subwatershed scale have been linked to more streamflow (duration) in some subwatersheds (Bosh and Hewlett 1982, Stednick 1996). However, Alternative 1 would not reduce basal areas enough to increase streamflows and probably would not be to a measurable degree (Watershed Report, Champs project record). Eagle Lake rainbow trout migration duration would not be affected by such small increases in streamflow.

Cumulative Effects

Past and current activities within the subwatersheds containing the analysis area that have the potential to influence aquatic resources include livestock grazing, past timber sales, DFPZ Projects (PORFFA Summary, Appendix B), wildland fire, wildland fire suppression, prescribed burning and dispersed recreation. Some of these activities have had intermingled long-term impacts from multiple types of activities that are not easily identified by source. An example is the encroachment of trees in meadows on the Eagle Lake district over the past 150 years (Eastside Historical Assessment, Champs project record).

Foreseeable future actions in the area include fuels management, DFPZ maintenance, livestock grazing, and dispersed recreation. Cumulatively, all the activities put the Champs, Aspen Well, Squaw Valley, Burgess, Little Harvey Valley, Logan North and Shoestring subwatersheds below threshold for cumulative watershed effects (Watershed Report, Champs project record). The proposed action does not increase risks to a level where viability of Eagle Lake rainbow trout is affected or there is a trend toward listing when evaluated in conjunction with the other activities. It was concluded in the Watershed Report for this project that cumulative watershed effects that exceed threshold are not anticipated as a result of this project (Watershed Report, Champs project record).

Potential cumulative watershed effects are not expected to meet or exceed threshold levels within Pine Creek subwatersheds and are expected to recover to near current levels within 10 years (Watershed Report, Champs project record).

Determination

From the analysis contained in the Aquatics BE, it is determined that the proposed activities within Alternative 1 "may affect individuals of Eagle Lake rainbow trout, but is not likely to cause a trend toward federal listing or a loss of viability."

Alternative 2

Direct, Indirect, and Cumulative Effects

There are no direct effects to Eagle Lake rainbow trout or loss of habitat resulting from Alternative 2.

Long-term effects to Eagle Lake rainbow trout habitat are possible from Alternative 2. Streamflow in the analysis area may decrease into the future, as forest stand densities increase, and conifer encroachment of meadow areas continues (Watershed Report, Champs project record). Reduced streamflow would decrease the timeframe in which Eagle Lake rainbow trout can migrate through the section of Pine Creek within the Champs project area. This negatively affects Eagle Lake rainbow trout since migration is considered necessary to complete their natural life cycle.

There is an increased risk of future high-intensity wildland fire effects because Alternative 2 would not alter the conditions within the landscape that are conducive to large high-intensity fires (Fuels Report, Champs project record). This risk includes increased sediment delivery (Watershed Report, Champs project record). Increased sediment delivery could lead to reduction in pool size and frequency in Pine Creek. Pools are considered important resting habitat needed for Eagle Lake rainbow trout migration. Therefore, a reduction in pool quantity and quality would be a negative effect.

Peak flows would be greater if a high intensity fire were to burn a substantial portion of Pine Creek subwatersheds, which could inhibit fish migration. In the event of a high intensity wildfire, peak flows from the burned area would certainly increase until such time that groundcover in the burned area can be reestablished (Watershed Report, Champs project record). A decreased window for migration would be a negative effect to Eagle Lake rainbow trout for that period. Effects from existing changes in water movement due to raised roadbeds in meadow sections, and destabilized banks and disconnected floodplain from past grazing, would compound water yield problems.

If a large fire burned a substantial portion of a watershed, a beneficial effect could occur once vegetation is reestablished sufficiently. The migration window may be lengthened, a possible benefit to Eagle Lake rainbow trout if they outlast the window of negative effects.

Alternative 3

Direct, Indirect, and Cumulative Effects

The potential direct, indirect, and cumulative effects of implementing Alternative 3 and Alternative 1 are similar. Small differences between stream shading, sedimentation, and stream flow are expected; however, the differences of Alternative 3 and Alternative 1 would not be measurable.

Shading effects to tributary waters of Pine Creek due thinning activities would be less than Alternative 1. As in Alternative 1, it would not affect temperature in Pine Creek enough to cause differences in Eagle Lake rainbow trout migration.

Similar to Alternative 1, potential cumulative watershed effects are not expected to meet or exceed thresholds within the Pine Creek subwatersheds and are expected to drop to near current levels within 10 years. Though ERAs differ slightly between Alternatives 3 and 1 (Watershed Report, Champs project record), they are not different enough to affect Eagle Lake rainbow trout. Alternative 3 may reduce the response of understory vegetation compared to Alternative 1; therefore, bank stability may increase less (Factors Influencing Understory Vegetation for Champs EA, Champs project record). As a result, sedimentation in some intermittent streams may be higher in Alternative 3. This difference is not expected to be measurable.

Since less acres would be treated under Alternative 3 compared to Alternative 1, and with less intensive treatments (i.e., 20 inch dbh upper diameter limit, 40 percent minimum canopy cover restriction with spotted owl habitat, RHCA thinning the same as adjacent prescriptions, and no group selections), Alternative 3 would leave more basal area than Alternative 1 (Silviculture Report, Champs project record). Differences in basal areas between Alternative 3 and Alternative 1 are below the threshold for measurable streamflow changes.

Determination

From the analysis contained in the Aquatics BE, it is determined that the proposed activities within Alternative 3 “may affect individuals of Eagle Lake rainbow trout, but is not likely to cause a trend toward federal listing or a loss of viability.”

Alternative 9

Direct, Indirect, and Cumulative Effects

The potential direct, indirect, and cumulative effects of implementing Alternatives 9, 3 and 1 are similar. Small differences between stream shading, sedimentation, and stream flow are expected between the three alternatives; however, the differences of Alternatives 9, 3 and 1 are unlikely to be measurable.

Shading effects to tributary waters of Pine Creek due to thinning activities would be the same as Alternative 1, and more than Alternative 3. Therefore, the potential for increased temperatures in Pine Creek is the same as Alternative 1 and slightly higher than from Alternative 3.

Similar to Alternatives 1 and 3, potential cumulative watershed effects are not expected to meet or exceed thresholds within the Pine Creek subwatersheds and are expected to drop to near current levels within 10 years. Though ERAs differ slightly between Alternatives 9, 3 and 1 (Watershed Report, Champs project record), they are not different enough to affect Eagle Lake rainbow trout. Any response of understory vegetation from Alternative 9 may be more than Alternative 3, but the same as Alternative 1 (Factors Influencing Understory Vegetation for Champs EA, Champs project record). Therefore, there is a potential for increased bank stability in this alternative compared to Alternative 3, but would be the same as Alternative 1. As a result, sedimentation in some intermittent streams might be lower than in Alternative 3. As in Alternative 1, potential increased cattle utilization may negate any bank stability gains. The difference in sedimentation between Alternatives 9, 3 and 1 are not expected to be measurable.

The acreage mechanically treated under Alternative 9 is less than Alternatives 1 and 3. However, considering the intensity of thinnings is between Alternatives 1 and 3 (i.e., 20 inch dbh upper diameter limit except in RHCAs and groups, 40 percent minimum canopy cover restriction within spotted owl habitat, RHCA thinning the same as Alternative 1, and an intermediate number of group selections), Alternative 9 would leave a basal area between that of Alternatives 1 and 3 (Silviculture Report, Champs project record). Differences in basal areas between Alternatives 9, 3 and 1 are below the threshold for measurable streamflow changes.

Determination

From the analysis contained in the Aquatics BE, it is determined that the proposed activities within Alternative 9 “may affect individuals of Eagle Lake rainbow trout, but is not likely to cause a trend toward federal listing or a loss of viability.”

Botany

Introduction

This section summarizes the potential affects of the Champs Project proposed action and alternatives to Forest Service Sensitive Plant Species, Special Interest Plant Species, and MIS Plant Species.

Eriogonum prociduum (prostrate buckwheat) is a Forest Service Region 5 Sensitive plant species. *Eriogonum prociduum* has been found in the Champs project area in Harvey Valley. No other currently listed Forest Service Sensitive species are known from the project area. A full list of Threatened, Endangered, and Sensitive plant species considered for the Champs Project is contained in Appendix A.

The following MIS plant species are discussed in this section: bitterbrush. A full list of MIS plant species considered for the Champs Project is contained in Appendix A.

The following Special Interest Plant species are known to occur in the Champs project area: *Arnica fulgens* (hillside arnica), *Astragalus inversus* (Susanville milk-vetch), *Carex petasata* (Liddon’s sedge), *Mimulus pygmaeus* (Egg Lake monkeyflower), *Penstemon heterodoxus* var. *shastensis* (Shasta beardtongue), *Senecio hydrophiloides* (sweet marsh ragwort), and *Stenotus lanuginosus* (woolly stenotus).

The Noxious Weed Risk Assessment for the Champs Project is located in the Champs Project record.

Eriogonum prociduum (prostrate buckwheat) – (Forest Service Sensitive)

The Biological Evaluation for Sensitive Plants for the Champs Environmental Assessment is hereby incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

The Champs Project area is the area considered for potential project effects to *Eriogonum prociduum*. As noted below, no direct, indirect, or cumulative effects are expected to *Eriogonum prociduum*.

Alternatives 1, 3, and 9

Direct, Indirect, and Cumulative Effects

No direct or indirect effects to *Eriogonum prociduum* plants or their habitat are expected for any of the action alternatives. The known occurrence of *Eriogonum prociduum* in the project area would be flagged and avoided during ground-disturbing activities, including prescribed fire, although no activities are planned near the occurrence. The nearest proposed treatment areas (underburning) are approximately ½-mile west and northwest of the occurrence.

Sporax treatment, for annosus root disease, would be applied to fresh-cut conifer stumps 14 inches diameter or greater. The active ingredient in Sporax is borax, and is registered compound for use to control annosus root disease in California (Silviculture Report, Champs project record). At high enough soil concentrations borax can be toxic to plants. However, when used as proposed to selectively treat stumps, borax soil concentrations would not approach levels that are known to be toxic to plants (USDA Forest Service 2006). Within the project area the *Eriogonum prociduum* occurrence is more than ½-mile from the nearest borax treatment areas. Project Integrated Design Features also specify that Sporax would not be applied within 25 feet of Sensitive plant occurrences. Therefore, the proposed use of Sporax would not affect this species.

In addition, indirect effects to *Eriogonum prociduum* from a potential increased risk of noxious weed establishment and spread in the project area should also not be a concern [1]. Proposed thinning, group selections, underburning, and road management would create widespread soil disturbance and reduce overall forest canopy cover in the project area, creating conditions that are more favorable to noxious weed spread. Two species of California Department of Food and Agriculture listed noxious weed species are known from the project area (spotted knapweed [*Centaurea stoebe* ssp. m*icranthos*] and pepperweed [*Lepidium latifolium*]), but are over a mile from the occurrence of *Eriogonum prociduum* and are under control practices. If existing weed occurrences were to expand or if new weed occurrences became established within or adjacent to the *Eriogonum prociduum* occurrence in the project area, then long-term impacts could occur to this species and this habitat. However, since no treatments are proposed near this occurrence, and Integrated Design Features require post project monitoring and continued treatments of known occurrences, impacts from noxious weed invasion are not expected.

[1] The Noxious Weed Risk Assessment for the Champs Environmental Assessment is hereby incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

With the implementation of Integrated Design Features, no direct or indirect effects are expected to *Eriogonum prociduum.* Therefore, cumulative effects are not a concern for this species from implementation of the Alternative 1, 3 or 9 of the Champs Project.

Determination

From the analysis contained in the Biological Evaluation for Sensitive Plants, it is determined that through implementation of IDFs, Alternatives 1, 3, and 9 would not affect *Eriogonum prociduum* since no adverse direct, indirect, or cumulative effects would occur.

Alternative 2

Direct, Indirect, and Cumulative Effects

There would be no direct effects to *Eriogonum prociduum* from the No Action Alternative other than those associated with current ongoing activities. The potential indirect effects from this alternative could be those associated with vegetative succession and the potential risk of a stand-replacing fire.

Vegetative succession is unlikely to affect the *Eriogonum prociduum* occurrence in the project area, because this occurrence is located in the middle of a naturally open site that appears to be successionally stable. The *Eriogonum prociduum* occurrence would not be affected by a wildfire in the project area because the occurrence is on a rocky site with sparse vegetation that is unlikely to carry a fire.

Widespread disturbance associated with a wildfire and associated fire suppression activities could also have the potential to increase the risk of noxious weed spread in the project area. However, ongoing noxious weed monitoring and treatments in the project area would moderate this risk, and since there are so few known noxious weed occurrences within the project area, the chance of large scale noxious weed impacts after a fire is minimal.

No direct or indirect effects are expected to *Eriogonum prociduum* from the implementation of the No Action Alternative. Therefore, cumulative effects are not a concern for this species.

MIS for Botanical Species

The Management Indicator Species Report for Botanical Species for the Champs Environmental Assessment is incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

Bitterbrush

Alternatives 1, 3, and 9: Relationship of project-level impacts to Forest-scale habitat for antelope bitterbrush.

Due to past vegetation management, grazing and fire suppression activities, there has been a loss of the large tree component, a reduction of ecologically important understory vegetation and non-coniferous vegetation types (e.g., shrub fields, aspen), and subsequent increase in canopy cover of these areas relative to historical conditions (Eastside Historical Assessment, Champs project record).

Currently there is approximately 224,066 acres of eastside pine habitat on the Lassen National Forest (US Forest Service 1993). In addition, there is approximately 460,853 acres of high potential suitable habitat for bitterbrush on the Lassen National Forest, within and outside of eastside pine habitats (US Forest Service 2006). The action alternatives of the Champs Project would result in a treatment of approximately 6,586 (Alternative 1), 6,492 (Alternative 3) and 6,062 (Alternative 9) acres of the eastside pine habitat within the project area. This is equivalent to less than 3 percent of the total eastside pine habitat, and is equivalent to less than 1 percent of the total potential bitterbrush habitat on the Forest. However, while there may be short-term impacts to bitterbrush and its associated eastside pine habitat with the implementation of the Champs Project, the proposed project would move treated eastside pine stands back closer to their historical condition and wwould benefit bitterbrush by opening up the stands and providing the bare mineral soil conditions needed for regeneration.

The Management Indicator Species Report for Botanical Species concludes that Alternatives 1, 3, and 9 would alter existing forest-wide trends to eastside pine within the Champs Project, but would provide a long-term benefit to bitterbrush by moving these stands toward historical conditions, which have been lost due to past disturbances on the landscape.

Alternative 2: No action effects to Forest-scale bitterbrush habitat and distribution trends

It is anticipated that the implementation of the no action alternative, in combination with past, ongoing and reasonably foreseeable future actions (Appendix B), would result in no short-term impacts to eastside pine habitat within the project area. Future impacts from this alternative could include the continued increased canopy within eastside pine stands and the movement away from the desirable habitat characteristics required for long-term viability of bitterbrush within the project area. In addition, if a large-scale wildfire event occurred within the project area, some or all of the 13,572 acres of eastside pine stands within the project area could be lost, along with those bitterbrush ecotypes that are not adapted to high intensity fire.

Special Interest Plant Species

The Botany Report for Special Interest Plant Species for the Champs Environmental Assessment is hereby incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

The project area was chosen as the cumulative effects analysis area for Special Interest Plant Species because their historic range and specific habitat requirements are unknown, and it was assumed that if the Champs Project would not affect the viability of these species within the project area, it also would not affect their viability outside of the project area. All of the Special Interest Plant occurrences in the project area were discovered after 1991, thus their historic abundance in the project area is unknown. Therefore, their condition since 1991 was used as the baseline condition for analysis. In choosing these years as the baseline for analysis, various historic activities are incorporated into the baseline (Eastside Historical Assessment, Champs project record). Although these historic activities cannot be quantified, they can be

mentioned in a general sense to put current conditions into perspective for this analysis. The threshold for this analysis is whether the viability of each of the Special Interest plant species in the project area would be maintained.

Alternative 1

Direct and Indirect Effects

With the implementation of IDFs, no direct or indirect effects to *Arnica fulgens, Carex petasata, Mimulus pygmaeus*, or *Penstemon heterodoxus* var. *shastensis* are expected. Therefore, cumulative effects are not a concern for these species from the Champs Project.

Several *Astragalus inversus* occurrences, containing over 700 plants, are within proposed DFPZ, Thin and Underburn, group selection and DFPZ, Underburn Only treatment areas. *Astragalus inversus* plants would likely be damaged or killed during thinning or underburning activities, especially from May to July when they have above-ground stems and flowers. However, proposed activities may have beneficial effects to *Astragalus inversus* plants and habitat, by reducing conifer canopy and creating gaps.

Five *Senecio hydrophiloides* occurrences in the project area are within proposed thinning and/or underburn units. However, sites within Squaw Valley, north of Little Harvey Valley and northeast of Shoestring Draw are protected by IDFs of flag and avoidance, and require that if the sites are burned in the fall that the occurrences would be protected with a “wet” fire control line. The remaining two *Senecio hydrophiloides* occurrences have the potential to be impacted either by thinning and/or underburning treatments, or logging skid trails through their habitat. Overall, of the eight known occurrences within the project area, fewer than 1 percent of *Senecio hydrophiloides* plants would potentially be affected by project activities, and substantial effects on this species are not expected. As a result, species viability would not be adversely affected by implementation of Alternative 1.

There would be direct and indirect effects to *Stenotus lanuginosus* by the implementation of the Champs Project. Currently, there is one *Stenotus lanuginosus* occurrence and a portion of a second within proposed treatment areas. However, most of the occurrence north of Harvey Valley would be protected by IDFs for *Arnica fulgens,* since both species are found within the same meadows in this area. All other occurrences are found outside of proposed treatment areas.

Individual *Stenotus lanuginosus* plants found within treatment units could be directly affected by thinning and/or underburning if plants are driven on by logging machinery or burned. However, *Stenotus lanuginosus* plants and habitat in these occurrences could also receive an indirect benefit from these activities, which would reduce conifer canopy cover and woody fuel/duff accumulation within or adjacent to these occurrences. Overall, of the seven known occurrences within the project area, fewer than 1 percent of *Stenotus lanuginosus* plants are found in proposed treatment areas. If some of these plants are killed or damaged by project activities, it would represent a small percentage of the known plants in the project area, and would not affect the viability of the species in the project area.

Project activities could increase the risk of noxious weed spread in the project area, because proposed thinning, group selections, underburning, and road management would create widespread soil disturbance

and reduce overall forest canopy cover. If existing weed occurrences were to expand in the project area, or if new weed occurrences became established near the existing Special Interest plant species occurrences or their habitat, these species could be detrimentally affected. Noxious weeds are often more competitive than native plant species and can come to dominate a site, making it less suitable for native species. Project noxious weed IDFs, such as post project monitoring and continued treatments of known occurrences, would substantially reduce the risk of noxious weed spread, lowering the overall risk of weed spread so impacts from noxious weed invasion are not expected (Noxious Weed Risk Assessment, Champs Project Record).

Sporax treatment for annosus root disease would be applied to fresh-cut conifer stumps 14 inches diameter or greater. Project IDFs also specify that no Sporax would be applied within 25 feet of known Special Interest plants. Therefore, the proposed use of Sporax would not affect these species.

Cumulative Effects

There are two post-1991 activities (Grays [1996] and Champs [1998]) Underburn projects (Past, Ongoing and Reasonably Foreseeable Future Action (PORFFA) Summary, Appendix B) that may have impacted *Astragalus inversus* occurrences in the project area. However, since *Astragalus inversus* occurs in habitats that historically experienced periodic fire, these underburn activities most likely did not have a detrimental effect on the species. In addition, ongoing livestock grazing in the Harvey Valley and Champs Flat allotments could also add cumulatively to effects from the Champs Project. However, *Astragalus inversus* plants are inconspicuous and they grow widely scattered in eastside pine forests, and since cattle use of eastside pine forests in the project area is light (Range Report, Champs Project Record), livestock grazing would most likely only be incidental. Future activities such as DFPZ maintenance could also affect *Astragalus inversus* plants and their habitat in the project area, but the effects would be similar to those previously described above.

Although *Astragalus inversus* is endemic to a relatively small area in northeast California, it is widespread on the northern portion of the LNF, where it is known from 116 occurrences. Considering its relative abundance within the LNF, and its frequent association with historically logged and/or burned sites, cumulative effects from past, ongoing or future activities, when added to the Champs project proposed action would not be detrimental to the viability of *Astragalus inversus* in the project area or across the forest.

Two *Senecio hydrophiloides* occurrences in the project area (Shoestring Draw, and part of Squaw Valley) may have been affected by the Grays (1996) and Champs Underburn (1998) (PORFFA Summary, Appendix B), although it is unclear if either of these prescribed fires actually burned within the occurrences. Since *Senecio hydrophiloides* grows in the wettest portions of wet meadow complexes, the occurrences may have been too moist to burn. Regardless of whether they burned, the occurrences appear vigorous and contain thousands of flowering plants when they were last visited in 2004. In addition, ongoing livestock grazing in the Harvey Valley and Champs Flat allotments could also add cumulatively to effects from the Champs Project, since cattle tend to concentrate in areas of palatable forage and/or near water, including the wet meadows where *Senecio hydrophiloides* occurs (Range Report, Champs

Project Record). However, *Senecio hydrophiloides* plants are somewhat leathery and therefore rarely grazed. In spite of evidence of cattle grazing within the seasonal meadows they occur in (e.g., cattle trails), all *Senecio hydrophiloides* occurrences in the project area are in good to excellent condition (USDA Forest Service 1995-2006).

Future DFPZ Maintenance activities (thinning and underburning) could affect *Senecio hydrophiloides* plants and habitats in the same ways that the current proposed action would. It is assumed that future Champs DFPZ Maintenance activities would include an IDF to protect the *Senecio hydrophiloides* occurrences within Squaw Valley and north of Harvey valley, if needed. Therefore, no substantial cumulative effects from are anticipated and the viability of *Senecio hydrophiloides* in the project area would be maintained for at least the next 20 years.

Ongoing livestock grazing in the Harvey Valley and Champs Flat allotments could add cumulatively to effects from the Champs Project, since cattle tend to concentrate in dry meadows and sage flats where *Stenotus lanuginosus* occurs (Range Report, Champs Project Record). In spite of this, cattle do not appear to select *Stenotus lanuginosus* plants when grazing, perhaps because the woolly-hairy, glandular leaves are not especially palatable, and the plants grow in discontinuous, low mats that may be less likely to be grazed than taller plants. Cattle trampling most likely damages some *Stenotus lanuginosus* plants, but the effects are likely to be scattered and relatively minimal.

Future DFPZ Maintenance activities (thinning and underburning) could affect *Stenotus lanuginosus* plants and habitats in the same way that the current proposed action would. Any effects to this species would add cumulatively to those impacts from the proposed action, but would not affect the viability of the species within the project area or across the forest where it is currently known from over 37 occurrences.

Alternative 2

Direct and Indirect Effects

There would be no direct effects to *Arnica fulgens*, *Astragalus inversus*, *Carex petasata*, *Mimulus pygmaeus*, *Penstemon heterodoxus* var. *shastensis*, *Senecio hydrophiloides* or *Stenotus lanuginosus* from Alternative 2 because no action would occur other than ongoing activities. The primary indirect effects to this species from this Alternative would be associated with habitat succession and the potential increased risk of wildfire. Habitat succession would likely result in increased canopy cover in existing forest stands (Silviculture Report, Champs Project Record), and could allow conifers to invade currently unforested sites, such as meadows and sagebrush flats, over the next 20 years. *Arnica fulgens*, *Mimulus pygmaeus*, *Penstemon heterodoxus* var. *shastensis*, *Senecio hydrophiloides* and *Stenotus lanuginosus* grow in open habitats and appear unable to persist under a dense conifer canopy. Therefore, expansion of conifers into existing occurrences could decrease habitat quality for these species. *Astragalus inversus* often grows under a conifer canopy, but appears to be more vigorous where there are gaps in the canopy. If vegetative succession reduced canopy gaps within *Astragalus inversus* occurrences, the vigor of *Astragalus inversus* plants in the project area could decline over the next 10-20 years.

A wildfire could set back vegetative succession in the project area and reduce conifer canopy cover (Fuels Report, Champs project area). Depending on factors such as season of burning and fire intensity, individual plants of *Arnica fulgens, Astragalus inversus, Carex petasata, Mimulus pygmaeus, Penstemon heterodoxus* var. *shastensis, Senecio hydrophiloides* and *Stenotus lanuginosus* could be damaged or killed. However, since all of these species grow in habitats that historically experienced periodic wildfires (Norman and Taylor 2005), they would be expected to persist after a wildfire, and could potentially benefit from the opening of the canopy, as a result of a large wildfire though or adjacent to their habitat.

Cumulative Effects

The cumulative effects analysis area, baseline, threshold, and rationale would be the same as those described under Alternative 1. In addition, past, ongoing, and reasonably foreseeable actions contributing to cumulative effects would be the same as under Alternative 1, except that future Champs DFPZ Maintenance would not occur. Unlike Alternative 1 though, there would be no direct effects, but the indirect effects of habitat succession could contribute to increased conifer canopy cover in the project area and to the invasion of conifers into meadows and sagebrush flats. In addition, the actual impacts from a wildfire would depend on timing and intensity of the fires within plant habitats, but could also add cumulatively to past, ongoing activities. If a wildfire occurred, it is unlikely to have substantial detrimental effects to *Arnica fulgens, Astragalus inversus, Mimulus pygmaeus, Penstemon heterodoxus* var. *shastensis,* because these species grow in habitats that historically experienced periodic wildfire. Overall, the viability of *Arnica fulgens, Astragalus inversus, Carex petasata, Mimulus pygmaeus, Penstemon heterodoxus* var. *shastensis, Senecio hydrophiloides* and *Stenotus lanuginosus* in the project area is expected to be maintained under Alternative 2 for at least the next 20 years.

Alternatives 3 and 9

Direct and Indirect Effects

There would be no direct or indirect effects to *Arnica fulgens, Carex petasata, Mimulus pygmaeus,* or *Penstemon heterodoxus* var. *shastensis* by the implementation of Alternative 3 or 9, because known locations are either outside of proposed treatment areas or occurrences are protected by project Integrated Design Features.

Direct and indirect effects to *Senecio hydrophiloides* and *Stenotus lanuginosus* from the implementation of Alternative 3 or Alternative 9 would be similar to these described in the Alternative 1, since these species do not grow in timbered habitats within the project area. Proposed activities for both Alternative 3 and 9, which include dropping some or all group selection treatment units, reducing upper diameter limits, and limiting canopy cover to 40 percent in specific units, would not impact these species differently than those described in Alternative 1. There would be less direct effects from the implementation of Alternative 3 to *Astragalus inversus,* due to the removal of group selection units from this Alternative, where this species has been found. However, since the groups with *Astragalus inversus* would still be thinned under Alternative 3, any benefits are anticipated to be minimal. Effects to this species from the implementation of Alternative 9 would be similar to those of Alternative 1, since group

selection units adjacent to known occurrences of this species would still be treated with the implementation of Alternative 9.

Cumulative Effects

Cumulative effects for past, ongoing, and foreseeable future actions for Alternatives 3 and 9 would be identical to those previously discussed within Alternative 1. As with Alternative 1, there would be no direct or indirect effects to *Arnica fulgens, Carex petasata, Mimulus pygmaeus*, or *Penstemon heterodoxus* var. *shastensis,* and the effects to *Senecio hydrophiloides* and *Stenotus lanuginosus* would be similar with implementation of Alternatives 3 or 9. However, *Astragalus inversus* would most likely have fewer impacts under Alternative 3, since this species has been found in or adjacent to proposed group selection treatment units, which would be dropped under Alternative 3. These impacts may add cumulatively to past, ongoing and future actions discussed within the project area, but these should not be detrimental to the viability of these species within the project area, or throughout their range.

Economics

The economic analysis for the Champs Project is contained within the Silviculture Report.

Alternatives 1, 3, and 9

Direct and Indirect Effects

Alternatives 1, 3, and 9 proposes a variety of treatment activities including harvesting, tree thinning, tree planting, prescribed burning, mastication, road construction, and other post-harvest activities. Net values are discussed below and are summarized in Table 30. Activity revenues are the estimated value of wood fiber that would be removed from the project as a result of implementing DFPZ treatments, area thinning treatments, and the group selection treatments (Alternative 3 does not include group selection harvesting). Revenues would be collected in the form of stumpage paid by contractors for both sawtimber size material (generally trees larger than 10 inches dbh), and biomass material (generally trees between 3 and 10 inches dbh). Alternative 1 would remove an estimated 113,604 CCF of wood fiber in the form of both sawlogs and biomass. Alternative 3 would remove an estimated 90,486 CCF of wood fiber in the form of both sawlogs and biomass. Alternative 9 would remove an estimated 94,379 CCF of wood fiber in the form of both sawlogs and biomass. Revenue generated from the sale of commercial timber is a direct benefit. Alternative 1 would generate an estimated $7,772,774 in revenues. Alternative 3 would generate an estimated $4,252,417 in revenues, and Alternative 9 would generate an estimated $5,052,670 in revenues. The difference in revenues between the alternatives is due to, 1) a higher upper diameter limit under Alternative 1, and in some cases under Alternative 9, which would yield higher revenues, and 2) different treatment acres between alternatives. Costs for the alternatives as outlined below include all dollars that would be expended to plan and implement the alternatives. Total costs for Alternative 1 are estimated at $3,986,000. The net value for Alternative 1 is estimated at $3,786,774, with a benefit-cost ratio of 1.95:1, which indicates that the timber sale value would exceed the costs associated with this project. Total costs for Alternative 3 are estimated at $3,582,750. The net value for Alternative 3 was

estimated at $669,667, with a benefit-cost ratio of 1.19:1, which indicates that the timber sale value would exceed the costs associated with this project. Total costs for Alternative 9 are estimated at $3,853,950. The net value for Alternative 9 was estimated at $1,198,720, with a cost-benefit ratio of 1:1.31, which indicates that the timber sale value would exceed the cost of the non-timber sale related activities. The difference in costs between alternatives is due to the costs associated with reforestation of the groups under Alternative 1 and Alternative 9.

Table 30. Revenues, Costs, Net Value, and Benefit-Cost Ratio By Alternative

Alternative	Revenues	Costs	Net Value	Benefit-Cost Ratio
Alternative 1 – Proposed Action	$7,772,774	$3,986,000	$3,786,774	1.95:1
Alternative 2 – No Action	$0	$556,750	-$556,750	0
Alternative 3	$4,252,417	$3,582,750	$669,667	1.19:1
Alternative 9	$5,052,670	$3,853,950	$1,198,720	1.31:1

Source: Champs Project Economic Spreadsheet (Quick Silver), Silviculture Report

Indirect effects of implementing Alternatives 1, 3, and 9 are additional public benefits such as employment, income generated from the forest products industry, and energy from co-generation plants. Jobs result from employment created by the purchase of materials for sawmills, expenditures by workers, and the demand for government employees. The restoration and fuel work would support additional direct and induced employment. All jobs are equivalent to year-round employment. Based on these assumptions, Table 31 displays the predicted total full time jobs and associated employee-related income resulting for these alternatives. Alternative 1 would create an estimated 738 full time jobs for direct and induced employment. The total employee related income for Alternative 1 would be $26,467,092. Alternative 3 would create an estimated 588 full time jobs for direct and induced employment. The total employee related income for Alternative 3 would be $21,087,602. Alternative 9 would create an estimated 613 full time jobs for direct and induced employment. The total employee related income for Alternative 9 would be $21,984,019. The difference in the number of jobs between the alternatives is due higher project volumes associated with Alternative 1 and 9, and additional project activities associated with Alternative 1 and 9, as compared to Alternative 3 (i.e., reforestation work in groups).

Table 31. Comparison of Employment Related Effects by Alternative

Alternative	Total Full-time Jobs	Total Employee Related Income
Alternative 1 – Proposed Action	738	$26,467,092
Alternative 2 – No Action	0	$0
Alternative 3	588	$21,087,602
Alternative 9	613	$21,984,019

Source: Champs Project Economic Spreadsheet, Silviculture Report

Cumulative Effects

The cumulative effects of Alternatives 1, 3, and 9 would include the potential maintenance costs associated with the various treatments. The projected cumulative impacts of this project when combined

with other projects would be to further increase employment and contracts to accomplish such work. These alternatives would add value to the pilot project when considered as a whole. The cumulative economic benefits, revenues, and expenditures for the HFQLG Pilot Project are documented annually in a Status Report to Congress (2006).

Alternative 2

Direct, Indirect, and Cumulative Effects

Project planning costs are sunk costs incurred initially because they are incurred regardless of the alternative selected. Planning costs for Alternatives 1, 2, 3, and 9 are estimated at $556,750 (Table 30). This alternative proposes no activities and produces no economic outputs. No DFPZ, area thinning, group selection, road management, or monitoring activities would occur. No market benefits, (direct, indirect, or non-quantifiable) can be attributed to this alternative. Implementation of the No Action alternative would not provide additional public benefits to local jobs or income generated from the forest products industry.

Implementation of the No Action alternative would produce no employment (Table 31) and no service contracts.

Fuels

Introduction

The Fuels Report for the Champs Environmental Assessment is incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

The Fire and Fuels cumulative effects analysis area for the Champs Project includes seven sub-watersheds: Aspen Well, Burgess, Shoestring, Squaw Valley, Champs, Logan North and Little Harvey Valley. All of these sub-watersheds are contained within the project area boundary except for portions of Logan North and Little Harvey Valley. These sub-watershed boundaries make a logical perimeter for the area of the fire and fuels analysis because they contain the project area and generally exclude effects from outside sources. The exception would be wildland fire moving into the analysis area from the outside. This would generally not occur, except under the most extreme fire weather conditions, since fires slow or sometimes even stop as they cross ridge tops, which often serve as sub-watershed boundaries as well.

Fire Behavior and Fire Hazard

Fire behavior is the manner in which a fire reacts to available fuels, weather, and topography. A change in any of these components results in a change in fire behavior (DeBano et al. 1998). Fire behavior is described by flame length and rate of spread (Rothermel 1983).

Fuels management modifies fire behavior, ameliorates fire effects, and reduces fire suppression costs and danger (DeBano et al., 1998). Manipulating fuels reduces fire intensity and severity, allowing firefighters and land managers more control of wildland fires by modifying fire behavior in the fire environment (Pollet and Omi, 2000).

Fuels management can include reducing the loading of available fuels, lowering fuel flammability, or isolating or breaking up large continuous bodies of fuels (DeBano, 1998). Fuels contribute to the rate of spread of a fire, intensity, flame length, fire residence time, and the size of the burned area (Agee et al., 2000). For these reasons, the comparison of alternatives in this analysis focuses on the reduction of important fuels (surface, ladder and canopy), fire behavior indicators (flame length and rate of spread), and relative ratings of fire hazard (torching and crowning indices).

A fire hazard assessment should analyze crown fire potential as well as that of a surface fire. Crown fires normally are highly destructive, difficult to control, and present the greatest safety hazard to firefighters and the public. Therefore, fuels management must emphasize the factors that lower the probability of the initiation and spread of crown fires. These factors include height of the forest canopy above the ground (canopy base height) and the density of the crowns (canopy bulk density) and surface fuel loading (Omi and Martinson, 2002). In general, crown fires burn hotter and result in more severe effects than surface fires. Crown fires generally spread many times faster than surface fires (Rothermel, 1983). Fires that spread quickly and at higher intensities can pose a greater risk to firefighters and the public when they occur. Agee (1996) states that crown fire potential can be managed through prevention of the conditions that initiate crown fires and allow crown fires to spread. Three main factors contributing to crown fire behavior can be addressed through fuels management: initial surface fire behavior, canopy base height, and canopy bulk density.

Fire hazard in the Champs project area is rated as predominately high due to the low canopy base heights (CBH) and high canopy bulk densities (CBD) found in the majority of stands (Champs Silviculture Report). These factors could, given extreme fire weather, result in a wildland fire of large size and severely negative environmental effects. There are areas within the project area that have a moderate or even low wildland fire hazard rating (i.e. meadows, rocky areas or areas of previous fuels treatments) however these areas exist as small and discontinuous patches that, on their own, would be ineffective in slowing or stopping a large wildland fire.

Desired fuels conditions include reduction of surface, ladder and crown fuels in order to reduce predicted flame lengths, rates of spread, probability of crown fire initiation or spread, and to reduce predicted mortality within the stand if a wildland fire were to occur. Desired fuels conditions would be achieved by reducing surface fuels using pile or broadcast burning, reducing ladder fuels by thinning from below to raise the canopy base height and thinning the canopy from below to decrease canopy bulk density and reduce crown continuity.

Passive crown fire initiation (torching) is governed by several conditions including surface fire intensity, foliar moisture content, canopy base height and canopy bulk density. CBH is the average height from the top of the surface fuel to the lowest part of a tree's crown at which there is a sufficient amount of crown fuel to propagate fire vertically into the canopy (Scott and Reinhardt, 2001). CBH incorporates ladder fuels such as shrubs and understory trees as well as the live and dead lower branches of mature trees. It is measured at the lowest height above ground where at least 0.010 kilograms per cubic meter (kg/m3) of available canopy fuels are present. The lower the crown base height, the easier it is for a given

surface fire to initiate a crown fire. Low crown base height provides the "ladder" which allows a surface fire to become a crown fire. Canopy bulk density is defined as the amount of available canopy fuel per unit canopy volume. Canopy bulk density is the average mass (kg/m^3) of tree crowns across a forest stand (Brown and Smith, 2000). It is a bulk property of a stand, not an individual tree, and is represented as the available canopy fuel load divided by canopy depth (Scott and Reinhardt, 2001). For any given species, less trees per acre equates to a lower canopy bulk density, which makes it more difficult to maintain crown fires.

The desired CBH within the proposed Defensible Fuel Profile Zone or DFPZ (Prescriptions A-E) is a minimum of 10 feet. This would allow the DFPZ to continue to function as intended between the completion of the proposed action and the proposed maintenance activities.

As discussed in the Purpose and Need for the Champs project (number 2), at 90th percentile fire weather, an effective DFPZ treatment would have a predicted surface flame length of less than four feet, forest structure that would not allow transition of a surface fire to a crown fire (torching index (TI)) and would not allow an approaching crown fire to persist in the canopy of the DFPZ (crowning index (CI)).

TI is a measure of how susceptible a stand is to the vertical movement of fire. It is the 6.1meter (20 feet) windspeed at which crown fire is expected to initiate based on Rothermel's (1972) surface fire model and Van Wagner's (1977) crown fire initiation criteria. TI is a function of surface fuel characteristics (fuel model), surface fuel moisture content, foliar moisture content, canopy base height, slope steepness, and wind reduction by the canopy (Scott and Reinhardt 2001). The higher the TI the less susceptible a stand is to the vertical movement of fire.

CI is a measure of the ability of a stand to sustain a fire that moves through the canopy (active crown fire). It is the 6.1meter (20 feet) windspeed at which active crowning is possible, based on Rothermel's (1991) crown fire spread rate model and Van Wagner's (1977) criterion for active crown fire spread. CI is a function of canopy bulk density, slope steepness and surface fuel moisture content (Scott and Reinhardt 2001). The higher the CI the less susceptible a stand is to an active crown fire.

The 90th percentile 6.1 meter (20 feet) windspeed for the Champs project area is 11 mph. This means that stands that have a TI or CI equal to or less than 11 are susceptible to crown fire under 90th percentile weather.

Fire behavior was modeled for Prescriptions A (Thin and underburn) and D (Underburn only) the results are shown in Tables 32 through 34. Treatments B, C, E, F and G were not modeled but fire behavior results would be similar to or less than the treatments modeled. The representative sample of CWHR classes modeled for fire behavior in eastside pine covers 51 percent of the eastside pine CWHR classes proposed for treatment or 2,928 acres. The representative sample of CWHR classes modeled for fire behavior in mixed conifer covers 41 percent of the mixed conifer CWHR classes proposed for treatment or 1,094 acres.

Tables 32 through 34 are modeling results for all tree alternatives analyzed in detail.

Table 32: Fire behavior results from modeling (Prescription A: Thin and Underburn) using 90th percentile weather in eastside pine (CWHR 4M).

Fire Behavior Scenario One			
	Alternative 2	Alternative 1	Alternative 3
Flame length (feet)	8.6	2.1	2.1
Rate of spread (chains/hour)	24.1	4.9	4.9
Fire Type	Passive Crown	Surface	Surface
Size of fire one hour after ignition (acres)	35.9	1.21	1.21
Canopy base height (feet)	1	18	7
Canopy bulk density (kg/m^3)	0.1233	0.0721	0.1009
Torching Index	0	74	74
Crowning Index	17	26	26

Source: Fire behavior outputs from FMA+. Data: Site-specific stand exams (stand structure modeled with FVS) and fuel surveys (surface fuel loadings computed with DDWoodyPC).
Note: Fuel model 9Z (Alternative 2) represents existing conditions and 9A (Alternatives 1 and 3) represents post treatment conditions.

Table 33: Fire behavior results from modeling (Prescription A: Thin and Underburn) using 90th percentile weather in eastside mixed conifer (CWHR 4M).

Fire Behavior Scenario Two			
	Alternative 2	Alternative 1	Alternative 3
Flame length (feet)	78.6	3.0	3.0
Rate of spread (chains/hour)	40.7	7.0	7.0
Fire Type	Active Crown	Surface	Surface
Size of fire one hour after ignition (acres)	105.4	2.47	2.47
Canopy base height (feet)	1	10	10
Canopy bulk density (kg/m^3)	0.2707	0.1233	0.1634
Torching Index	0	29	29
Crowning Index	10	17	17

Source: Fire behavior outputs from FMA+. Data: Site-specific stand exams (stand structure modeled with FVS) and fuel surveys (surface fuel loadings computed with DDWoodyPC).
Note: Fuel model 10A (Alternative 2) represents existing conditions and 9M (Alternatives 1 and 3) represents post treatment.

Table 34: Fire behavior results from modeling (Prescription D: Underburn only) using 90th percentile weather in eastside pine (CWHR 4M).

Fire Behavior Scenario Three			
	Alternative 2	Alternative 1	Alternative 3
Flame length (feet)	3.0	2.1	2.1
Rate of spread (chains/hour)	5.5	4.9	4.9
Fire Type	Surface	Surface	Surface
Size of fire one hour after ignition (acres)	1.93	1.2	1.2
Canopy base height (feet)	7	27	29
Canopy bulk density (kg/m^3)	0.1105	0.0497	0.0465
Torching Index	22	22	22
Crowning Index	19	19	19

Source: Fire behavior outputs from FMA+. Data: Site-specific stand exams (stand structure modeled with FVS) and fuel surveys (surface fuel loadings computed with DDWoodyPC).
Note: The fuel model 9Z (Alternative 2) represents existing conditions and 9A (Alternatives 1 and 3) represents post treatment.

Fuel Modeling

Fuel models describe surface fuel loadings. The fuel models used for this analysis are those tabulated by Rothermel (1972) and Albini (1976) and modified by Carlton (2005). Carlton uses the basic 13 fuel models (signified by the letter M), tabulated by Rothermel and Albini, with the addition of a low and high loading version of each model. The low version is designated by an A and has a 30 percent reduction of the fuel loading and the fuel bed depth compared to the basic Rothermel and Albini models. Conversely, a high version is designated by a Z and has a 30 percent increase of the fuel loading and the fuel bed depth compared to the basic Rothermel and Albini models. This modification allows for a better representation of actual fuel loadings found on a site and as a result produces more accurate fire behavior predictions.

Alternative 1

Direct Effects

As noted in the Silviculture section, Prescriptions A and C would remove ladder fuels in the suppressed and intermediate crown classes, which would reduce the vertical continuity between surface and canopy fuels (Peterson et al. 2005, Graham et al. 2004). Removal of saplings and pole-sized trees would reduce stand density, ladder fuels, and shade-tolerant species, while increasing canopy base height. This treatment would be effective in reducing torching, and would increase the probability that an approaching crown fire would transition to a surface fire.

These prescriptions would also thin the co-dominant trees to reduce the horizontal continuity of canopy fuels. The reduction of canopy continuity would reduce stand density, canopy bulk density, and interlocking crowns by increasing crown spacing between residual trees. Species preference for retention would be given to shade-intolerant trees with more fire-resistant characteristics, such as ponderosa pine.

Whole-tree yarding would be used, during thinning operations, to reduce the creation of slash generated by harvest activity. Removal of limbs and tops by such methods would greatly reduce activity-generated surface fuels (Agee and Skinner 2005). The majority of trees would be removed using whole-tree yarding, which would effectively reduce the amount of activity-generated fuel accumulation. Thinning treatments may result in incidental activity-generated fuel accumulations. However, these accumulations would be removed during prescribed fire operations.

Underburning would follow thinning operations to reduce the natural surface fuel accumulations, as well as, activity generated surface fuels. The direct effects of underburning would be to reduce surface fuel loading and raise the CBH.

The direct effects of both prescriptions would be very similar from a fire behavior standpoint. The direct effects of Prescriptions A and C would be a reduction in conifer stocking and density, with a corresponding increase in average tree spacing, and reduced surface fuel loadings.

Prescription B would occur in areas where natural fuel loadings are currently so heavy as to make the use of prescribed fire undesirable (high mortality in the residual stand) immediately after mechanical thinning. Thinning treatments may result in incidental activity-generated fuel accumulations. However,

these accumulations would be removed during mastication. Mastication would alter the structure and arrangement of the surface fuel loading (chipping and compacting) and reduce flame lengths and rate of spread in the event of a wildland fire. The direct effects of Prescription B would be reduced stand density, with a corresponding increase in average tree spacing and a compacted surface fuel profile.

Prescription G would be implemented to allow residual mid and overstory trees to be irregularly spaced such that large-scale continuity of canopy fuels would be broken up. Prescribed burning to reduce surface fuels less than 11 inches in diameter, to less than five tons per acre, and to promote understory vegetation development, would follow the thinning treatment. The direct effects of the area thinning followed by prescribed fire would be to increase tree spacing, decrease canopy bulk density, raise canopy base height, break up horizontal and vertical fuel continuity and reduce surface fuel loadings

Prescription H would occur in plantations within and outside of the DFPZ. This prescription would thin the plantations to achieve 17 by 17 foot spacing. The direct effects of hand thinning would be increased tree spacing and surface fuel loading, and reduce crown bulk density. In areas where Prescription H intersects the primary zones of DFPZs, the thinned material would be masticated and/or hand pile and burned. The direct effects of these treatments would be to decrease the surface fuel loading.

Prescription D would be used in stands that would not be mechanically treated. The prescribed fire treatment would reduce surface fuel loading by consuming duff, litter, and down woody debris. This treatment is likely to induce scorch in the lower canopy of trees and may cause limited mortality in trees. This mortality would help to create snags to replace ones that may have to be removed, for safety and containment reasons, during prescribed firing operations. Prescribed fire may also increase the canopy base height in the stands. It would also create a mosaic of conditions through ignition pattern and microclimate variability, creating bare mineral soil in some areas and leaving vegetation intact in other areas. Where bare mineral soil is exposed sprouting and regeneration would reinvigorate the understory plant community (Kauffman and Martin 1990).

Due to the buildup of the pine litter mat from lack of fire, many of the grasses and forbs have been reduced in number and extent of coverage in the project area (Botany Report, Champs Project record). Underburning would allow the grasses and forbs to increase in abundance in the understory. The brush species that resprout following fire would be younger, would have less dead material to contribute as available fuel and would not be as dense. Underburning would also improve nutrient cycling and encourage pruning of the lower limbs of the trees. The pruning would increase the mean canopy base height.

Machine and hand pile burning would not have the same effects on vegetation as underburning. There could be some scorching of low branches due to heat and flames from burning piles, but this would occur only in isolated patches.

Prescription E would use mastication to reduce ladder and surface fuels in areas where underburning alone could cause excessive damage to the stand, because of the in growth of small trees in the units. The direct effects of this prescription would be to reduce the ladder fuels and increase the surface fuel loading.

The surface fuel loading would be increased, but also compacted. This compaction would cause a decrease in expected flame lengths and rates of spread.

Prescription F is intended to increase structural diversity across the landscape by establishing areas of early seral development. It is not intended to affect fire behavior or reduce the size of wildland fires. There would be no effect on the size and development of large wildland fires due to this prescription.

The group selection prescription would remove conifers under 30 inches dbh, except those retained per integrated design features. Following mechanical treatment the surface fuels, both natural and activity generated would be reduced by piling and burning or broadcast burning. The direct effects of the Group Selection prescription would include raising the CBH, and decreasing the CBD and surface fuel loading.

Indirect Effects

Fire Behavior and Fire Hazard

The indirect effects of Prescription A and C associated with reduction of CBD and surface fuel loading (Tables 32 through 34), and increased tree spacing, would include increased wind speed within the stands, increased growth of shrubs and grasses and a decreased probability of perpetuating or initiating a crown fire. The indirect effects associated with a reduction of surface fuel loadings would include a reduction in fire behavior, decreased tree mortality and a decreased probability of maintaining or initiating a crown fire. The indirect effects associated with an increased CBH include a decreased probability that a surface fire would transition to a crown fire, increased probability that a crown fire approaching the DFPZ from an outside source would transition to a surface fire and a reduction in canopy scorch and torching during prescribe fire treatments.

Another indirect effect associated with the DFPZ network would be to reduce the amount of acres burned in the event of a wildland fire. The decreased flame lengths and fireline intensity, which would result from the DFPZ treatments, would give firefighters a better chance of halting the progress of a wildland fire and keeping the final amount of acres burned to a minimum. This effect would result in increased protection for areas outside of the DFPZ network including communities, watersheds and wildlife habitat.

The indirect effects of Prescription B would be very similar to Prescriptions A and C with these exceptions. Expected flame lengths and rates of spread would be decreased, residence time of a fire could be longer and reestablishment of the grass and forb species could be slower.

Predicted fire behavior would be decreased due to the compaction of the surface fuels. This compaction would decrease the packing ratio of the surface fuels, which would lead to shorter flame lengths, and lower rates of spread.

The indirect effects of prescribed fire underburning treatments (Prescription D) could result in mortality of individual or isolated pockets of trees; however, this effect would be incidental on the stand level.

The indirect effects of mastication (Prescription E) on fire behavior would be an expected decrease due to the compaction of the surface fuels. This compaction would decrease the packing ratio of the surface fuels and would lead to shorter flame lengths and lower rates of spread.

The indirect effects of group selection (Prescription F) would be an initial decrease in fire behavior. This effect would be caused by the removal of the ladder fuels and reduction of the surface fuels. Subsequent development of the seedlings within the group would create an area that could experience increased fire behavior and mortality, prior to pre-commercial thinning. These effects would be limited in scope due to the relatively small size of the groups.

The indirect effects of the proposed area thinning (Prescription G) would be very similar to the indirect effects of the DFPZs. The indirect effects would include increased wind speed within the stands, increased growth of shrubs, decreased expected fire behavior and effects, and a decreased probability of sustaining an incoming crown fire or initiation of a crown fire from within the stand.

The indirect effects of increased wind speed would be more pronounced in the area thinning prescription than in the DFPZ prescription. However, fire behavior would still be less intense after treatment due to the change in the fuel profile that would result from the proposed treatment.

Hand thinning treatments, within plantations (Prescription H), would increase the amount of surface fuel loading. This would cause an increase in flame lengths, fireline intensity and expected mortality in areas proposed for Prescription H outside of the DFPZ network. The resulting surface fuel loading in areas proposed for Prescription H that are within the DFPZ would be treated by handpiling or mastication to reduce the loadings. These treatments would be effective in reducing flame lengths, fireline intensity and expected mortality within the proposed Prescription H areas of the DFPZ.

Fuels Management Analyst Plus (FMA+) was used to model selected treatments for fire behavior (Fire type, flame length, torching and crowning indices), CBH, and CBD. Data from stand exams was used in the Forest Vegetation Simulator (FVS) to model stand structure and change due to treatments and time. Modeling for fire behavior, CBH, and CBD were done on selected CWHR classes and fuel models that are representative of forest types and fuel loadings in the Champs Project area.

Data used in this analysis were based on site-specific stand exam and surface fuel loading surveys. Modeling parameters for weather are those outlined in Table 35 under 90th percentile fire weather. Fuel models used in fire behavior modeling, after proposed treatments, were based on average surface fuel loading reductions observed on similar prescribed fires conducted on the ELRD.

Table 35. 90th percentile fire weather data.

Fuel/Weather Variable	90th Percentile Values
1 Hour Fuel Moisture, %	2.5
10 Hour Fuel Moisture, %	4.0
100 Hour Fuel Moisture, %	8.4
1000 Hour Fuel Moisture, %	9.8
Herbaceous Fuel Moisture, %	30.0
Woody Fuel Moisture, %	60.0
20 Foot Wind Speed, MPH	11.0
Dry Bulb Temperature, Degrees F	86

Source: Bogard RAWS (1985-2005).

As shown in Tables 32 through 34 under 90th percentile weather, Alternative 2 (existing condition) had predicted flame lengths ranging from nine to 79 feet, excluding the eastside pine 4M (Underburn only areas). Scenario three (Prescription D) represents areas of the project that have experienced previous mechanical thinning followed by prescribed fire. The proposed treatment in these areas (Prescription D) would only use prescribed fire to reduce surface fuel loadings. The predicted flame lengths in all the other scenarios would exclude direct attack methods by hand crews. The predicted flame lengths in scenarios 1 and 2 would exclude direct attack methods by all ground forces and cause aerial resources to be only marginally effective. This would result in large fires, increase the amount of resource damage and decrease the safety of firefighters and the public.

Predicted flame lengths for the same scenarios following the proposed treatments range from two to three feet. Flame lengths of four feet or less can be directly attacked by hand crews and engines, allowing faster fireline construction and generally resulting in less total acreage burned and safer conditions for firefighters. The large change in predicted flame lengths for Scenarios One and Three is due to the predicted transition from a crown fire to a surface fire that would result from the proposed treatments. The predicted flame lengths following the proposed treatments would allow direct attack of wildland fire occurring in these areas. This would allow firefighters to use direct attack methods on fires occurring within the proposed treatment areas. Direct attack of a wildland fire would result in safer conditions for firefighters and the public and less acres burned. The TI's and CI's of both treatment alternatives would be sufficient to reduce the chance of torching and active crown fire, even under extreme fire weather conditions, to very low levels.

Rate of spread (ROS), measured in chains per hour, is a measurement of how fast a fire is moving at the head of the fire. A chain length is 66 feet. The fire behavior tables (Tables 32-34) show that the predicted rates of fire spread under Alternative 2, with 90th percentile weather conditions, would range from 24 to 41 chains per hour, excluding Prescription D (Underburn only). Wildland fires burning with these predicted flame lengths and rates of spread would be large, severely destructive and costly to extinguish. Firefighters would have to use indirect tactics, due to the flame lengths (Roussopoulos and Johnson 1975), which would allow a fire to become much larger than when direct attack tactics can be employed. Fires that must be attacked with indirect tactics also tend to be more dangerous for firefighters. The predicted rates of spread, after the proposed treatments (five to seven chains per hour), would mean that a wildland fire in the treated areas would be smaller when crews arrive and would be moving slower, making it easier to contain with fewer resources. Additionally, wildland fires entering the area proposed for treatment would show a decreased rate of spread and allow firefighters more time to prepare the fire line prior to the arrival of the fire.

Surface Fuel Loading

Table 36 shows the estimated fuel loading (tons/acre) in four diameter size classes post-treatment. Estimates were based on field observations using the Photo Series for Quantifying Natural Forest Residues: Southern Cascades, Northern Sierra Nevada (Blonski, 1981).

Table 36. Estimated average surface loading of dead and down woody fuels by fuel model (tons/acre).

Fuel Model	0 - 0.25”	0.26 - 1.0”	1.1 - 3.0”	>3.0”	Live Fuel	Total Loading
9A	2.04	0.29	0.11	0.92	N/A	3.36
9M	2.92	0.41	0.15	3.5	N/A	6.98

Source: Field surveys using the Photo Series for Quantifying Natural Forest Residues: Southern Cascades, Northern Sierra Nevada (Blonski 1981).

The fine surface fuels (0-3 inches) range from 2.44 to 3.48 tons/acre. Total surface fuel loading would range from 3.36 to 6.98 tons per acre, which are relatively low surface fuel loading and more representative of historic conditions. Surface fuels greater than 3 inches in diameter contribute towards intensity, resistance to control and spotting. However, the fire behavior algorithm does not use them for rate of spread calculations.

Cumulative Effects

Past Vegetative Management actions in the analysis area over the past thirty years can be found in the Past, Ongoing and Reasonably Foreseeable Future Actions section (PORFFA Summary, Appendix B). The existing fuels conditions and resulting predicted fire behavior are the result of past management practices that include regeneration harvest, DFPZ construction, biomass removal, grazing, fire suppression, prescribed fire and tree planting. These treatments have resulted in a range of fuel loadings and have created the existing fire and fuel conditions within the project area. Without periodic maintenance, and in the absence of fire, even areas that received previous fuels reduction treatments would continue to accumulate canopy, ladder and surface fuels.

Regeneration harvesting removed dominant and co-dominant trees and the residual smaller trees and slash were piled during site preparation and burned. These areas were generally planted with tightly spaced, shade-intolerant trees and maintained as plantations (PORFFA Summary, Appendix B). Pre-commercial thinning has occurred on most plantations created prior to 1990. These plantations have grown tall enough and their spacing is wide enough that they should be able to withstand a wildland fire under moderate conditions without excessive mortality. Younger plantations that have not received pre-commercial thinning are currently tightly spaced and could be expected to experience almost total mortality, under even very benign fire weather conditions. The resulting plantations are areas of relatively high value that are difficult to defend from wildland fire. However, they become more fire resistant after pre-commercial thinning and with increasing age. Additional fuels reduction projects, such as Champs, would provide protection to these plantations.

Approximately 1,300 acres of DFPZs have been constructed within the cumulative effects boundaries within the last three to five years (PORFFA Summary, Appendix B). These DFPZs have the same basic characteristics as the DFPZs proposed by Alternative 1. These DFPZs combined with those from Alternative 1 would have the effect of increasing the area that could be expected to experience low severity fire behavior and increasing the connectivity and thus the effectiveness of the entire DFPZ network. This would decrease the amount of acreage burned in the event of a wildland fire and increase the safety of firefighters and the public.

Ladder fuels reduction, in the form of biomass harvest, has occurred on approximately 7,700 acres throughout the project area over the last thirty years (PORFFA Summary, Appendix B). Biomass harvesting generally removes all trees between three and nine inches diameter at breast height (dbh). The trees are whole tree yarded and are required by contract specifications to be completely removed from the site. This type of treatment, when combined with surface fuel reduction, can reduce the expected fire behavior and effects. The ladder fuels reduction reduces expected fire behavior, and improves the safety and efficiency of firefighters when suppressing wildland fires. The effect of these treatments would continue to decrease without some type of disturbance (i.e. large wildland fire, prescribed fire or mechanical treatment).

Surface fuel treatments have occurred, in the form of underburning, on approximately 8,500 acres within the project area over the last ten years (PORFFA Summary, Appendix B). These treatments have generally occurred in areas that have received some sort of mechanical fuels reduction prior to underburning in order to reduce negative fire effects such as mortality. These treatments on average have removed approximately 40 to 50 percent of the surface fuel loadings in the zero to nine inch fuels. The majority of these past actions occurred between 1994 and 1998. The surface fuels reduction reduces expected fire behavior and improves the ability of firefighters when suppressing wildland fires. This effect would continue to decrease without some type of disturbance (i.e. large wildland fire, prescribed fire or mechanical treatment).

Grazing has occurred over much of the project area over the last 140 years (Eastside Historical Assessment, Champs Project Record). The effect of grazing have been to reduce the loading of fine flashy fuels (grass) which has led to a decrease in the rate of spread for grass fires and a decrease in the ability of a wildland fire to carry across meadows. This, combined with fire suppression activities, has reduced the ability of low and moderate severity wildland fires to spread over large areas as they have done in the past. This has resulted in increased surface and ladder fuel loadings and densification of stands. Historically, these types of fires spread over large areas consuming surface fuels and thinning out the in-growth of smaller trees (ladder fuels). Currently, most wildland fires in the project area are suppressed quickly, and rarely become larger than a few acres. The exception to this are fires that burn under extreme fire weather conditions. These types of wildland fires can overwhelm suppression forces and burn over large areas. They also burn at high intensities and can produce severely negative environmental effects.

Fire suppression activities have occurred within the project area since approximately 1905. These activities have dramatically reduced the amount of the area to experience wildland fire. These past actions

have resulted in increased in-growth of small trees (ladder fuels) and increased surface fuel loading. The effect of this has been to change the fire regime of the area from one that experienced frequent low intensity fire to one that rarely experiences fire. A wildland fire burning under normal summer time conditions could produce extreme fire behavior and very negative effects to the ecosystem. This shift in fire regime has been a major factor in the change in Condition Class that has occurred in the area.

Ongoing activities within the cumulative effects analysis area include approximately 1,841 acres in DFPZ construction and an estimated ten percent of the land base harvested on private lands that would reduce tree densities and ladder fuels (PORFFA Summary, Appendix B). These treatments would decrease surface and ladder fuels thereby decreasing expected fire behavior and fire effects. These treatments would increase the connectivity of the DFPZ network and decrease total fuel loadings. This would increase the safety and effectiveness of firefighters. It would also move the area closer to the desired Condition Class 1.

Future actions in the project area include underburning, DFPZ construction, area thinning and the maintenance of the Champs DFPZ (PORFFA Summary, Appendix B). The maintenance actions would consist of underburning, hand and mechanical treatments. Maintenance of the DFPZ is planned from five to 10 years beyond project initiation.

Alternative 2

Direct Effects

The Champs Project would not be implemented under Alternative 2 and therefore there would be no direct effects.

Indirect Effects

Fire Behavior and Fire Hazard

The absence of fuels treatment and prescribed fire would allow continued increases in fuel loading across the project area. Down woody material would continue to accumulate at a rate that is greater than decomposition. Absence of thinning would allow continued in-growth of ladder fuels. As stands become denser with understory in-growth and surface fuel loads increase, anticipated fire behavior and effects would become more severe. These factors would cause an increase in the probability of stand replacement in the event of a wildland fire. Across the project landscape, Condition Class would remain in a state (Condition Class 3) that could allow the loss of key ecosystem components in the event of a large wildland fire.

Under 90th percentile weather conditions, predicted flame lengths in a wildland fire would be in excess of four feet in much of the project area. Flame lengths during passive crowning are predicted to be approximately nine feet and during active crowning they are predicted to be around 79 feet. Rates of spread (excluding areas proposed for Prescription D, under Alternative 1) range from 24 to 41 chains per hour. Predicted flame lengths and rates of spread would create a situation where direct fireline attack would be prohibited and firefighters would have to employ indirect suppression methods. Such a situation

would allow fires to become considerably larger, more expensive, and potentially more hazardous for firefighters and the public. Associated smoke from intense, severe wildland fires could create both nuisance and health concerns in nearby communities for considerable durations (days or weeks).

Surface Fuel Loading

Table 37 shows the estimated existing fuel loading (tons/acre) in four diameter size classes. These fuel loadings are a representative example of existing fuel conditions in the project area. Estimates were based on field observations using the Photo Series for Quantifying Natural Forest Residues: Southern Cascades, Northern Sierra Nevada (Blonski, 1981) and site specific Brown's transect data.

Table 37. Estimated average surface loading of dead and down woody fuels by fuel model (tons/acre).

Fuel Model	0 - 0.25"	0.26 - 1.0"	1.1 - 3.0"	>3.0"	Live Fuel	Total Loading
9Z	1.2	1.2	1.9	4.6	N/A	8.3
10A	0.9	3.1	3.3	7.4	1.4	16.1

Source: Field surveys using the Photo Series for Quantifying Natural Forest Residues: Southern Cascades, Northern Sierra Nevada (Blonski 1981) and site specific Brown's
Transect data taken in July 2006.

The fine surface fuels (0-3 inches) range from a moderate loading (4.3 tons/acre) to a heavy loading (7.3 tons/acre). Total surface fuel loading is moderate to heavy, ranging from 8.3 to 16.1 tons per acre. Surface fuels greater than 3 inches in diameter contribute towards intensity, resistance to control and spotting. However, the fire behavior algorithm does not use them for rate of spread calculations.

Cumulative Effects

Past, ongoing, and foreseeable actions in the project area are the same as those used for Alternative 1. Under Alternative 2, densification of stands, and surface and ladder fuel loading throughout the project area would continue to increase. Lives, property, and natural resources in and around the Champs Project area would continue to be at risk from wildland fires that have the potential to be both large in size and damaging to the ecosystem well beyond the scope of what occurred in this area historically. Fire Regime Condition Classes would remain at their current levels. In the event of a wildland fire in the project area, under existing fuel conditions and extreme fire weather, large-scale loss of key ecosystem components could result. Twenty years in the future, these conditions would be more pronounced without some type of fuels reduction treatment or other disturbance (wildland fire) that reduces fire hazard in the area.

Alternative 3

Direct Effects

The direct effects of Alternative 3 would be very similar to those of Alternative 1, with the following exceptions. Alternative 3 would not remove trees greater than twenty inches in diameter a breast height (dbh), would retain 40 percent canopy closure in suitable spotted owl habitat, it would not include any group selections and the proposed basal area retention within RHCAs would be the same as in the adjacent DFPZ.

The retention of the trees over twenty inches would change the stand structures in the DFPZ and RHCA area to one of more large diameter trees and less smaller diameter ones. The stand structure, in areas that are proposed for group selections under Alternative 1, would change in two ways depending on where they were proposed to be located. The groups that were proposed to be located within the DFPZ network would be treated in the same manner as the DFPZ. The groups that were proposed to be located outside of the DFPZ network would retain their current stand structure.

The CBD would be slightly increased in the eastside mixed conifer areas that are within suitable owl habitat, due to this alternative retaining forty percent canopy closure in these areas. The CBD in eastside pine stands would remain the same as Alternative 1. The CBH within eastside pine stands would remain the same as those for Alternative 1. The CBH within eastside mixed conifer stands, considered suitable spotted owl habitat, would be slightly lower.

Indirect Effects

Fire Behavior and Fire Hazard

The indirect effects would be very similar to those for Alternative 1 with the exception of the group selections, outside of the DFPZ, proposed under Alternative 1. Under Alternative 1 these areas would have experience an initial decrease in expected fire behavior and effects. However, as the plantations became established and aged, expected fire behavior would have increased and expected fire effects would have become more severe. This effect would have persisted up to the time that the plantations were pre-commercially thinned. These areas would be expected, under Alternative 3, to have fire behavior and effects very similar to Alternative 2.

Surface Fuel Loading

The indirect effects of surface fuel loading are the same as Alternative 1. Surface fuel loading outside the DFPZ would be expected, under Alternative 3, to have fire behavior and effects very similar to Alternative 2 since no group selections are being proposed.

Cumulative Effects

Past, present, and foreseeable actions in the project area are the same as those used for Alternative 1. The cumulative effects for Alternative 3 would be very similar to those for Alternative 1 from a fire behavior and effects standpoint.

Alternative 9

Alternative 9 contains components of Alternatives 1 and 3, and are described as follows:

A 20 inch upper diameter limit would be applied to all treatments involving mechanical harvesting, except for Prescriptions C and F, where a 30 inch upper diameter would be applied (as in Alternative 1), and except in rare instances of felling for operability or for safety reasons. Portions of the DFPZs proposed for Prescriptions A and B (731 acres) that are currently typed as suitable California spotted owl habitat (CWHR eastside mixed conifer 4M, 4D, and 5D) would be thinned at a slightly lower intensity to

retain a minimum canopy closure of 40 percent. Prescription A acres would drop to 5,026 and Prescription B acres would drop to 531 acres (as compared to 5,245 and 535 acres respectively in Alternative 1). Prescription B surface fuel treatment would change from mastication to jackpot pile and burn in Alternative 9 only. Prescription C acres would remain the same as Alternative 1 (519 acres). Unthinned patches or non-mechanically treated leave islands, in addition to the untreated suitable California spotted owl habitat mentioned previously, would decrease to 556 acres. Due to dropped groups within DFPZ Prescription D, under burn only acres would increase to 3,115 (as compared to 3,103 acres under Alternative 1). Group selection harvests (261 acres) would only be implemented outside of suitable California spotted owl habitat and potential habitat (mixed conifer) within the Area of Concern and away from California spotted owl PACs and HRCAs. Groups dropped from inside of proposed DFPZ thinning units would revert to the associated DFPZ prescriptions.

Direct and Indirect Effects

Fire Behavior, Fire Hazard, and Surface Fuel Loading

Approximately 4,454 acres of Prescription A and 334 acres of Prescription B would be treated in the same manner as proposed under Alternative 3. The direct and indirect effects would be the same as described under Alternative 3. Approximately 731 acres of suitable spotted owl habitat (534 ac. Prescription A, 197 ac. Prescription B) would be thinned less intensively to retain a minimum canopy cover of 40 percent. These areas would remain at risk for density related tree mortality post-treatment and residual trees would be more susceptible to mechanical damage from harvest operations and fuels treatments due to the higher stocking levels (Champs Silviculture Report). Additionally, this area would be more susceptible to torching during prescribed fire operations that could lead to more damage and mortality in the residual stand. The projected CBH in these areas would range from three to 12 feet after thinning. However, under burning would further raise the CBH through scorching of the lower canopies and torching of smaller trees. This would lead to an average CBH that would be effective in retarding the potential for crown fire, but it would cause increased mortality in the smaller trees and lead to a slightly higher surface fuel loading in the future compared to the areas of Prescription A that do not have the 40 percent canopy closure restriction.

An additional 341 acres of suitable California spotted owl habitat, within Prescription A, would not be thinned. These areas would be utilized to make up the approximately 10 percent of DFPZs that would be left as unthinned leave islands under all alternatives. The direct and indirect effects would be the same under all action alternatives since the acres included as unthinned leave islands would remain essentially the same.

Prescription B would be applied to areas that currently have a high surface fuel loading that would make the use of prescribed fire undesirable (high mortality in residual stand) without an intervening surface fuel treatment. Alternatives 1 and 3 propose the use of mastication in these areas after thinning to reduce the size and increase the compaction of both natural and activity generated surface fuels. Alternative 9 would to treat these heavy surface fuel concentrations by breaking up the fuel continuity

through the use of machine piling and burning. The direct effects of this prescription would be to reduce tree density and reduce and fragment surface fuel loadings. The indirect effects of this prescription would include reducing flame lengths and intensity of a wildland fire. It would also reduce the ability of a wildland fire to carry through the DFPZ. This effect would be caused by the removal of portions of and the fragmentation of the remaining surface fuel loading. Mastication of the surface fuel loading would result in smaller flame lengths than piling and burning. However, it would not actually remove the surface fuels; instead, the reduction in flame lengths would be caused by the compaction of the fuel profile. This compaction would cause a fire to have a longer residence time, which would lead to a higher mortality rate within the stand.

Group selection treatments would be implemented, although not at the same density as proposed under Alternative 1; fewer acres would be treated using the group selection prescription under Alternative 9. The same direct and indirect effects would apply as those described under Alternative 1. Group selections proposed under this alternative would have little impact to the overall behavior of fire in the project area due to the small number of proposed acres and the fragmented nature of the treatment.

Treatments proposed under Prescriptions C would remain the as proposed under Alternative 1. The direct and indirect effects would be the same as described under Alternative 1.

Treatments proposed under Prescriptions D and E are the same as those described in the other action alternatives, with only slight acreage adjustments for Prescription D. Direct and indirect effects of these two prescriptions would be the same as those described under Alternative 1.

Treatments proposed under Prescriptions G and H are the same as those described under Alternative 3. Direct and indirect effects of these two prescriptions would be the same as those described under Alternative 3.

Cumulative Effects

Past, present, and foreseeable actions in the project area are the same as those used for Alternative 1. The cumulative effects for Alternative 9 would be similar to those for Alternatives 1 and 3.

Air Quality

Alternatives 1, 3, and 9

Direct and Indirect Effects

The project area lies within the Lassen County Air Quality Management District (LCAQMD). In accordance with Title 17 of the California Code of Regulations, a smoke management plan would be submitted to and approved by the LCAQMD prior to any prescribed fire ignitions that are part of the action alternatives. Adherence to the smoke management plan (SMP) for pile and understory burning would decrease the chance of negative impacts to communities and other smoke sensitive areas. It would also help to decrease the chance that particulate matter emissions from pile or understory burning would violate the National Ambient Air Quality (NAAQ) emission standards.

Prescribed burning would only occur on 'permissive' burn days as defined by the California Air Resources Board (CARB). CARB makes daily determinations of smoke transport conditions and grants permission to burn only on days with adequate smoke transport and dispersal conditions. Short-term production of smoke and associated emissions would occur during prescribed burning in the project area. However, daily coordination among local fire management officials (Air Quality Management Districts, the California Air Resources Board, the National Weather Service and agencies that are conducting prescribed fire operations), adherence to the SMP and the daily determination of smoke transport conditions by CARB would help to ensure that the smoke and related emissions for the proposed prescribed fire activities would stay within the standards of the Clean Air Act. Coordination helps ensure that burning only occurs when atmospheric conditions are conducive to good smoke dispersion and that the cumulative effects of all prescribed burning remain at levels that are within the provisions of the Clean Air Act. The direct effects to air quality would be minimal and mitigated by following the guidance of the SMP and CARB.

Alternatives 1 and 3 propose 9,542 acres of underburning and approximately 360 acres of landing pile burning over the next five to eight years. Following these constraints Alternatives 1 and 3 would only produce short-term smoke impacts to the local areas. Local or nearby communities (Spalding, Susanville and the Chester/Westwood areas) may see smoke from a distance during the day. However, given the predominant wind flow in the area (southwest to northeast), the smoke would tend to move away from these areas.

Alternative 9 proposes an additional 531 acres of pile burning under Prescription B. The smoke and related emissions caused by the burning of these additional piles would be mitigated by the same measures that are discussed under Alternative 1. In the event of a wildland fire, smoke and related emissions would be lessened, post-treatment, since there would be less surface fuels to be consumed than under all the other alternatives.

Treatment of fuels under Alternatives 1, 3, and 9 would result in decreased smoke production and associated emissions in the event of a wildland fire. This decrease in emissions would help to reduce smoke related impacts to nearby communities. Short-term impacts from smoke and associated particulate matter, from the proposed prescribed fire treatments, combined with emissions from other vegetation burning on public and private land is possible. However, as discussed earlier, these possible impacts would be mitigated by adherence to the SMP and CARB.

Fugitive dust could result from logging operations such as skidding and hauling during dry seasons. It would be mitigated by standard contract requirements for road watering or other dust abatement techniques and would not cumulatively add to the Air Quality concern.

Cumulative Effects

The cumulative effects analysis for Air Quality issues considers ongoing, proposed and reasonably foreseeable future actions. Impacts to air quality from prescribed underburning and machine pile burning in the project and adjacent areas, during the last five years have been minimal and no Notice of Violation

of air quality standards has been issued on the Lassen National Forest during this period. Alternatives 1, 3, and 9 would not increase the amount of prescribed fire activities in the area above what they have been implementing for the last five years and would not impact the air quality of the area, when combined with ongoing and reasonably foreseeable future actions, beyond what has occurred during this time.

Alternative 2

Indirect and Cumulative Effects

This alternative would create no short-term impacts to the local areas from prescribed fire since no new burning would be proposed under this alternative. However, the risk of a major air quality impact from a large wildland fire burning in the area would be increased under Alternative 2. The amount of smoke created in the event of a large wildland fire burning in the project area would be greater than smoke created by burning of fuels under Alternatives 1, 3, and 9. This is because there would be more acres burned in a shorter period of time that would burn under hotter and drier conditions, and, the amount of fuel consumed under a wildland fire condition would be greater. Increased consumption of the canopy fuels, due to the more intense fire behavior, would also contribute to increased smoke production. Additionally, smoke impacts to local communities would be more severe in the event of a wildland fire due to the normal summertime inversions. Inversions cause smoke to linger near the surface in low-lying areas and can last for extended periods, especially during summertime conditions. Summertime inversions have impacted the area during years when large wildland fires burned including 1977, 1987, 1992 and 1999.

Heritage Resources

Introduction

The Heritage Resources Report for the Champs Environmental Assessment is incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

The cumulative effects analysis boundary for heritage resources is the project area. The geographic scope of the cumulative effects analysis boundary was selected because impacts to heritage resources accumulate at the specific location of heritage resources, irrespective of actions in surrounding areas. Archaeological sites are stationary resources, which are protected from all project (current or future) related activities until eligibility to the National Register of Historic Places has been determined. Generally, archaeological sites are not influenced by actions taken outside their boundary since this is addressed and mitigated during project planning and integrated design features. A temporal scope was also selected in determining cumulative effects, because impacts to heritage resources at a given location can accumulate over time from different activities or events.

Alternative 1

Direct and Indirect Effects

Ground-disturbing activities associated with this alternative have the potential to directly affect heritage resources. Treatments such as mechanical treatments including thinning, piling and mastication, prescribed burning, and road construction can damage or destroy historic and prehistoric archaeological sites and features. Increased traffic, use, and maintenance of roads could possibly affect heritage resources that are bisected by roads, however road prisms are previously disturbed contexts, additional potential effects are not likely.

Out of the eighty-eight identified properties within the Champs Analysis Area boundary, about 71 historic properties are directly within proposed treatment areas. However, Standard Resource Protection Measures (SRPM) as defined in the Regional Programmatic Agreement and Interim Protocol would be employed as integrated design features and applied to all heritage resources within the Area of Potential Effect (APE), and therefore there would be no effect to heritage resources resulting from proposed treatments within the project area.

Some of these treatments could enhance heritage resource values. Timber harvesting in areas of historic logging camps and other associated historic logging features could enhance the historic character of the resource by restoring its original landscape context. This would apply to the Lassen Trail as well, as such harvesting begins restoring the more open and park-like conditions initially encountered by Euro-American emigrants (Eastside Historical Assessment, Champs project record). Treatments adjacent to historic railroad grades and the Lassen Trail would enhance heritage values and the historic context of these resources. One mile of the Trail bisects and/or is adjacent to proposed treatments associated with the Champs project.

Activities associated with this alternative would comply with the National Historic Preservation Act (NHPA) of 1966, as amended; the Archaeological Resources Protection Act of 1979 (ARPA), the Native American Grave Protection and Repatriation Act, the American Indian Religious Freedom Act (1978), and as called for by the First Amended Regional Programmatic Agreement Among The U.S.D.A. Forest Service, Pacific Southwest Region California, State Historic Preservation Officer, And Advisory Council On Historic Preservation Regarding The Process For Compliance With Section 106 Of The National Historic Preservation Act For Undertakings On The National Forests Of The Pacific Southwest Region (2001) (Regional PA), and the 2004 Interim Protocol for Non-Intensive Inventory Strategies for Hazardous Fuels and Vegetation Reduction Projects (Interim Protocol).

Ground-disturbing activities can indirectly affect the integrity i.e. the feeling or setting of the resource. This can occur even if activities are not conducted inside the resource boundaries. The importance of a heritage site may be encompassed in its setting and landscape associations as much as with its physical features. When the integrity of heritage resources becomes compromised, it affects the sites' qualities for being eligible to the National Register of Historic Places.

This alternative could also benefit heritage resources by providing opportunities for study (i.e., information on heritage resources, locations of these resources, pre-historic and historic use of the area, etc.), thereby adding to knowledge of past human behavior and the trend of human-environment interactions and settlement and subsistence practices. This information can contribute to our understanding of cultural adaptations within the environment and provides opportunities for protection and interpretation of heritage resources for the public.

The proposed action would reduce the risk of impacts to heritage resources by reducing hazardous fuel accumulations around the sites, thus reducing the risk of subsequent high intensity fires (Fuels Report, project record). The alternative should, therefore, have an overall beneficial effect to heritage resources.

Cumulative Effects

The cumulative effects analysis for heritage resources considers impacts of the alternatives when combined with the past, present, and foreseeable future actions and events (PORFFA Summary, Appendix B). Prior to the 1974 Forest and Rangeland Renewable Resources Planning Act and the archaeological protection laws of the mid 1970's, effects to heritage resources were not considered during project planning or implementation. Consequently, cumulative impacts of varying degrees occurred within the project area from various land management activities including primarily logging, road construction, and grazing. Natural environmental processes and unrestricted land uses have also contributed to effects to heritage resources within the Champs Project Area. These include: dispersed recreation, OHV uses (Recreation / Visual Resources Report, Champs project record), user created roads and trails, wildfires (Fuels Report, Champs project record), erosion (Soils Report, Champs project record), and exposure to the elements.

Heritage resources have been protected using "flag and avoid" as protection measures during all projects subsequent to 1970s legislation. All projects analyzed under Champs past actions (PORFFA Summary, Appendix B) have occurred since then and sites have been protected from project activities. There has been no documentation of inadvertent effects to historic properties within the Champs Project Area due to recent management activities. However, this management practice has deferred management of heritage resources and in some instances resulted in unintended consequences due to neglect and unnatural and heavy fuel loading within site boundaries. Future wildfires (Fuels Report, Champs project record) could potentially affect the integrity of fragile heritage resources. No anticipated future management activities would affect heritage resources.

Since heritage sites have been protected from recent past project ground disturbing activities and impacts from existing or future projects are not expected, there should be no adverse cumulative effects to heritage resources resulting from the proposed activities associated with the Champs Project.

Alternative 2

Direct, Indirect, and Cumulative Effects

No direct effects from project related activities would occur to heritage resource sites as a result of implementing this alternative. The risk of potential wildland fire and damage to fragile heritage resources is greater should the no action be implemented due to increased fuel loading (Fuels Report, Champs project record).

Without management intervention there is a concern that future high-severity fires could occur due to increased fuel loading. Potential high intensity wildland fires may affect heritage resource values. Heritage resources within the Champs project area have features, structures, artifacts that could be destroyed by high-intensity wildfire. The effects of wildfire could result in charring, spalling, discoloring, melting, and destroying individual artifacts and complete destruction of wooden structures and features.

Alternative 3

Direct, Indirect, and Cumulative Effects

The differences in the proposed treatments with regard to potential effects to heritage resources under Alternative 3 are substantially less than Alternative 1, merely because there are fewer sites within the Area of Potential Effects under Alternative 3. There are no differences between Alternative 3 and Alternative 1 with regard to beneficial effects, indirect effects, and cumulative effects to heritage resources.

Compared to Alternative 1 that contains 71 historic properties within proposed treatments, Alternative 3 proposed treatments include 43 historic properties, which is about one half of all properties identified within the Champs Project area. Due to protection measures as discussed under Alternative 1, there would be no effect to heritage resources resulting from proposed treatments associated with this alternative.

The omission of group selection harvest units, and reduced thinning within RHCAs, treatments under Alternative 3 reduces the potential to incur inadvertent effects to 21 heritage site resources. Although proposed group selections that fall within DFPZs would be thinned consistent with surrounding prescriptions, this type of thinning would constitute less ground disturbance than group selection harvest activity, thus posing less of a threat to adjacent heritage resources.

There are three heritage resources within owl habitat proposed for thinning and under burning. Retaining a minimum 40 percent canopy cover and 20 inch dbh upper diameter limit would offer more protection to the three heritage properties in owl habitat within the project area, because less ground disturbance would be occurring adjacent to the heritage sites. Thus, the alternative reduces the potential for inadvertent effects to heritage resources within owl habitat areas.

The road management proposals associated with Alternative 3 does not pose any potential effects to heritage resources, as there are no cultural properties within the vicinity of these actions.

As noted under Alternative 1, activities associated with Alternative 3 would also comply with the various Acts and Protocols for the preservation and protection of heritage resources.

Alternative 9

Direct, Indirect, and Cumulative Effects

The project area would be treated similarly under this alternative as in Alternative 1. The differences in the proposed treatments with regard to potential effects to heritage resources are negligible and there are basically no differences in potential effects to heritage resource between alternatives. There are no substantial differences between the alternatives with regard to beneficial effects, indirect effects, and cumulative effects to heritage resources.

Under Alternative 9 many of prescriptions are the same as in Alternative 1. However, Alternative 9 was designed to further reduce impacts to suitable California spotted owl habitat. Under Alternative 9, this would be accomplished by reducing the number of acres thinned within suitable owl habitat within eastside mixed conifer stands and reducing the number of acres treated under group selections within suitable and potential habitat. Some “no treatment” areas were also identified under this alternative. However proposed “no treatments” do not offer any advantage to heritage resources because there are no historic properties within those areas.

Proposed activities associated with Alternative 9 have more potential to incur effects to heritage resources than Alternative 3 and slightly less potential than proposals in Alternative 1. This is largely due to the number of historic properties within the alternatives. Within Alternative 1 there are 71 sites, Alternative 3 contains 43 sites, and Alternative 9 contains 63 sites within proposed treatment areas.

As with the other alternatives, the following of identified protective measures would result in no direct effects to the known heritage resource sites.

Hydrology

Introduction

The Watershed Report for the Champs Environmental Assessment is incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

The Champs Project area is located on portions of seven subwatersheds that feed and encompass Pine Creek, ultimately draining into the Eagle Lake. The majority of the subwatersheds are public land managed by the Forest Service, although there a few private rangeland holdings in the Champs Flat area and private timber land holdings in the Logan Spring area, just northeast of Crater Mountain. The cumulative effects analysis area is defined by the entire area of the seven subwatersheds (approx. 39,000 acres). Activities that occur within watersheds can affect the channels within those watersheds. Therefore, activities that occur outside the project boundary, but within the watershed boundary, must be analyzed together to determine their effect on streams within the project area. Activities that take place outside of the watershed boundaries have limited effect on streams within the project area. Therefore, subwatersheds that do not drain to Pine Creek are not considered in this analysis. Subwatersheds a long distance upstream from this area (miles) are also not considered, as the effects of proposed actions in this project

area would be artificially diluted by doing so. Subwatersheds immediately downstream from the project area are also not used in this analysis, for the same reason.

Alternatives 1, 3 and 9

Direct, Indirect, and Cumulative Effects

Most of the activities under the two action alternatives involve ground disturbing activities, such as timber harvest, prescribed burning, fuel reduction, and understory thinning. However, with the implementation of IDFs and adherence to BMPs, there would be no measurable direct or indirect effects on stream flows, water quality, stream morphology, riparian areas, floodplains, or wetlands in the Champs analysis area. Since no new roads would be built, and no existing roads would be removed, values for four of the seven watershed disturbance parameters would remain unchanged (Road Miles, Road Density, RHCA Road Density, and RHCA Equivalent Roaded Acres [ERA] percent). The proposed vegetation treatments would affect the ERA and ERA percentage values for the seven analysis area subwatersheds (Table 38). ERA percent and the Threshold of Concern (TOC) are used as the primary indicators to make effects determinations.

The action alternatives would not combine with past, individually insignificant impacts to result in a significant cumulative impact on watershed resources. The results displayed in the table below include all past, ongoing, proposed, and reasonably foreseeable future activities within this analysis area (PORFFA Summary, Appendix B). Considering that no subwatershed would exceed the 15 percent Threshold of Concern (TOC), cumulative impacts are not anticipated. The ERA percentage values for the more disturbed subwatersheds (Shoestring and Squaw Valley) would recover to near current levels by 2018. Future possible actions include removing some of the road network from the landscape, thereby reducing its cumulative effect on watershed resources.

Table 38. Cumulative Watershed Effects Analysis Results.

Subwatershed	Alt. 2 Current ERA	Alt. 2 Current ERA%	Alt. 1 Post ERA	Alt. 1 Post ERA%	ERA 10 years after Alt. 1	ERA% 10 years after Alt. 1	Alt. 3 Post ERA	Alt. 3 Post ERA%	ERA 10 years after Alt. 3	ERA% 10 years after Alt. 3
Champs – PI24	320	**2.8**	849	**7.5**	564	**5.0**	811	**7.2**	552	**4.9**
Squaw Valley – PI23	221	**5.0**	541	**12.2**	321	**7.3**	511	**11.6**	307	**7.0**
Shoestring – PI22	274	**7.0**	455	**11.7**	267	**6.8**	443	**11.4**	252	**6.5**
Burgess – PI21	47	**2.3**	124	**6.1**	80	**3.9**	114	**5.6**	75	**3.6**
Aspen Well – PI20	347	**4.3**	597	**7.4**	351	**4.3**	549	**6.8**	327	**4.0**
Little Harvey Valley – PI18	62	**1.6**	142	**3.8**	82	**2.2**	139	**3.7**	81	**2.1**
Logan North – PI17	183	**3.4**	362	**6.7**	235	**4.4**	340	**6.3**	225	**4.2**

Table 38 continued. Cumulative Watershed Effects Analysis Results.

Subwatershed	Alt. 2 Current ERA	Alt. 2 Current ERA%	Alt. 9 Post ERA	Alt. 9 Post ERA%	ERA 10 years after Alt. 9	ERA% 10 years after Alt. 9
Champs – PI24	320	**2.8**	849	**7.5**	568	**5.0**
Squaw Valley – PI23	221	**5.0**	519	**11.8**	308	**7.0**
Shoestring – PI22	274	**7.0**	437	**11.2**	245	**6.3**
Burgess – PI21	47	**2.3**	112	**5.5**	72	**3.5**
Aspen Well – PI20	347	**4.3**	546	**6.7**	319	**3.9**
Little Harvey Valley – PI18	62	**1.6**	140	**3.7**	81	**2.2**
Logan North – PI17	183	**3.4**	339	**6.3**	222	**4.1**

Source: Watershed Report, Champs project record

This analysis assumes that all of the proposed action treatments would occur in 2008. Realistically, given contract time frames, limited operating periods, and limited prescribed burning windows, all activities are not likely to take place in one year. This analysis presents the results of a worst-case-scenario, regarding the impact level of the action alternatives.

The TOC for each of these watersheds is 15 percent. Since none of the post-project ERA percentage values exceed this TOC, detrimental effects to watershed resources are not anticipated. Although under Alternatives 1, 3, and 9 the TOC is approached in two subwatersheds (Squaw Valley and Shoestring), detrimental effects to watershed resources are unlikely, due to the discontinuous nature of the stream network, planned implementation of IDFs and BMPs, and the fact that all proposed treatments would be spread temporally and spatially.

Alternative 2

Direct, Indirect, and Cumulative Effects

Given that no proposed actions would take place, there would be no direct effects on watershed resources. Indirect and cumulative effects related to the No Action Alternative result from past actions, ongoing actions, reasonably foreseeable actions, and potential future occurrences, such as catastrophic wildfire. Without the proposed action, ERA percentage values would remain nearly as low as they currently are. Ongoing actions would affect these values some. However, recovery from past actions would have a greater effect than the impact of the ongoing actions and ERA percentage values would continue to decrease over time. This comes from the fact that there are many more acres of past treatment (50,000 acres over the past 30 years) than there are ongoing treatments (about 1,000 acres over the next few years). Stream flow in the analysis area may decrease into the future, as forest stand densities increase, and conifer encroachment of meadow areas continues. In the event of a catastrophic wildfire, watershed resources would be affected. Precipitation events on newly burned areas cause excessive sediment erosion and deposition, increases in peak flows, and channel incision. Solar inputs to channels would also increase which could raise stream temperatures. Erosion and sedimentation rates would remain high until such a time that groundcover in the burned area can be reestablished. Solar inputs to streams due to lack of canopy would remain high until vegetation recovers to a level that can provide shade. Nutrients, such

as nitrogen and phosphorous, would likely be mobilized by such a wildfire event. If the event is large enough, and subsequent runoff reaches Pine Creek, these nutrients would be deposited in Eagle Lake. This could add to the existing nitrogen and phosphorous impairment of Eagle Lake. Wildfire can also remove riparian area and wetland vegetation, leading to increased erosion in and decreased function of these areas. High intensity fire can sterilize soils in these areas and inhibit recovery of riparian area and wetland vegetation. When considering the scale and effect of a large catastrophic wildfire, inputs from past and ongoing actions are not distinguishable.

Public Safety

Introduction

The Recreation / Visual Resources Report for the Champs Environmental Assessment includes a discussion on public safety and is incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

The public safety effects analysis boundary for the Champs Project is the outer project boundary. There are no designated hiking/biking trails within the project area or developed recreation sites within the project area. Known recreational use of the project area is minimal and includes hunting, firewood cutting, dispersed camping, limited off-highway vehicle (OHV) and over-snow vehicle (OSV) use, as well as driving for pleasure. Effects to these activities would be confined to the specific areas where project activities are undertaken.

Alternatives 1, 3, and 9

Direct Effects

Development of access and harvest operations would involve use of mechanical equipment; falling of trees; hauling of harvest products on Forest roads, county roads, and state highways; and use of prescribed fire, all of which potentially pose risks to workers to the public. Such risks would remain at acceptable levels because the public would be alerted to active harvest areas, haul routes on Forest roads would be clearly signed as required in contract provisions to warn the public of project activities, traffic on Forest roads would be monitored by Forest Service inspectors to ensure the safety of the public, and haul speeds on county and state roads are regulated by the county sheriff and California Highway Patrol. Also, prescribed fire would only be ignited when fuel moisture, air humidity, wind, and staff and equipment availability are favorable to control of fire based on a site-specific burn plan developed for each burn project. These types of activities (logging, hauling, burning, etc) have historically occurred on Forest roads within and near the project area (including the past five years) without creating public safety and health problems in the past.

Portions of the project area could be temporarily impacted by smoke from prescribed burning operations occurring primarily during the fall months (Fuels Report, Champs project record). Hunters may experience this impact, but would not necessarily be using the same areas being treated, since game animals would likely disperse from the area where burning operations are occurring.

Roads within the project area may be closed to the recreating public on a temporary basis for safety reasons. Typically, these closures are caused by roads being blocked with heavy equipment operating on project related activities. These closures are of limited duration lasting within a range of minutes to a few hours. These alternatives include an integrated design feature that would alert the public to potential hazards through signing along Forest Service system roads.

Indirect and Cumulative Effects

The project would reduce the fire hazards that could contribute to large-scale wildland fires within the project area (Fuels Report, Champs project record). This would increase safety for recreation users in the event a wildland fire occurs during their visit.

Alternative 2

Public safety would not be affected by this alternative since no activities would be implemented. In the event of a severe wildland fire within this forest area, associated smoke could create both a nuisance and health concerns in nearby communities for considerable durations (days or weeks) (Fuels Report, Champs project record).

Range

Introduction

The Range Report for the Champs Environmental Assessment is incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

The cumulative effects analysis area is the Champs Flat and Harvey Valley Allotments because these allotments overlap the Champs Project and are currently active.

Alternative 1

Direct and Indirect Effects

All range improvements within the proposed project boundary would be avoided or repaired if damaged during project activities, including fences and corrals on private lands at Champs Flat.

Advance notification of project activities and coordination with the permittees would reduce any unexpected disbursement of cattle caused by project noise, heavy road use or the cutting of fences. As heavy road use occurs, the permittees could adjust travel timing (before or after project work hours) to perform their authorized use activities. When fences are cut or temporarily removed, coordination with the permittees would be implemented.

Most range monitoring transects are in open meadows within the allotments. If project activities could have the potential to impact transects, they would be identified on the ground and would be avoided or protected.

All prescribed fire implementation would follow specific Burn Plans (Fuels Report, Champs project record) and permittees would be notified in advance if any adjustment to their operations needed to be

made. Since most underburning is planned away from the main livestock use areas, it is not anticipated that prescribed burning would displace livestock grazing activities.

Regeneration efforts within group selection units would be monitored and an assessment of any livestock impacts would be completed. If needed, the standard and guideline to defer livestock grazing may be required for two growing seasons after site preparation and planting. On both allotments (Harvey Valley and Champs Flat), cattle are frequently moved and distributed throughout the primary grazing areas, and are also grazed in fenced private holdings during a portion of the season. Therefore, deferred use is not expected to be necessary.

Effectiveness monitoring is needed to evaluate diversity and productivity of native and desired non-native plant communities due to treatments within RHCAs and Area Thinning (Thin and Underburn, Prescription G) (Factors Influencing Understory Vegetation for Champs EA, Champs project record). The principal objective of this monitoring is to contrast plant community metrics (species richness, cover, diversity, evenness, and dominance) among four treatments: 1) thinned and fenced to exclude livestock grazing, 2) thinned and open to livestock grazing, 3) not thinned and fenced to exclude livestock grazing, and 4) not thinned and open to livestock grazing. As part of this monitoring strategy, temporary fencing is needed to exclude livestock grazing and trailing within the monitoring plots during the monitoring effort (approximately 5 -10 years). A minimum of five intermittent stream reaches would randomly be selected in areas within Prescription C and Prescription G. Within each randomly selected area, four 33 ft. x 66 ft. would be established of which two would need to be fenced. Fenced monitoring plots to evaluate change in understory plant communities due to treatments would have a negligible effect to rangeland resources. (Monitoring to evaluate change in understory plant communities due to treatment would apply to Alternatives 1, 3, and 9.)

The proposed project could have a positive effect on rangeland availability and range health by creating additional forage within the treated areas. Forage production and accessibility could increase once thinning and underburning is implemented on the allotments (Factors Influencing Understory Vegetation for Champs EA, Champs project record). New areas of transitory range could be created which could improve livestock distribution and use patterns.

Cumulative Effects

Past and ongoing activities within the analysis area that have influenced livestock grazing consist of past timber sales, DFPZ projects, controlled burns, and limited dispersed recreation. Previous vegetation management projects have provided, or are providing, transitory grazing opportunities for livestock. However, these particular allotments have not been reliant on transitory rangelands and no major changes in stocking rates use is known to have occurred due to past projects within the Champs and Harvey Flat allotments.

Livestock have impacted key areas and congregated in areas such as watering sites, and corrals causing soil compaction, surface disturbance, direct plant mortality or changes in species composition (Eastside Historical Assessment, Champs project record). Cattle-grazing also affects wetlands and wet

meadows throughout the area. Past management practices have led to compacted earth, bare ground, soil pedestals, and trailing in and through wetlands and wet meadows. Most areas are slowly recovering from past activities. Ground cover, plant vigor, and compaction are improving under current management (Watershed Report, Champs project record). Past grazing activities may have cumulatively contributed to increases in silting and erosion, affecting current stream and watershed condition. The cumulative effects of potential additional compaction through project activities and grazing are expected to be minimal since livestock use generally occurs on meadows and riparian stringers, and monitored using grazing standards and guidelines.

Other foreseeable future actions in the area include fuels management, wildfire suppression, DFPZ maintenance, road closures, and dispersed recreation.

Existing grazing, ongoing, and proposed project activities would increase the risk of noxious weed spread in the project area (Noxious Weed Risk Assessment, Champs project record). Proposed thinning, group selections, underburning, and road management would create widespread soil disturbance and reduce overall forest canopy cover, thus increasing the risk of noxious weed spread.

Even though there are no aspen treatments in the Champs project, action to protect the aspen stands are in effect. Plantations and young aspen would be monitored, and if needed, protective barriers or temporary fence could be installed in active allotments to prevent cattle entry. No new fences are being proposed at this time, however, any new range fences would be planned separately from this project and exact locations and designs of new improvements would be determined later in a site-specific environmental analysis document.

Even with implementation of Alternative 1, trend in range condition is anticipated to remain in a static or slight upward trend on these two active allotments.

Alternative 2

Direct, Indirect, and Cumulative Effects

Livestock grazing would continue to be managed and authorized under appropriate management plans, regulations, and policies. Current grazing management on the allotments is described in Range Report (Champs project record). A potential adverse impact to grazing as a result of not reducing fuels, could come from a wildland fire (Fuels Report, Champs project record).

Available forage within the allotments would decrease by not implementing the project since dead surface material would continue accumulate in the forest understory. Even though these allotments do not rely on transitory range, the increase of transitory range does help the overall distribution of cattle, thus decreasing impacts to sensitive areas.

Alternative 3

Direct, Indirect, and Cumulative Effects

Direct, indirect, and cumulative effects for Alternative 3 are essentially the same as Alternative 1. However, because Alternative 3 does not implement group selection harvest, deferral of grazing to reduce

impacts to plantations would not be necessary. Also, with Alternative 3, a 20 inch dbh upper diameter limit would be implemented across all treatments, as well as a 40 percent minimum canopy cover requirement within suitable spotted owl habitat areas (outside of HRCAs). These treatments could reduce the potential for transitory range production.

Alternative 9

Direct, Indirect, and Cumulative Effects

Direct, indirect, and cumulative effects for Alternative 9 are essentially the same as Alternatives 1 and 3 with the following exceptions. Alternative 9 would implement fewer group selection harvests as compared to Alternative 1. Similar to Alternative 1, natural and artificial regeneration efforts within group selection units would be monitored and an assessment of any livestock impacts would be completed. If needed, the standard and guideline to defer livestock grazing may be required for two growing seasons after burning. On both allotments, cattle are frequently moved and distributed throughout the primary grazing areas, and they are also grazed in fenced private holdings during a portion of the season. Therefore, deferred use is not expected to be necessary.

Similar to Alternative 3, Alternative 9 would implement a 20 inch dbh upper diameter limit across all treatments except for group selection harvest units and within RHCAs, and a 40 percent minimum canopy cover requirement within 731 acres of suitable spotted owl habitat areas. These treatments could reduce the potential for transitory range production.

Recreation

Introduction

The area considered for cumulative effects analysis for recreation is the same as for public safety.

Alternatives 1, 3, and 9

Direct Effects

There would be no measurable differences between Alternatives 1, 3, and 9 regarding direct, indirect, and cumulative effects to recreation resources.

Impacts to visitors participating in dispersed recreation activities within the Champs project area are expected to be minimal due to the large size of the project area. It is unlikely that a visitor being displaced by vegetation management activities would not be able to find a similar campsite, hunting area, or road within a short distance of the affected area. Recreationists could be affected by an intermittent and temporary increase in large truck and heavy equipment traffic, as well as the noise associated with management activities.

Portions of the project area could be temporarily impacted by smoke from prescribed burning operations occurring primarily during the fall months (Fuels Report, Champs project record). Hunters may experience this impact, but would not necessarily be using the same areas being treated, since game animals would likely disperse from the area where burning operations are occurring.

Roads within the project area may be closed to the recreating public on a temporary basis for safety reasons. Typically, these closures are caused by roads being blocked with heavy equipment operating on project related activities. These closures are of limited duration lasting within a range of minutes to a few hours. The proposed action includes an integrated design feature that would alert the public to potential hazards through signing along Forest Service system roads.

Indirect and Cumulative Effects

Long-term effects of the project would include a restoration of forest health due to vegetative treatments (Silviculture Report, Project Record). An open or less continuous forest canopy would provide for more recreation opportunities due to a reduction of dense timber stands that currently preclude recreation use. A more open landscape would allow for easier hiking as well as improved opportunities for bird watching and wildlife viewing.

The Champs Project area has a long history of vegetation management projects similar to the proposed action (PORRFA Summary, Project Record). Users of the project area appear to be satisfied with their recreational experiences, even though vegetative treatments have occurred in the past. This project, combined with past and future vegetative treatments would have minimal effects on the overall experience of recreationists using the area.

Once vegetative treatments have been completed, recreational users would be able to enjoy their outdoor activities as before the project began. Therefore, little or no negative cumulative effects would occur to possible recreation activities. Over a post-treatment period of 20-years, it is not anticipated that recreational activities would be negatively affected by the project.

Alternative 2

Direct and Indirect Effects

The Champs Project would not be implemented under this alternative and no direct effects would occur. This alternative would result in no immediate or foreseeable change to existing dispersed recreation activities and visitor use of system roads. In the event of a large-scale wildland fire within this forest area (Fuels Report, Champs project record), users would be displaced to other nearby areas that provide the same recreation opportunities and experience.

Cumulative Effects

With no reduction in the risk of wildfire to this forest area, negative effects for most types of recreation activities would take place if a large-scale wildland fire did occur (Fuels Report, Champs project record). Depending on the scale of the wildfire, temporary or long-term closures could be implemented resulting in inconvenience to the recreational user. In the event of debris, brush and ladder fuels being consumed in a large-scale wildland fire, damage to the forest could be extreme and take several decades to recover. In this scenario, many recreational users of the area would be displaced. Without treatment, it is not expected that recreational activities would change very much over a 20-year period.

Silviculture

Introduction

The area of consideration for silviculture cumulative effects is the project area. The project boundary is defined on the north and east by watershed boundaries, and almost entirely by watershed boundaries on the south. The west side of the project area is bordered by Blacks Mountain Experimental Forest. This area was chosen because stand growth and development is primarily dependent on site conditions such as soils, elevation, and precipitation. Stand and site conditions elsewhere (outside of the treated stands) generally have little effect on treated stands, with the exception of effects on forests insect populations. Activities and management since 1975 within the project area are considered in this analysis because the effects of the past silvicultural treatments are still occurring. Management activities and events prior to this are considered in this analysis in so far as they have shaped current stand structure conditions. The Silviculture Report is hereby incorporated by reference and located in the Champs project record, ELRD.

Alternative 1

Stand Composition, Stand Structure and Density

Direct Effects of All Prescriptions Involving Mechanical Harvesting

Within all prescriptions involving mechanical harvesting, specifically A, B, C, F, and G, legacy trees would typically be retained where they exist on the landscape, and maintained to the extent possible with radial thinning to reduce competition and increase individual legacy tree health and vigor. Research in the southwest has shown positive response to this release (Covington and Moore, 1992). Physiological responses include: increased diameter growth, and greater uptake of carbon, water, and nitrogen. These, in turn, increase the tree's capacity to resist insect attacks and impacts from prescribed fire within the second or third year after the thinning.

Within all treatments involving mechanical harvesting trees 30 inches in diameter and greater would typically be retained where they exist on the landscape, regardless of species or condition. They would only be cut in situations to facilitate operability. For example, in the last 10 years of implementing similar prescriptions on the Eagle Lake Ranger District, there have only been a few occasions where trees 30 inches dbh or greater were removed for operability. These included trees that were removed to create landings and skid trails, which is expected to impact less than 1 percent of the treated areas, or as identified as hazards per OSHA requirements for logging operations.

Mechanical harvesting would require small clearings, or landings, generally less than 1/2 acre, to store logs prior to trucking. Landing size depends on the topography, the number of trees to be brought in, and the harvest equipment. Many openings already exist; however, some would require clearing of trees. Landings utilized during operations would be evaluated post-treatment by the Forest Service on a site-specific basis to determine if subsoiling would be beneficial in reducing compaction that affects hydrological function of the soils. This would lift and fracture the soil in place leaving it loose and friable to a minimum depth of 18 inches.

Road construction, reconstruction, and maintenance would remove trees from the road travel-way and ditches. Most trees to be removed are saplings and seedlings, which have become established since construction or the last road maintenance treatment.

The possible use of a dust palliative, for dust abatement where rubber-tired vehicles are operating on haul routes, may include magnesium chloride, calcium chloride, lignin sulfate, or an approved equal. The dust palliative would not be used within 25 feet of water bodies. Based on similar, past applications in the project area and in various locations across the District, it is not anticipated that vegetation adjacent to haul route roads would be impacted.

Road construction from past projects throughout the project area has decreased the forested area. Formerly forested lands are now within road rights-of-way. Road construction in the Proposed Action would result in a slight increase of land in road right-of-way.

Direct and Indirect Effects of DFPZ Prescriptions A, B, C, D, and E

Stocking would generally be retained towards the lower end of full site occupancy, with basal area as the tool to measure site occupancy. Thinning prescriptions were designed to thin to stocking levels that address site carrying capacity, with a lower thinning intensity in eastside mixed conifer.

DFPZ treatments would result in initially eliminating surface fuels, greatly reducing ladder fuels, and lowering canopy density and continuity producing widely spaced, open fuel arrangements in specific areas on the landscape. These forests identified for treatment are outside of their range of natural variability in respect to historical species composition, forest structure, and the natural processes of periodic low intensity fire. Residual stand structures would primarily be open, fairly single-canopied stands comprised of large trees with relatively greater spacing between crowns and a lower surface and ladder fuel load.

DFPZ treatments would generally promote healthy forested stands by reducing tree stress and improving the growth and vigor of residual trees, and reduce the risk of stand replacement due to wildfire.

Trees would be irregularly spaced to provide for crown fuel separation. Some intermediate trees in the midstory and understory would be retained where they are healthy, well-growing trees that are isolated from serving as ladder fuels and needed for retention standards. Healthy trees of shade intolerant species (pines) would be favorably retained; however, trees of all occurring species would be retained to maintain species diversity. By prioritizing retention of shade intolerant species, species diversity would be maintained while adjusting species composition to that which reflects a condition closer to the pre-settlement range of variability.

Unthinned patches or non-treated leave islands, ranging in size from ¼ to five acres in size and generally consisting of 4M CWHR strata, would be retained over 10 percent of the forested acres within DFPZs receiving silvicultural treatments, increasing within-stand heterogeneity and diversity both horizontally and vertically. These untreated leave islands, accounting for up to 630 acres, would contribute to the overall treatment unit reserve basal area. Overall, these leave islands would result in very slight increases in canopy cover and decreases in diameters, but would not be enough to change size or

density classes. These untreated leave islands would not have desirable fuel configurations and would be susceptible to torching during a wildfire; this is the reason they would typically be located where they would not serve as ladder fuels to adjacent overstory leave trees and would be located within the secondary zones of the DFPZs. Retaining three of the largest snags and downed logs per acre, where they exist, also provides an attribute of vegetative stand diversity.

Prescribed burning would be conducted in DFPZ stands post-thinning to remove remaining surface fuels, by consuming duff, litter, downed woody debris, and activity-generated material, in excess of desired levels. Prescribed burning would also serve to promote an increase in desired understory vegetation development such as grasses, which is currently below a desired ecological condition. Where bare mineral soil is created and vegetation is killed, sprouting and regeneration would re-invigorate the understory plant community (Kauffman and Martin, 1990). Due to the buildup of the conifer litter mat from lack of fire, many of the grasses and forbs have been reduced in number and extent of coverage in the project area. Underburning would begin to allow the grasses and forbs to return to the understory. The brush species that resprout following fire would be younger, would have less dead material, and would not be as dense. Underburning would also create a mosaic of surface cover conditions, improve nutrient cycling, stimulate nitrogen availability, and encourage pruning of the lower limbs of the trees which would increase the average crown base height. The tree, brush, forb, and grass species that are present in the project area would be affected by prescribed fire in a variety of ways.

Prescribed burning poses a risk of damaging or killing residual trees, but is mitigated by concentrating fuels away from live trees, and by burning under weather conditions that promote low flame lengths and low burning intensities. There is a slightly higher risk of damaging or killing unthinned patches, and retained snags and downed logs, which is minimized by also concentrating fuels away from these attributes and using controlled ignitions within the leave islands. Generally, incidental mortality may occur as a result of prescribed burning, possibly increasing slightly where leave islands are retained. Mortality from prescribed burning would primarily occur in smaller understory trees that have thinner bark and crowns closer to ground level. This incidental mortality would help to create snags and logs to replace ones that may be lost during prescribed burning or that have to be removed, for safety and containment reasons, during firing operations.

Mastication would be conducted primarily in DFPZ stands, post-thinning, where residual fuel loadings would be so heavy as to make the use of prescribed fire undesirable, due to likely high mortality in the residual stand, immediately after mechanical thinning. Mastication would alter the structure and arrangement of surface vegetation and fuels via chipping. Burning of landing piles could produce some scorching in adjacent trees due to heat and flames from burning piles, but this would occur only in isolated patches. Prescribed burning or mastication would not appreciably alter post-thinned stand structure.

DFPZ Prescription A would be used to treat 5,245 acres of stands that are moderately to densely stocked in order to reduce density. This prescription would remove between 15 and 50 percent of stand basal area stocking. Stands, post-treatment, would remain stocked, however, due to the nature of thinning

from below, which removes the smaller diameter trees, average stand diameters would generally increase approximately four to six inches. As shown in the analysis below, most trees to be cut would be 20 inches dbh or less. Empirical data from proposed DFPZ thinning within the Champs project area indicate that approximately four trees per acre (of which, 3 are 20 to 23.9 inches diameter and 1 is 24 to 29.9 inches diameter), or 25 percent, of trees 20 inch diameter and greater could be removed through DFPZ thinning, with possibly up to eight trees per acre removed through group selection harvesting. These would be young, second growth trees. No legacy trees 200 years or older would be cut. These occasional larger trees would be cut to break up pockets of horizontal continuity of canopy fuels or lower densities down to prescribed levels in pockets or to selectively leave an adjacent similar-sized but smaller, healthier tree (Peterson et al, 2005; Graham et al, 2004). Typically, trees considered for removal include primarily encroaching small diameter conifers, saplings and pole-sized trees of suppressed and intermediate crown classes, in the understory, as well as some small and medium pole-sized trees of intermediate and codominant crown classes, where arrangement and densities warrant removal. Most of the overstory trees of the dominant crown class would be retained to maintain stocking levels in trees with desired characteristics.

The majority of trees would be removed using whole-tree yarding, which would effectively reduce the potential for activity-generated fuel accumulation by removing limbs and tops (Agee and Skinner, 2005). The net effect may result in incidental accumulations; however, underburning as a follow-up would be used, as needed, to reduce activity-generated fuels, as well as existing fuels.

Representative stands were modeled with the Forest Vegetation Simulator (FVS) to display and compare projected stand conditions with DFPZ thinning treatments and with no treatment in both a representative eastside pine and an eastside mixed conifer stand. In the FVS model stand diameter and canopy cover are measured from trees five inches dbh and above. Numerous small trees provide some additional understory cover; however, these small trees are subsidiary and do not reflect the dominant stand structure. These stand parameters are near those described as desirable for a DFPZ in the Proposed Action; however, the stand parameters do not reflect undesirable spacing of trees, such as smaller trees growing under or adjacent to overstory trees and serving as ladder fuels. These stands are used as examples of stands that are identified for treatment. The projected results of proposed DFPZ thinning on these stands provide an example of conditions and results for stands at similar and higher densities and otherwise undesirable stand conditions.

Existing conditions of the eastside pine stand include typing as CWHR 4M with an average stand diameter of 13.5 inches, an average canopy cover of 51 percent, a basal area of 186 square feet per acre, 187 trees per acre, 15 feet of spacing between trees, and a crown base height of eight feet. Additionally, stand density is at 83 percent of maximum SDI. Existing conditions of the eastside mixed conifer stand include typing as CWHR 4M with an average stand diameter of 5.8 inches, an average canopy cover of 62 percent, a basal area of 223 square feet per acre, 1,212 trees per acre, six feet of spacing between trees, and a crown base height of six feet. Additionally, stand density is at 139 percent of maximum SDI.

DFPZ Prescription A was modeled using FVS with the representative stands described above. After thinning, the eastside pine stand was classified as CWHR 4P with an average stand diameter of 19.1 inches, an average canopy cover of 28 percent, a basal area of 100 square feet per acre, 50 trees per acre, 30 feet of spacing between residual trees, and a crown base height of 32 feet. Additionally, stand density is at 39 percent of maximum SDI.

After thinning, the eastside mixed conifer stand was classified as CWHR 4P with an average stand diameter of 12.6 inches, an average canopy cover of 33 percent, a basal area of 120 square feet per acre, 139 trees per acre, 18 feet of spacing between residual trees, and a crown base height of 12 feet. Additionally, stand density is at 55 percent of maximum SDI.

Stand development at twenty years (year 2026) was also modeled in FVS. Twenty years after thinning, the treated eastside pine stand still typed out as CWHR 4P with an average stand diameter of 23.2 inches, an average canopy cover of 35 percent, a basal area of 142 square feet per acre, 48 trees per acre, 30 feet of spacing between trees, and a crown base height of 36 feet. Additionally, stand density would be 51 percent of maximum SDI. Twenty years after thinning, the treated eastside mixed conifer stand typed out as CWHR 4M with an average stand diameter of 15.3 inches, an average canopy cover of 40 percent, a basal area of 167 square feet per acre, 130 trees per acre, 18 feet of spacing between trees, and a crown base height of 10 feet. Additionally, stand density is at 71 percent of maximum SDI.

Table 39 and Table 40 display the projected FVS modeling attributes of Prescription A thinning for eastside pine and eastside mixed conifer CWHR 4M stands for existing conditions, post-thinning, and 20 years post-thinning (Alternative 1). Modeling results are also displayed in Figure 8 below.

Table 39. FVS modeling results of Prescription A for eastside pine CWHR 4M stands for existing conditions, post-thinning, and 20 years post-thinning (Alternative 1).

EP	CWHR	QMD	CC	BA/AC	TPA	Spacing	CBH	% Maximum SDI
Existing Condition	4M	13.5”	51%	186	187	15’	8’	83%
Post-thinning	4P	19.1”	28%	100	50	30’	32’	39%
20 Years	4P	23.2”	35%	142	48	30’	36’	51%

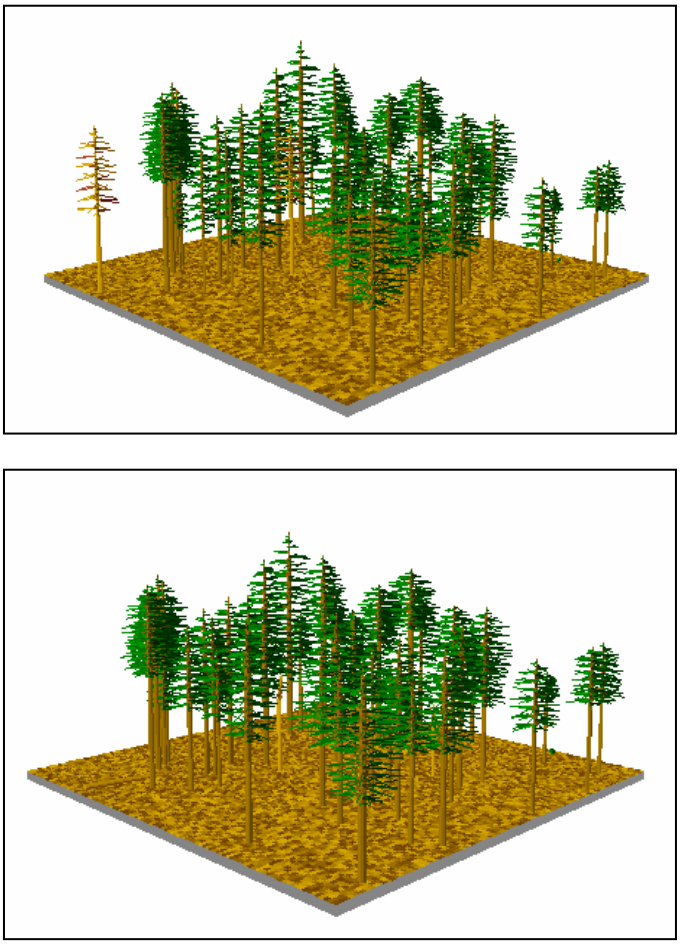
Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter; CC = canopy cover; BA/AC = basal area per acre; TPA = trees per acre; Spacing = spacing between trees; CBH = crown base height; % Maximum SDI = percent maximum Stand Density Index

Table 40. FVS modeling results of Prescription A for eastside mixed conifer CWHR 4M stands for existing conditions, post-thinning, and 20 years post-thinning (Alternative 1).

EMC	CWHR	QMD	CC	BA/AC	TPA	Spacing	CBH	% Maximum SDI
Existing Condition	4M	5.8”	62%	223	1212	6’	6’	139%
Post-thinning	4P	12.6”	33%	120	139	18’	12’	55%
20 Years	4M	15.3”	40%	167	130	18’	10’	71%

Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter; CC = canopy cover; BA/AC = basal area per acre; TPA = trees per acre; Spacing = spacing between trees; CBH = crown base height; % Maximum SDI = percent maximum Stand Density Index

Figure 8. Eastside Pine Stand Conditions After DFPZ Prescription A At Year 2006 and 2026 (Alternative 1).



Source: USDA Forest Service, Forest Vegetation Simulator

Eastside Mixed Conifer Stand Conditions After DFPZ Prescription A At Year 2006 and 2026 (Alternative 1).

Source: USDA Forest Service, Forest Vegetation Simulator

DFPZ Prescription B would be used to treat 535 forested acres to reduce surface, ladder, and canopy fuels. Conditions, treatments, and modeling for Prescription B are comparable to the above discussion pertaining to Prescription A, with the exception that primarily surface fuel loading would be high enough post-thinning to warrant further mechanical treatment of mastication to safely reduce these fuels, rather than using prescribed burning. This treatment would be applied to primarily mixed conifer stands with a heavy component of white fir, which typically have higher levels of existing surface fuels to begin with, as well as existing conditions that contribute to higher levels of activity generated fuel loading.

DFPZ Prescription C would be used to treat 519 forested acres in RHCAs. Conditions in areas receiving this treatment are comparable to the above discussion pertaining to Prescription A. However, this prescription would reduce stocking levels within the RHCAs slightly further than in adjacent DFPZ stands in order to restore understory vegetative conditions and lengthen the re-entry interval thus minimizing long-term disturbance in these potentially sensitive areas. Emphasis would be placed on spatial heterogeneity; for example, maintaining existing clumps of trees with preference given to the largest trees. Retained trees would exhibit, variable spacing and density, which would create a non-continuous canopy cover and modified light quality.

These areas have been encroached with the expanding forest, resulting in a reduction of grasses, forbs, and shrubs. This Prescription would allow more light to penetrate the forest floor and improve conditions for riparian and understory vegetation. When canopy cover is less than 20 percent, maximum yield for all vegetation groups occurs, with grasses having the highest rate of increase, followed by forbs, and then shrubs. Also, with the increased amount of light penetrating the ground, flowering and fruit production increases, producing berries and seeds that are important for pollinators and wildlife species (Terrestrial Species BE, Champs project record).

DFPZ Prescription C would improve riparian function by increasing understory vegetation along stream banks. This treatment would also create a floristically rich and productive understory (Factors Influencing Understory Vegetation for Champs EA, Champs project record).

Prescription C would remove an average between 40 and 60 percent of stand basal area stocking, reducing tree stress. Residual average stand basal area would generally range between 60 and 80 square feet. Post treatment stands would remain stocked, averaging 25 to 30 percent of maximum SDI. Average canopy cover would be reduced from generally near 50 percent down to near 20 percent. Due to thinning from below, removing more of the smaller diameter trees, average stand diameters would generally increase by four to 12 inches. Trees less than 30 inches dbh would be removed; however, most trees to be cut would be 20 inches dbh or less. Larger trees could be cut to break up pockets of fuel continuity or to selectively leave an adjacent similar-sized but smaller, healthier tree. Typically, trees considered for removal include primarily encroaching small diameter conifers in the understory, as well as small and medium sized trees where arrangement and densities warrant removal. Most of the overstory trees would be retained to maintain stocking levels in desired tree characteristics. Trees 30 inches dbh and greater would only be cut to facilitate operability.

A DFPZ Prescription C representative stand was modeled in the FVS model to display and compare projected stand conditions with this DFPZ thinning treatment and with no treatment. An eastside pine stand, typed as CWHR 4M with a basal area of roughly 150 square feet per acre, an average stand diameter of 12 inches dbh, and an average canopy cover of 46 percent was chosen. Stand density is at 73 percent of maximum SDI, which is undesirably high. This stand is used as an example of stands that are identified for Prescription C. The projected results of proposed DFPZ thinning on these stands provide an example of conditions and results for stands at similar and higher densities and otherwise undesirable stand conditions.

After thinning, the stand averaged 64 square feet of basal area per acre and was at 24 percent of maximum SDI. Average stand diameter increased to 20 inches dbh. Residual canopy cover was 19 percent. Stand development at twenty years (year 2026) was also modeled in FVS. Twenty years after thinning, the treated stand averaged 76 square feet of basal area per acre and was at 28 percent of maximum SDI. Canopy cover increased to 21 percent and the average stand diameter increased to 22 inches dbh.

Table 41 displays projected FVS modeling attributes for Prescription C thinning for eastside pine CWHR 4M stands for existing conditions, post-thinning, and 20 years post-thinning (Alternative 1).

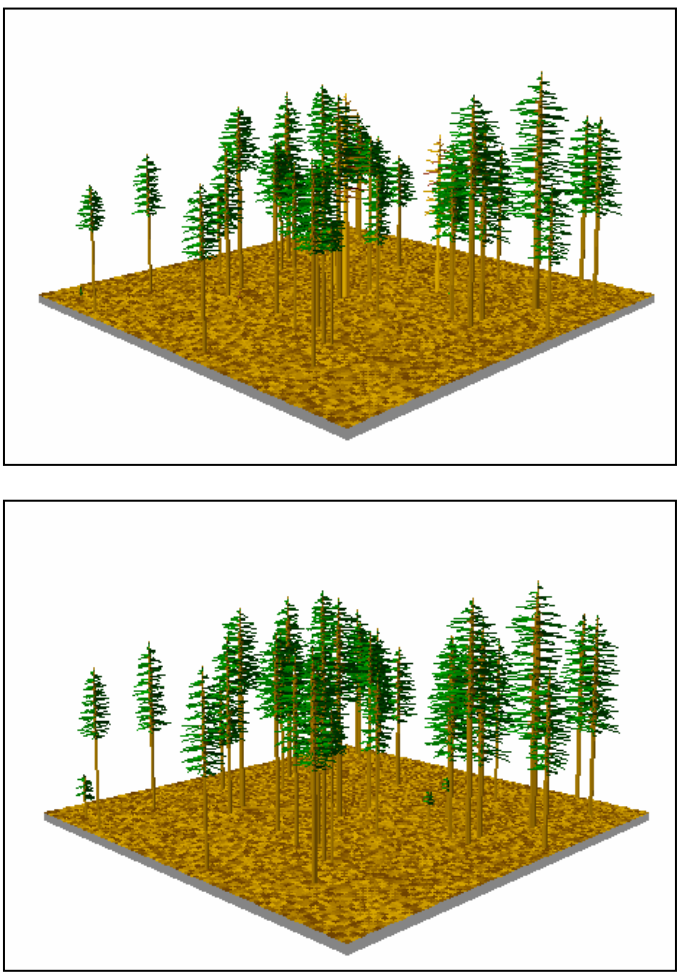
Modeling for DFPZ Prescription C results are displayed in Figure 9 below. Because a majority of the RHCAs proposed for treatment contain eastside pine, RHCAs with eastside mixed conifer was not modeled.

Table 41. FVS modeling results of Prescription C for eastside pine CWHR 4M stands for existing conditions, post-thinning, and 20 years post-thinning (Alternative 1).

EP	CWHR	QMD	CC	BA/AC	TPA	Spacing	CBH	% Maximum SDI
Existing Condition	4M	12.0”	46%	150	187	15’	8’	73%
Post-thinning	4S	20.0”	19%	64	50	30’	32’	24%
20 Years	4S	22.0”	21%	76	48	30’	36’	28%

Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter; CC = canopy cover; BA/AC = basal area per acre; TPA = trees per acre; Spacing = spacing between trees; CBH = crown base height; % Maximum SDI = percent maximum Stand Density Index

Figure 9. Eastside Pine Stand Conditions After DFPZ Prescription C At Year 2006 and 2026 (Alternative 1).



Source: USDA Forest Service, Forest Vegetation Simulator

DFPZ Prescription D would be used to treat 3,103 generally forested acres with underburning only to reduce surface fuels. This treatment would be applied to stands that do not require silvicultural treatments prior to burning. Effects to stand structure from underburning were discussed under Prescription A.

DFPZ Prescription E would be used to mechanically treat 34 forested acres via mastication only to reduce surface fuels. This treatment would be applied to stands that do not require silvicultural treatments prior to mastication. Effects to stand structure from mastication were discussed under Prescription A.

Table 42 displays the predominant forest cover, and acres of each CWHR class pre- and post-DFPZ treatment. This table shows changes in stand structure and density as a result of DFPZ treatments. Most notable is the decrease of acres of CWHR density class M among the forest cover types and subsequent increases in acres of CWHR density class P. The changes reflect a decrease of canopy densities, particularly in CWHR density class M and D stands, and increases in stand average diameter, moving stands to the larger end of the size class and causing some stands to increase in CWHR size class, as a result of thinning from below. Changes in CWHR size and density classes, as a result of treatments, is further summarized in Table 44 for all treatments combined.

Table 42. DFPZ Prescriptions: Acres Within Treated Stands Before And After Treatment

Forest Cover	CWHR Class	Pre Treatment Acres	Post Treatment Acres
Eastside Mixed Conifer	1	33	33
	3D	99	19
	3M	391	97
	3P	251	64
	3S	6	0
	4D	464	23
	4M	1,094	610
	4P	296	1,683
	4S	1	7
	5D	4	4
	5P	0	99
Eastside Pine	1	44	44
	3D	227	53
	3M	698	191
	3P	558	130
	3S	21	5
	4D	474	20
	4M	2,928	1,391
	4P	803	3,902
	4S	40	57
Brush/other		1,004	1,004
Total		9,436	9,436

Source: Eagle Lake Ranger District GIS (CALVEG), Champs FVS Output Files

Understory vegetation growth is expected to be variable, but generally slow in most DFPZ units. Reduced canopy cover would allow more sunlight to the forest floor; however, residual trees would typically continue to dominate site resources and tree roots would grow into newly available growing

space. Reducing canopy cover to less than 30 percent, such as in treatment C would encourage a greater understory vegetation response because of an increase in sunlight hitting the forest floor and a decrease of residual tree roots occupying available growing space. Understory vegetation is desirable in these areas from an ecological standpoint. DFPZ maintenance is projected to occur between five to 10 years to treat understory vegetation growth and surface fuel accumulations, with most stands projected to need maintenance treatment at 10 years post-treatment.

Direct and Indirect Effects of Group Selection Prescription F

Group selection Prescription F would be used on 489 acres of forested stands. Group selections provide structural diversity by creating small patches of vegetation and young trees interspersed in stands of larger trees. Identified areas from ½ to 2 acres in size would have most trees less than 30 inches in diameter cut; however, existing healthy sugar pine and predominant, overmature, legacy trees would generally be retained, as well as all trees 30 inches dbh and greater, regardless of species or condition. Leave trees would also be free of dwarf mistletoe, which can be quite common in the larger trees on the landscape. Groups would generally contain no more than a maximum of 2 large trees per acre. It is anticipated that such trees within groups would be minimal and growth suppression effects on regeneration would be noticeable but within acceptable limits.

Harvesting would be accomplished using ground-based tractor yarding systems with whole-tree removal. Within the ½-2 acre groups a very open stand conditions with an approximate canopy cover ranging between 0 to 15 percent would remain. Less than 5.7 percent, specifically 2.19 percent, of the available, suitable, capable land base within the project area would be treated within this project. Group selections would occur both outside and within DFPZ treatments. Of the 489, 242 acres of groups are planned within DFPZ treatments.

As discussed in the Proposed Action, placement of group selections are typically focused in 4M and 4D CWHR strata because this particular strata is the most predominant on the landscape and offers the best potential to increase structural diversity, both vertically and horizontally. In addition, size class 4 strata have diameters ranging from 11 to 23.9 inches, which should assist in producing a minimum of roughly 2.5 mbf (one mbf = one thousand board feet) of sawlog volume per acre, thus accommodating economic viability for timber sales and contributing to rural community economic stability factors. Because group selections are such small gaps on the landscape and are implemented on less than 10 percent of a stand, there would be no measurable change to the overall stand strata typing. Group selection placement would avoid CWHR strata 5S, 5P, 5M, and 5D.

Groups were located to avoid the largest trees, especially those 30 inches dbh and greater, while still considering commodity outputs and the purpose and need for group selections. Field estimates indicate that, typically, the majority of the volume to be removed would come from trees between 12 to 19 inches dbh, with only about one quarter of the volume coming from trees between 20-29.9 inches dbh. Up to eight trees per acre 20 inches in diameter and greater could be removed with the group selection prescription.

Ponderosa and Jeffrey pine require full sunlight to regenerate and grow at maximum potential. Seedlings of very shade intolerant species require a minimum of 30 percent full sunlight to survive in the understory (Oliver and Larson, 1996). Group selections would be configured to maximize sun exposure. Because of the small size of the groups, there would be an edge effect (shade from residual trees around the edge of the group). Pine height growth would be higher in 2 acre openings as compared to smaller openings, and natural seedling regeneration would be more abundant. Higher density and better seedling development tends to occur in the central portion of the openings. Larger openings provide more area free of edge effects and hence more available site resources (McDonald and Reynolds, 1999). Trees that are retained within the group selection units would also provide some shading effect. However, this effect would be limited by the minor amount of trees retained in the majority of groups.

Group selections were located in forested stands where soils are plantable and capable of supporting conifer regeneration. There has been little or no difficulty in establishing plantations on these soil types. Experience with plantations on the District, resulting from wildfires and timber harvest, in these particular soil families indicate that survival and stocking levels are acceptable, ranging from 74 to 96 percent for survival and 100 percent for stocking. These plantations are very healthy and vigorous, distribution is good, and trees are growing extremely well. These plantations are on track for precommercial and commercial thinning as needed for timber stand improvement purposes.

Mechanical site preparation would be completed prior to tree planting using a tractor with mounted brushrake, as needed. It is anticipated that approximately half of the group selections would require this site preparation. Use of whole-tree removal would reduce the potential for activity-generated fuel accumulation (Agee and Skinner, 2005). Brush and competing vegetation, natural fuels, and logging slash up to 12 inches in diameter would be piled for burning. This soil scarification would prepare a mineral soil seedbed for natural regeneration. At least 50 percent of existing ground cover (duff), and 3 existing downed logs per acre 15 inches and greater in diameter would be retained. Brush re-growth response, where existing, would be partially controlled by manual or mechanical release treatments in the short term until planted and natural seedlings are tall enough to grow above the brush. Brush would eventually be shaded out, as canopy cover increases over time.

Soil compaction could occur and require subsoiling (Soils Report, Champs project record). The District has been subsoiling as a tool for site preparation since 1995, and it has proven to be very effective in reducing soil compaction and improving conditions for root growth.

Local subsoiling studies have been conducted both on and adjacent to the District. Research results show that subsoiling can cause root damage, but that impacts to tree growth or mortality are not noticeable (Kliejunas and Otrosina, 1997). Root diseases, such as black stain and fomes annosus, are not shown to have a noticeable spread where this activity occurred. Even though subsoiling would be beneficial in reducing compaction that effects the hydrological function of the soils, it is short-lived, 10 years or less.

Following harvest and fuel treatments, groups would have created openings favorable in most cases for shade intolerant pine regeneration and growth, which eventually provides for recruitment of future

overstory pine. Seedlings would come primarily from artificial regeneration such as tree planting, but could be supplemented with natural, on-site seed sources. Trees left within and adjacent to the group selections would maintain a constant seed source. Planting would occur on all group selection acres to achieve desired stocking levels and increase the species composition of shade intolerant species such as ponderosa, Jeffery, and sugar pine. The combination of tree planting and seed trees would ensure regeneration of these sites with conifers over time.

Vegetation including grasses, forbs, and brush could begin to establish in group selection units. Vegetation growth is expected to be slower than that observed in large openings such as clearcuts because of partial shading and resource uptake by overstory trees within groups and along group edges; however, vegetation competition could still be expected to impact seedling survival and growth to a small degree (McDonald and Fiddler, 1991). Grasses and forbs would be the primary competitor for soil moisture during the first three to five years. Control of grasses and forbs would increase seedling survival and growth and reduce potential for pocket gopher damage. Mechanical site preparation would increase initial tree growth and inhibit establishment of competing shrubs in the short-term. Manual and mechanical release methods would provide control of competing vegetation until the trees become established. Manual release methods could include hand grubbing, matting, brush cutting, or tilling. Herbicide use is not being considered in this analysis. As indicated in District records, based on other group selection treatments within the analysis area and in other areas on the District, survival rates are acceptable and competing vegetation is generally not an issue in which herbicides would be needed. Stocking surveys at years 1, 3, and five after planting would be conducted on all group selections to monitor seedling survival and stocking, animal damage, and to verify release needs. If release is needed, primarily hand grubbing or mechanical mastication release treatments would be conducted within five years of planting to ensure the survival and growth of establishing conifer seedlings by minimizing competition from competing vegetation.

In group selection Prescription F, as conifer regeneration in group selection units grows, these groups are expected to develop into subsequent CWHR size and cover classes, which would be largely dependent on seedling survival and competition factors. Competition comes in the form of brush, grass, and forb species, as well as other trees. If present, competing vegetation components are expected to persist until conifer canopy closure is sufficient to limit the understory light environment. Mortality of competing vegetation may begin to occur at the CWHR class 3M stage, as it is expected that pole-sized trees would develop crowns above competing vegetation.

Within 50 years of treatment, groups would be expected to develop into a pole structure with moderate canopy (CWHR 3D). Stand structure in group selection harvest units would develop into primarily single canopy, pole sized stands ranging in diameter from approximately eight to 10 inches dbh. Crowns would generally be codominant, but may begin to differentiate into dominant and intermediate crown classes. Consequently, diameter distributions within such aggregations would be relatively normal (approximating the bell shaped curve) and the canopy would be relatively contiguous, accounting for approximately 60 percent canopy cover and greater. Potential timber stand improvement activities, taking

place within the 50 year period following harvest, would further affect stand development for this time period by producing a stand with larger diameters and less canopy cover (CWHR 4M).

Direct and Indirect Effects of Area Thinning Prescriptions G and H

Area thinning, utilizing individual tree selection (ITS) harvest, would be used on 1,210 acres as an intermediate treatment, and is intended to provide restoration on a portion of eastside pine forest emphasizing promotion of structural diversity, improved forest health and resiliency via reduction of competition for site resources, and disruption of fuel continuity. Area thinning would also help build a strategic network of reduced fuel concentrations where fire severity and rates of spread would be appreciably reduced, thus reinforcing DFPZs. Treatment objectives of the two proposed area thinnings vary greatly, in that one is an eastside pine restoration prescription and the other focuses on tending of young plantations.

Prescription G would remove an average between 40 to 55 percent of stand basal area stocking. After treatment, residual average stand basal area would generally range between 60 and 80 square feet per acre. A preference to leave 60 square feet of basal area per acre would be emphasized in areas that are adjacent to existing openings in order to increase the spatial extent of non-forested opening and spatial heterogeneity. Eighty square feet of basal area per acre would be maintained in areas that are on slopes, and roughly beyond 300 feet from existing non-forested areas. Focus would be placed on retaining the largest diameter trees, with high priority on maintaining large trees within existing clumps. Retained trees should exhibit variable spacing and density, as this would create a non-continuous canopy cover and modify light quality creating conditions conducive to incremental understory vegetation response. Average residual canopy cover would typically range from 20 to 25 percent. Predominantly, trees to be cut would be pines in the understory and midstory, with occasional overstory trees removed to create gaps and to break up canopy fuels. This treatment would remove trees less than 30 inches dbh; however, most trees to be cut would be 20 inches dbh or less. Due to considerable thinning of predominantly smaller diameter trees and retention of lower basal areas, average stand diameters would dramatically increase by about six to nine inches post-treatment. Trees 30 inches dbh and greater would only be cut to facilitate operability.

A representative stand was modeled in the FVS model to display and compare projected stand conditions with this area thinning treatment and with no treatment. An eastside pine stand, typed as CWHR 4M with a basal area of roughly 130 square feet per acre, an average stand diameter of 11.7 inches dbh, an average canopy cover of 52 percent, 173 trees per acre, a spacing of 16 feet between trees, and a CBH of 22 feet was chosen. Stand density is at 61 percent of maximum SDI, which is high. This stand is used as an example of stands that are identified for Prescription G. The projected results of proposed DFPZ thinning on these stands provide an example of conditions and results for stands at similar and higher densities and otherwise undesirable stand conditions.

Area Thinning Prescription G was modeled using FVS with the representative stand described above. After thinning, where 60 square feet of basal area was retained the stand was at 24 percent of maximum SDI. Average stand diameter increased to 18.1 inches dbh. Residual canopy cover was 19 percent. There

were 34 trees per acre remaining with spacing of 36 feet between residual trees. CBH increased to 32 feet. After thinning, where 80 square feet of basal area was retained the stand was at 32 percent of maximum SDI. Average stand diameter increased to 18 inches dbh. Residual canopy cover was 24 percent. There were 45 trees per acre remaining with spacing of 31 feet between residual trees. CBH increased to 30 feet. Stand development at twenty years (year 2026) was also modeled in FVS. Twenty years after thinning, where 60 square feet of basal area was retained, the treated stand averaged 90 square feet of basal area per acre and was at 33 percent of maximum SDI. Canopy cover increased to 25 percent and the average stand diameter increased to 22.5 inches dbh. There were 33 trees per acre remaining with spacing of 36 feet between residual trees. CBH increased to 36 feet. Twenty years after thinning, where 80 square feet of basal area was retained, the treated stand averaged 117 square feet of basal area per acre and was at 43 percent of maximum SDI. Canopy cover increased to 31 percent and the average stand diameter increased to 22.2 inches dbh. There were 44 trees per acre remaining with spacing of 31 feet between residual trees. CBH increased to 34 feet.

Table 43 displays projected FVS modeling attributes for Prescription G thinning for eastside pine CWHR 4M stands for existing conditions, post-thinning at 60 and 80 square feet of basal area per acre, and 20 years post-thinning at 60 and 80 square feet of basal area per acre (Alternative 1). Modeling for DFPZ Prescription G results are displayed in Figure 10 below.

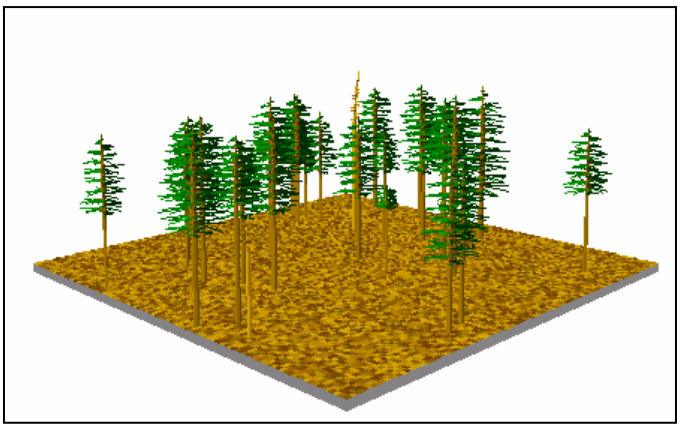
Table 43. FVS modeling results of Prescription G thinning for eastside pine CWHR 4M stands for existing conditions, post-thinning at 60 and 80 square feet of basal area per acre, and 20 years post-thinning at 60 and 80 square feet of basal area per acre (Alternative 1).

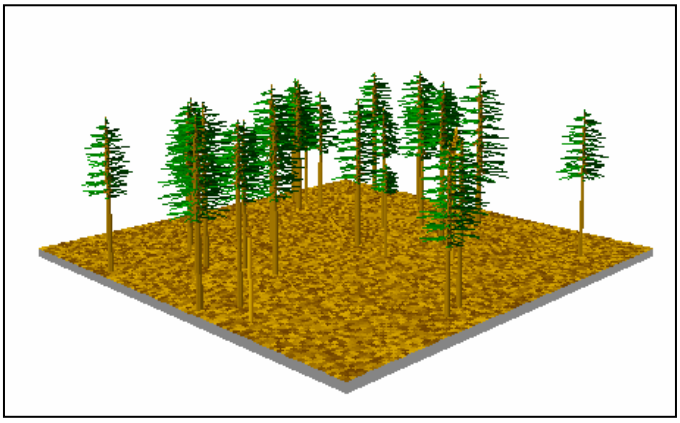
EP	CWHR	QMD	CC	BA/AC	TPA	Spacing	CBH	% Maximum SDI
Existing Condition	4M	11.7”	52%	130	173	16’	22’	61%
Post-thinning-60 sq. ft./ac. BA	4S	18.1”	19%	60	34	36’	32’	24%
Post-thinning-80 sq. ft./ac. BA	4S	18.0”	24%	80	45	31’	30’	32%
20 Years-60 sq. ft./ac. BA	4P	22.5”	25%	90	33	36’	36’	33%
20 Years-80 sq. ft./ac. BA	4P	22.2”	31%	117	44	31’	34’	43%

Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter; CC = canopy cover; BA/AC = basal area per acre; TPA = trees per acre; Spacing = spacing between trees; CBH = crown base height; % Maximum SDI = percent maximum Stand Density Index

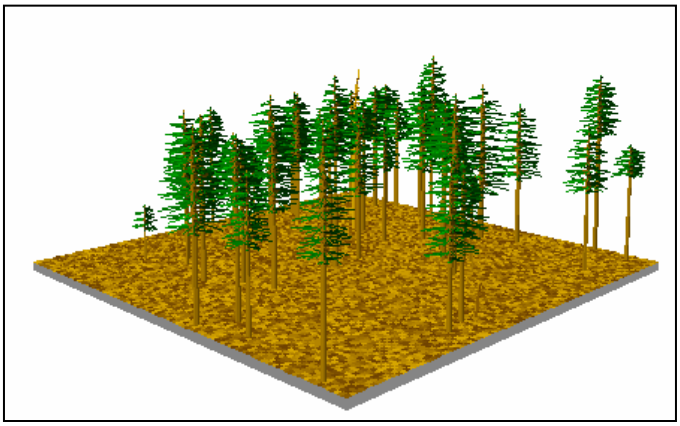
Figure 10. Eastside Pine Stand Conditions After Area Thinning Prescription G At Year 2006 and 2026 (Alternative 1).

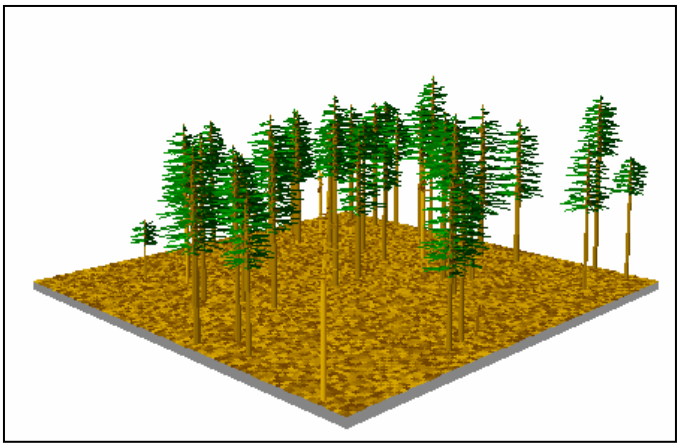
Basal area of 60 square feet per acre





Basal area of 80 square feet per acre





Source: USDA Forest Service, Forest Vegetation Simulator

Area thinning Prescription G would promote healthy forested stands by improving the growth and vigor of residual trees, and reduce the risk of stand damage due to wildfire. Thinned stands would increase overall forest health.

Area thinning Prescription G would enhance biodiversity, in terms of richness and cover, of understory vegetation such as forbs, graminoids, and shrubs, and also create of a floristically rich and productive understory (Factors Influencing Understory Vegetation for Champs EA, Champs project record).

Utilizing combined treatments of thinning and prescribed burning would maintain the forest structure, as well as enhance understory vegetation communities within a natural range of variability that resembles historic, sustainable landscape conditions (Factors Influencing Understory Vegetation for Champs EA, Champs project record).

Prescription H includes approximately 534 acres of young, pine plantations where trees would be precommercially hand thinned from roughly 300 to 400 trees per acre to approximately 150 trees per acre, or from about 10 feet of spacing between tree boles to 17 feet, reducing stocking levels to improve stand health and re-arrange fuel loading, disrupting fuel continuity.

Prescription H would reduce stand stocking levels by almost half, but still leave plantations fully stocked as per R5 stocking guides recommended in the Silviculture Handbook. Average residual stand stocking would reduce SDI to levels that would safely hold plantations for a period of at least twenty years. The largest, healthiest, most vigorous trees would be retained. These are young plantations, so trees selected for removal are typically less than eight inches dbh.

Understory vegetation growth in area thinning treatments is expected to be variable. Vegetation growth would be less suppressed in treatment G because of generally lower canopy cover and stand densities. As well, though, vegetation growth would also be less suppressed in treatment H because of the young trees occupying the site, which tend to have lower canopy cover and do not fully expand into available space because of tree size for several years.

Direct and Indirect Effects of all Thinning and Group Selection Prescriptions on CWHR Stand Structure

Thinning and group selection would change the distribution of CWHR size classes. There would be an increase in the seedling size class stands and medium/large size class stands, and a corresponding decrease in the pole and small sawtimber size class stands. Stand densities would decrease as a result of treatments. A summary of the distribution of all CWHR classes in the project area showing acres of change resulting from the Proposed Action is displayed in Table 44. Most notable is the decrease of 2,056 acres of all CWHR 3 density classes and 3,400 acres of CWHR 4M and 4D density classes. This decrease corresponds to increases in CWHR 4S and 4P, 5P, and seedling classes. Because each CWHR class represents a range of average stand diameter and canopy cover, the effects of treatments on the CWHR classification would vary by stand. For example, a stand that is near the upper limit of CWHR size class 4 before treatment would classify as a CWHR size class 5 stand after treatment because thinning from below would increase the average stand diameter above 23.9 inch dbh (the upper limit for CWHR size class 4 stands). In contrast, a CWHR size class 4 stand that has a smaller initial average diameter (nearer the lower limit of 11 inch dbh) would still classify as a size class 4 stand after thinning, even though the average diameter was increased a few inches because of thinning from below. Stands with initially lower densities (CWHR density class M stands that are near or below 50 percent canopy cover pre-treatment) are projected to drop to CWHR density class P following most of the thinning treatments. Because of higher densities in mixed conifer stands than in those of pine, canopy cover tends to be at the higher end of CWHR density class ranges, whereas in pine stands canopy cover tends to be at the lower end of CWHR density class ranges.

Table 44. Effects of Treatments On Project Area CWHR Classes

Forest Cover Type	CWHR Class – Acres in Project Area, Pre-Treatment																
	Seedling	Sapling (1" - 5.9" dbh)				Pole (6" – 10.9" dbh)				Small (11" – 23.9" dbh)				Medium/Large (>24" dbh)			
	1	2S	2P	2M	2D	3S	3P	3M	3D	4S	4P	4M	4D	5S	5P	5M	5D
Aspen	0	0	0	0	0	0	11	9	<1	1	5	36	14	0	0	0	0
Eastside Mixed Conifer	429	0	0	0	0	28	579	889	916	182	2,870	3,564	2,210	0	99	0	11
Change	*+195*	*NC*	*NC*	*NC*	*NC*	*-6*	*-215*	*-315*	*-96*	*+7*	*+1,367*	*-545*	*-486*	*NC*	*+99*	*NC*	*NC*
Eastside Pine	817	0	0	11	0	84	612	1,331	556	543	4,886	4,250	469	0	0	6	8
Change	*+294*	*NC*	*NC*	*NC*	*NC*	*-16*	*-552*	*-663*	*-193*	*+453*	*+3,046*	*-1,888*	*-481*	*NC*	*NC*	*NC*	*NC*
Total Acres	**1,245**	**0**	**0**	**11**	**0**	**112**	**1,202**	**2,230**	**1,473**	**726**	**7,761**	**7,850**	**2,693**	**0**	**99**	**6**	**19**
Change	**+489**	**NC**	**NC**	**NC**	**NC**	**-22**	**-767**	**-978**	**-289**	**+460**	**+4,413**	**-2,433**	**-967**	**NC**	**+99**	**NC**	**NC**

Source: Eagle Lake Ranger District (CALVEG)
S: sparse cover, 10-24 percent canopy cover
P: open cover, 25-39 percent canopy cover
M: moderate cover, 40-59 percent canopy cover
D: dense cover, 60-100 percent canopy cover
Note: No change to Aspen
Changes in CWHR acres (italics) are the difference between existing CWHR acres (Alternative 2, Table 47) and post-treatment CWHR acres from Alternative 1.

Forest Health

Direct and Indirect Effects to Forest Health

Thinned stands would generally increase in overall forest health and individual tree growth. Thinning would target the removal of damaged and diseased trees and favor retention of trees free of damage and defect.

The proposed thinning and group selection treatments would retain or promote a higher component of pine within mixed conifer stands. Lower stand densities in thinned stands would also promote the health of pine and reduce tree stress, since shade intolerant pines do not persist at the higher stocking densities of shade tolerant fir. This release affect of decreased competition would be shorter lived in mixed conifer stands because higher initial densities would be retained.

Thinning would favor the removal of dwarf mistletoe infected trees; however, to maintain desired stocking, which includes trees 30 inches dbh and greater, as well as legacy trees smaller than 30 inches, some infected trees would remain in the stands. The inclusion of leave islands could cause additional retention of mistletoe infected trees, which could be partly minimized by emphasizing not placing leave islands around infected trees. Remaining infected overstory trees would continue to serve as a source for the infection of adjacent and understory trees. Group selection may also decrease levels of overall stand infection by removing individual infected trees and pockets of infected trees; however, infected trees remaining on the edge of groups would serve as a host and spread mistletoe to regeneration in the group area. Impacts would be partially minimized by emphasizing removal of typically retained legacy trees smaller than 30 inches near group selections or by slightly adjusting group selection locations to avoid impacts from mistletoe infected trees. Density within leave islands would also cause them to be more susceptible to insect attack, particularly during drought conditions. This would provide for more snags and down logs (Biological Evaluation for Terrestrial Species, Champs project record).

Thinning would decrease stand mortality caused by bark beetles. Thinning would typically remove diseased and injured trees, which are most susceptible to bark beetle caused mortality (Demars and Roettgering, 1982; Ferrel, 1986; Kegley et al, 1997; Smith, 1971), and also reduce tree competition, which can improve resistance to beetle caused mortality. Leave islands of small diameter trees would be less at risk of bark beetle attack because their size makes them less favorable as host material (DeMars and Rottgering, 1982; Amman et al, 1989). Although small localized beetle infections could occur, it is unlikely they would have a measurable spread into thinned stands because healthy residual trees would more likely successfully defend against attack.

Thinning and group selection treatments have the potential to increase populations of the pine engraver beetle, *Ips pini*. Large populations commonly infest logging slash, windthrown trees, or trees broken by wind or snow. When populations are low, the beetle may kill or top-kill widely scattered single trees or small groups of trees. However, if large populations build, mortality of live trees can be serious. However, the proper slash treatments, such as whole-tree yarding, lop and scatter, chipping, and piling,

and timing of treatments that are proposed should minimize the slash and downed logs that serve as suitable habitat and maintain populations at endemic levels (Kegley et al, 1997).

A Forest Health Protection evaluation was prepared for the Champs project by the Forest Service, Forest Health Protection Pathologist (Champs project record) to provide information on annosus root disease infestation, its effects on the stands, the management alternatives appropriate in the context of the particular resource management objectives, and the future effects of each alternative. This evaluation identifies that the preventative actions proposed in this project should prevent the disease from spreading.

Annosus root disease is caused by the fungus *Heterobasidion annosum* and is found in all western conifer species; however, pine and true fir are especially susceptible to infection (Schmitt et al, 2000). In western North America, *Heterobasidion annosum* consists of two intersterility groups, or biological species, which includes the s-type and the p-type. These two biological species of *H. annosum* have distinct differences in host specificity. To date, within the Champs project area, all isolates of *H. annosum* from naturally infected ponderosa pine, Jeffrey pine, sugar pine, incense-cedar, western juniper, and manzanita are of the p-type. Isolates from true fir are of the s-type. In pine, p-type *H. annosum* usually kills the host within a short period. Pines weakened by *H. annosum* are often killed by bark beetles. In fir, s-type *H. annosum* seldom attacks the root tissues to the extent that the host is killed directly. In these hosts, the sapwood and inner bark usually are invaded only in the small-to-medium sized roots. The fungus is initially confined to the heartwood and inner sapwood of the larger roots. Within the heartwood, *H. annosum* spreads through the roots and root crown into the lower trunk of the host, where it causes a butt rot of the heartwood. Thus, infection in these species usually does not kill the host directly, although it may affect its growth and vigor. Losses from *H annosum* in true firs are mainly the result of butt rot, increased susceptibility to insect attack, and increased windthrow. Annosus root disease spreads from root to root contact, as well as from infection by airborne spores. Long distance spread can occur when airborne spores contact and infect fresh exposed wounds and stump surfaces (Schmitt et al, 2000). Once *H. annosum* occupies a site, it resides in the soil for up to 30 to 50 years as a saprophytic agent (an organism that obtains food from dead or decaying organic matter) (#NE06-14, 2006, Champs project record).

H. annosum is present in the Champs project area, and there is the potential for new infection in harvest areas from aerial dispersion of spores. Infection by *H. annosum* may become more wide spread if stumps are not treated. This would make the long-term control of annosus root disease more difficult and may impact previously unaffected stands, as well as adjacent landowners. The disease could create infection centers where trees of susceptible species would begin to display effects ranging from reduced individual tree vigor, root and bole decay, windthrow, root mortality, and tree mortality. The infection centers would create localized pockets of dead and down trees, contributing to higher surface fuel accumulation in the future. There are no proven methods for eradicating this disease on a site (#NE06-14, 2006, Champs project record).

Timber harvest has the potential to increase the disease through freshly cut stumps, but as proven over the last three decades, stump and root infection can be minimized by treating the freshly cut stump

surfaces with a light coating of borate compound (Schmitt et al, 2000). True firs are especially susceptible to annosus root disease (Schmitt et al, 2000). The proposed thinning and group selection treatments would favor the retention of pine over fir. This would help reduce the spread of root disease by reducing root-to-root contact between host tree species, as well as reducing host populations. Thinning also has the potential to create stand conditions that increase resiliency to annosus root disease; removing competing trees and making soil moisture available to remaining trees improves vigor and makes them less susceptible (Schmitt et al, 2000; #NE06-14, 2006, Champs project record).

Thinning and group selection treatments would occur on approximately 6,691 acres that would include harvest of live conifer trees with stumps 14 inches and larger in diameter and the application of a borate compound. Sporax is a borate compound registered for use to control *annosus* root disease. When applied to fresh cut stump surfaces, the borate compound penetrates into the upper stump surface and provides a protective barrier in which *H. annosum* spores are unable to survive. When applied properly, the use of Sporax has been shown to be up to 90 percent effective at preventing new infections of annosus root disease on stump surfaces (Schmitt et al, 2000). The recommended application level is one pound of Sporax to 50 square feet of stump surface (Wilbur Ellis, 2001). The basal area requiring Sporax treatment, when using a limit of a14 inch stump diameter, would range from approximately 45 to 200 square feet per acre, with an average of approximately 89 square feet per acre. Basal area requiring treatment is calculated based on basal area at dbh; however, the difference between approximate basal areas at dbh versus stump basal area at 1 foot has a negligible effect on estimating average application rates. Given the recommended application level, the potential amount of Sporax applied during treatments would be approximately 0.9 to 4.1 pounds per acre, with an average of approximately 1.8 pounds per acre.

Sporax is unusual for a pesticide, in that the toxicological agent of concern, boron, is a naturally occurring compound. Boron is a normal component of the earth's crust, all environmental media, as well as all forms of life, including humans. High levels of Sporax are considered toxic to soil microorganisms and plants. Application rates of nine to 15 lbs per 100 square feet (ground surface area) applied directly to vegetation would eradicate plants. These levels are much higher than application rates proposed for stump treatment (USDA FS, 2006).

Extreme cases of chronic over-exposure have produced symptoms of chronic poisoning, respiratory irritation, and chronic eczema in humans, but there is no evidence that Sporax use in a forested setting has resulted in chronic health issues. The primary targets for boron toxicity are the developing fetus and the male reproductive system. Because boron compounds may be more rapidly absorbed across damaged skin, individuals with large areas of damaged skin should avoid the application of Sporax or exercise extra caution if applying Sporax or other boron-containing compounds. Borax can cause eye irritation, which is likely to be the only overt effect as a consequences of mishandling Sporax. This effect can be minimized or avoided by prudent industrial hygiene practices during the handling of the compound. The Sporax label requires eye protection during application (USDA FS, 2006).

Applications of Sporax within the Champs project would follow all applicable Federal and California rules and regulations, including requirements for worker protection, storage, and environmental

protection. The use of Sporax in the control of annosus root disease does not present a significant risk to humans or wildlife species under most conditions of normal use, even under the highest application rate. Given the highly focused application method for Sporax, application of granular product to cut tree stump surfaces, exposures considered for both the human health and environmental risk assessments are limited to those which are not expected to result in significant exposure (USDA FS, 2006).

A possible risk of toxicity in both humans and wildlife species results from the direct consumption of Sporax applied to tree stumps. Inorganic borates are well absorbed following oral administration, and also following inhalation exposure to borate dust, but absorption does not appear to be complete. Borates are distributed in body soft tissues and eliminated in the urine with a half-life of approximately 13 hours. Due to the excessive energy required to break the boron-oxygen bond, borates are not metabolized by humans or animals. The "Human Health and Ecological Risk Assessment for Borax (Sporax) (2006)" concludes that the evidence indicates that workers who apply Sporax to cut stumps are not at risk of adverse effects due to boron exposure. Existing data also indicates that adverse effects of forest uses of Sporax on wildlife or livestock are improbable. Since the use of Sporax has not been shown to cause toxicity to soil, water, plants, or humans in a forested setting and the proposed treatment would be a one time, low dosage, site specific application, no measurable cumulative effects are anticipated (USDA FS, 2006).

Some controversy exists concerning the use of Sporax and its anticipated effects because it is registered by the State of California as a "pesticide". The application of Sporax is an approved fungicide in Region 5 for annosus root disease prevention and control.

Cumulative Effects of Stand Composition, Structure and Density

The existing vegetative conditions in the Champs project area are the result of past management and treatments that include logging, biomass removal, fuelwood harvest, grazing, fire suppression, prescribed fire, and tree planting. This has resulted in a range of vegetative conditions within the project area. These conditions have led to overall densification of the stands with encroachment and establishment of small diameter conifers in the understory and midstory. Stand structure has changed since settlement of the project area in the 1800s. Prior to European settlement of the west, large trees characterized Sierra Nevada forests, relatively open understories with only occasional ladder fuels (Verner and McKelvey, 1994).

Fire suppression and, to a lesser extent, grazing have resulted in an increase in the number of small diameter trees. Grazing and its associated soil disturbance provide suitable soil conditions for seedling establishment. Logging disturbance also creates canopy openings and scarifies the soil, which can lead to seedling establishment. Periodic wildfires, which could have consumed some of the small trees, have been suppressed (Eastside Historical Assessment, Champs project record). Forests of the Sierra Nevada, including the project area, have developed fuel ladders, accumulations of surface fuels, and an increase of shade-tolerant conifers such as white fir and incense cedar (Verner and McKelvey, 1994) in the forest understory. Since 1945 there has been an increase in the mixed conifer type and a comparable decrease in the pine type in Sierra Nevada forests (Beardsley and Warbington, 1999). This is true of the Champs project area, as well.

Previous timber harvest from the mid-1970s to the present occurred within the project area. Intermediate thinning occurred, including intermediate sanitation, thinning from below or above, and fuelwood harvests. Intermediate sanitation focused on removing trees that are damaged, diseased, have small live crowns, or otherwise exhibit low vigor and growth rate, and have a high risk of dying within 10 years. This treatment had the effect of reducing existing surface fuel loading. Thinning from below removes predominantly smaller trees and retains the healthy, larger, overstory trees. Thinning from above removes decadent or poorly growing overstory trees to release healthy, smaller trees from the mid and understory; healthy overstory trees are retained as well. Fuelwood harvesting of dead trees occurred, which entailed salvaging excess snags in a small area of considerable mortality.

Regenerative cuttings occurred, including clearcuts and overstory removals. These stands were then regenerated by planting. Plantations resulting from these clearcuts are currently typed as CWHR size 1 stands and represent 3 percent (756 acres) of the forest cover in the project area (not including private land).

Overstory removal focused on removing overstory trees that were damaged, diseased, and/or exhibited low vigor and growth rates, while retaining healthy intermediate and understory trees. These treatments were designed to improve forest health and growth.

Salvage harvesting of drought induced, insect killed trees has occurred, removing dead trees of commercial value.

Most of the project area has experienced some level of timber harvest in the last 30 years, stand growth data from within the project area suggests that previous harvest and natural mortality has not kept pace with overall forest growth. The current preponderance of CWHR 4M and 4D stands is mostly a result of ingrowth and increasing densification of stands that have been partially cut in the past. With the exception of clearcutting and overstory removal, previous thinning would typically promote the regeneration of predominantly shade tolerant white fir in areas where fir is a component on the landscape, with pine coming in on the pine dominated areas.

Public activities such as Christmas tree cutting, cutting of posts and poles, and firewood have and would continue to have little effect on stand structures except within small, localized settings.

Some DFPZ and area thinning under Alternative 1 would occur within areas of previous harvest activity. In stands that have had previous intermediate thinning, proposed treatments would focus on breaking up undesirable dense pockets of trees and removing ladder fuels growing underneath healthy overstory. Some mid and overstory trees would be removed in stands that were previously lightly thinned (such as intermediate sanitation) to reduce undesirable tree densities and crown fuels. Proposed area thinning treatments, under prescription H, in plantations would focus on treating standing fuels including thinning young trees to reduce ladder fuels and provide crown separation. Stands that have had salvage harvest of fire and insect killed trees can contain a wide range of residual stand structure, as do the stands that have not fallen under previous management practices. DFPZ and area thinning treatments in these areas would primarily focus on protecting healthy residual overstory and understory trees by removing ladder fuels accumulations; mid and upperstory trees would be thinned in undesirable dense pockets.

Thinning stands from below with an emphasis on retaining the larger, healthier trees would increase the health and vigor of the remaining trees while improving the long-term sustainability of the forested areas within the project area (Taylor, 1998; Dolph, 1995; Fiddler et al, 1995). Immediately after thinning, stand average diameter would increase and recruitment of future large, old-growth trees would increase.

Modeling indicates that eastside pine stands would remain in a good growth stocking range where density-related tree mortality would be reduced for approximately 20 years, whereas eastside mixed conifer stands, with higher retention levels, would generally not be thinned to stocking levels that would remain below 60 percent of maximum SDI for 20 years. Canopy could be reduced by density-related tree mortality 10 to 20 years in the future if not re-thinned. The understory vegetation, grass, herbs, and other native brush species could increase with thinning from below, if canopies are sufficiently open (McConnell and Smith, 1969).

Future maintenance treatments are analyzed within the DFPZ treatment areas on a schedule of five and 10 years. The bulk of these treatments would occur in approximately 10 years and would remove small trees and brush through hand treatment, mechanical treatment, or underburning. These maintenance treatments would maintain relatively open understories with small amounts of regeneration.

Cumulative Effects of Forest Health

Previous timber harvest has selectively removed dwarf mistletoe (*Arceuthobium spp*.) from stands; however, because mistletoe is so widespread it was not completely removed from the stands.

Earlier harvest treatments over the last 30 years provided some control for the spread of dwarf mistletoe as heavily infected trees were targeted for removal. More recent thinning and the proposed action may have a lesser effect of managing the spread of dwarf mistletoe due to prior and existing management direction that prohibits the removal of larger trees that may otherwise be heavily infected with dwarf mistletoe. Dwarf mistletoe infection levels may be decreased in the short term by the proposed action, but are likely to increase over time throughout much of the project area as infected overstory trees remain on site and the relative proportion of susceptible host trees remains high in many stands. Existing mistletoe resistant pines identified in the project area would be protected.

Insect-related tree mortality would decrease within thinned stands (Oliver, 1995), which is supported by reduced insect impacts in stands that have reduced stand densities. However, approximately 61 percent of the forested stands in the project area would not be thinned under Alternative 1. Virtually all of these stands are expected to have densities above 60 percent of maximum SDI and most are likely above 70 percent of maximum SDI. These stands are at risk of widespread mortality from insect attack or drought. Typically, widespread bark beetle attacks occur in dense stands in conjunction with drought conditions when trees are already under stress. These stands are also likely to experience complete mortality under typical late summer wildfire conditions, particularly as fuels continue to accumulate.

Annosus root disease is expected to remain near current levels throughout the project area. Annosus root disease levels may be higher than what existed prior to timber harvesting in past decades, because of past practices and increasing stand densification. In more recent years, harvest operations have included

the application of borate compounds that have been shown to be effective in preventing the infection of freshly cut stumps. Stands of mixed species, where root to root contact alternates between host and non-host trees, are less prone to the spread of annosus root disease. Additionally, thrifty well growing trees are thought to have some advantage by outgrowing the rate of infection. The proposed treatments would maintain existing mixed species stands and maintain or improve tree vigor by reducing stand densities, however thinning is not expected to remove all annosus infection, nor would it address infections outside of treatment stands.

Alternative 2

Stand Composition, Structure, and Density

Direct and Indirect Effects

The No Action alternative would allow stands to continue to develop according to succession and would perpetuate the legacy of past management practices and fire suppression.

By not doing silvicultural treatments, the opportunity would be lost to reverse post-settlement trends and to enhance and maintain the old-growth components in these fire-suppressed stands. Current research indicates that management of such stands is important to maintain old-growth components and to restore stands to a state which is closer to their range of natural variability (Covington et al, 1997).

The horizontal and vertical continuity of surface, ladder, and canopy fuels would remain intact in the absence of naturally occurring disturbance, such as mortality, and accumulation would continue to increase in the absence of fire.

Current stocking levels range from approximately 117 to 1,212 trees per acre. Most of these trees are less than 10 inches in diameter and represent ladder fuels in the suppressed and intermediate crown classes. The forest structure is characterized by dense, closed, multi-canopy stands with overlapping and interlocking crowns ranging from approximately 40 to 65 percent canopy cover. Average crown base heights would remain between 2 to 24 feet. There would be no opportunity to reduce the continuity of crown and ladder fuels and the risk for stand replacing wildfires in forested stands. Such stand structure would maintain vertical continuity of surface, ladder, and canopy fuels, thus creating the potential for surface fires to include torching and crown fire. This stand structure would also maintain horizontal continuity of canopy fuels that would maintain the potential for active crown fire spread (Fuels Report, Champs project record).

The existing stand structure promotes a low, diffuse light environment where understory conditions may be characterized by partial to complete shade. This is largely due to extremely dense stocking levels (approximately 122-223 square feet of basal area per acre) that have high canopy cover. Such conditions would not allow for regeneration of pine, but would favor the regeneration of shade tolerant species such as white fir and incense cedar, where they exist.

Regeneration of an additional cohort of shade intolerant species would be limited to existing gaps and those created by naturally occurring disturbance, such as larger mortality or fire events. Many stands

would begin or continue to incur density-related mortality, which may create openings sufficient for shade intolerant regeneration, but such mortality would also likely contribute to an increase in surface fuels. Canopy cover in pine stands would remain at densities that would keep understory vegetation stagnated.

Cumulative Effects

Cumulative effects of no treatment are discussed for the representative modeled pine and mixed conifer 4M stands described in the direct effects discussion of Alternative 1, and then for the project area as a whole. Average stand conditions of the modeled stands at year 2006 and projected to year 2026 are pictured below in Figure 11. Growth projections are based on the FVS model. The representative stands are currently at or above 60 percent of maximum SDI and would approach even higher percents of maximum SDI by year 2026. Average stand diameters would increase by roughly 2 inches in 20 years, from average dbhs of five to 12 inches to six to 14 inches. Basal area would increase from roughly 180 square feet per acre to 227-235 square feet per acre and canopy cover increases by five to 11 percent to an average of 52-67 percent. Ranges described reflect the differences and variations between pine and mixed conifer stands.

FVS modeling predictions give an indication of typical vegetative conditions. The information following is presented in general ranges that primarily represent variations between eastside pine and eastside mixed conifer stands. Specific FVS modeling data for the representative eastside pine and eastside mixed conifer stand identified in Alternative 1 are described below. Quadratic mean stand diameters would range from 10-19. Residual average canopy cover would range between 30 and 40 percent. CBHs would range from 3 to 32. Residual trees per acre would range from 48 to 412. Spacing to allow for mechanical operations would range from nine to 30 feet post-treatment. DFPZ treatment areas include four acres of CWHR 5D class strata, which would be left as part of the 10 percent retention of unthinned patches, and would thus remain as CWHR 5M class stands post-treatment.

Existing conditions of the eastside pine stand include typing as CWHR 4M with an average stand diameter of 13.5 inches, an average canopy cover of 51 percent, a basal area of 186 square feet per acre, 187 trees per acre, 15 feet of spacing between trees, and a crown base height of eight feet. Additionally, stand density is at 83 percent of maximum SDI, which is undesirably high.

Existing conditions of the eastside mixed conifer stand include typing as CWHR 4M with an average stand diameter of 5.8 inches, an average canopy cover of 62 percent, a basal area of 223 square feet per acre, 1,212 trees per acre, six feet of spacing between trees, and a crown base height of six feet. Additionally, stand density is at 139 percent of maximum SDI, which is undesirably high.

Stand development at twenty years (year 2026) was also modeled in FVS. Twenty years into the future, the eastside pine stand typed out as CWHR 4M with an average stand diameter of 17.3 inches, an average canopy cover of 57 percent, a basal area of 249 square feet per acre, 152 trees per acre, 17 feet of spacing between trees, and a crown base height of 31 feet. Additionally, stand density is at 101 percent of maximum SDI. Twenty years into the future, the eastside mixed conifer stand typed out as CWHR 4M

with an average stand diameter of 7.6 inches, an average canopy cover of 68 percent, a basal area of 289 square feet per acre, 911 trees per acre, seven feet of spacing between trees, and a crown base height of four feet. Additionally, stand density is at 161 percent of maximum SDI. This is above the zone of immanent mortality.

Table 45 and Table 46 display the projected FVS modeling attributes for eastside pine and eastside mixed conifer CWHR 4M stands for existing conditions and 20 years into the future (Alternative 2). Modeling results are displayed in Figure 11 below.

Table 45. FVS modeling results for a CWHR 4M eastside pine stands for existing conditions and 20 years into the future (Alternative 2).

EP	CWHR	QMD	CC	BA/AC	TPA	Spacing	CBH	% Maximum SDI
Existing Condition	4M	13.5”	51%	186	187	15’	8’	83%
20 Years	4M	17.3”	57%	249	152	17’	31’	101%

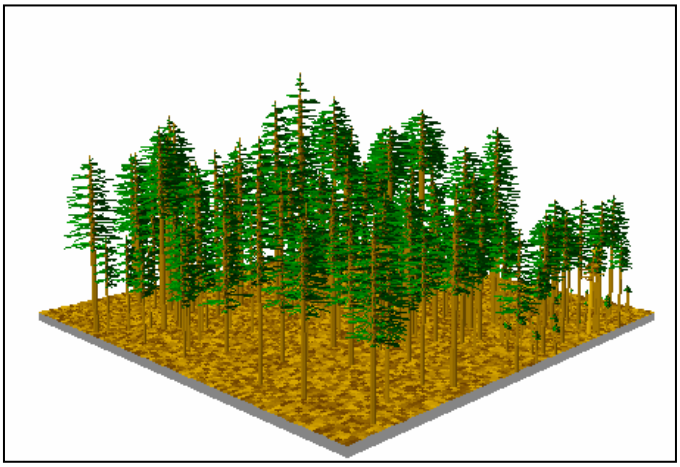
Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter; CC = canopy cover; BA/AC = basal area per acre; TPA = trees per acre; Spacing = spacing between trees; CBH = crown base height; % Maximum SDI = percent maximum Stand Density Index

Table 46. FVS modeling results for a CWHR 4M eastside mixed conifer stands for existing conditions and 20 years into the future (Alternative 2).

EMC	CWHR	QMD	CC	BA/AC	TPA	Spacing	CBH	% Maximum SDI
Existing Condition	4M	5.8”	62%	223	1212	6’	6’	139%
20 Years	4M	7.6”	68%	289	911	7’	4’	161%

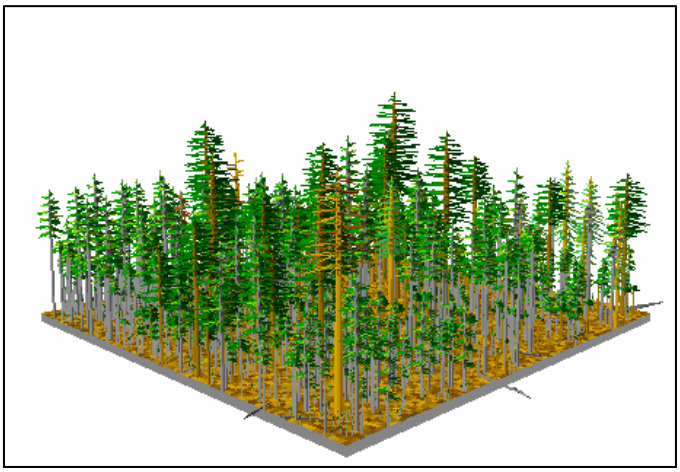
Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter; CC = canopy cover; BA/AC = basal area per acre; TPA = trees per acre; Spacing = spacing between trees; CBH = crown base height; % Maximum SDI = percent maximum Stand Density Index

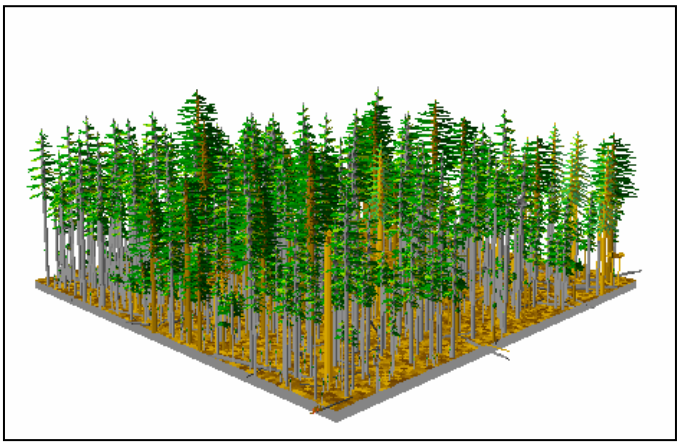
Figure 11. Eastside Pine Stand Conditions At Year 2006 and 2026 (Alternative 2).



Source: USDA Forest Service, Forest Vegetation Simulator

Eastside Mixed Conifer Stand Conditions At Year 2006 and 2026 (Alternative 2).





Source: USDA Forest Service, Forest Vegetation Simulator

Table 47 shows the distribution of existing CWHR size and density or canopy classes of the forest cover types in the project area using GIS remote sensing data. Note that Table 47 lists all the forest cover types. For consistency of tracking, Table 47 includes aspen; however, no treatments are proposed within this cover type.

Table 47. Project Area Existing CWHR Classes (Alternative 2)

Forest Cover Type	CWHR Class – Acres in Project Area																
	Seedling	Sapling (1" - 5.9" dbh)				Pole (6" – 10.9" dbh)				Small (11" – 23.9" dbh)				Medium/Large (>24" dbh)			
	1	2S	2P	2M	2D	3S	3P	3M	3D	4S	4P	4M	4D	5S	5P	5M	5D
Aspen (114 ac.)	0	0	0	0	0	0	11	9	<1	1	5	36	14	0	0	0	0
Eastside Mixed Conifer (M)	234	0	0	0	0	34	794	1,204	1,012	175	1,503	4,109	2,696	0	0	0	11
Eastside Pine (E)	522	0	0	11	0	100	1,164	1,994	749	90	1,840	6,138	950	0	0	6	8
Total Acres	**756**	**0**	**0**	**11**	**0**	**134**	**1,969**	**3,207**	**1,762**	**266**	**3,348**	**10,283**	**3,660**	**0**	**0**	**6**	**19**

Source: Eagle Lake Ranger District GIS (CALVEG)
S: sparse cover, 10-24 percent canopy cover
P: open cover, 25-39 percent canopy cover
M: moderate cover, 40-59 percent canopy cover
D: dense cover, 60-100 percent canopy cover
Note: No change to Aspen

Forest Health

Stand openings created in the area by old annosus stump infections would eventually become naturally reforested. Annosus root disease would persist in any infected true fir trees growing in the Champs Project area. Eventually, *H. annosum* could infect healthy white fir trees through naturally-occurring wounds or root contacts. New annosum infections in ponderosa or Jeffrey pine would be rare because p-type annosus infection centers almost always originate from freshly created pine stumps. Over-crowded and/or diseased trees would continue to be killed by bark beetle events, often associated with precipitation deficits. Eventually, sufficient woody material from dead and dying trees might accumulate on the forest floor and in the canopy to provide fuel which could sustain ground or crown fires of varying intensities.

As noted in the Forest Health discussion under Alternative 1, even though annosus root disease kills p-type hosts and slows the growth of s-type hosts, *H. annosum* is an effective decay organism which decomposes conifer roots and recycles forest nutrients. *H. annosum* also can create hollows in stumps and roots. Additionally, forests with advanced decline and mortality due to annosus root disease would provide canopy openings which are beneficial for some early-successional plant communities, including ponderosa pine, sugar pine and incense cedar.

The severity and extent of dwarf mistletoe infections would increase throughout the project area. Stands that currently have a light infection of mistletoe and are moderate to heavily stocked with pine are expected to become increasingly infected at fairly rapid rates. Infected overstory pine located adjacent to openings could infect pine regeneration. However, infection severity is slower to develop in highly dense stands due to low tree vigor and subsequent reduced production of dwarf mistletoe seed (Filip et al, 2000). White fir dwarf mistletoe would increase in dense stands with a high proportion of white fire in the understory and midstory.

Annual insect surveys on the LNF indicate a recent increase in insect activity. As these population build, the potential for insects to move into additional areas would increase. Maintaining stands in high densities would allow an increase in insect and disease abundance. If insect populations are allowed to build up on National Forest system lands, the potential for spread to adjacent lands would increase. During endemic periods of insect infestation, trees of low vigor are typically attacked, but once epidemic population levels are reached, even healthy trees are subject to attack. Density-related mortality as a result of insect and disease would contribute to the accumulation of surface fuels.

The risk of bark beetle outbreaks causing large-scale mortality in large, remnant, overstory pines would increase over time as stands grow increasingly dense. This would run counter to the desired condition of stands dominated by fire-resistant pine in the overstory. Of particular concern are mountain, Jeffrey, and western pine beetles because of their aggregating behavior. When there is an abundance of food (trees that are successfully attacked), pine beetle population outbreaks can occur and cause large-scale mortality across forested stands (DeMars and Roettgering, 1982; Amman et al, 1989; Smith, 1971). Stands at greatest risk in the project area are those stands with high levels of stocking (60% of maximum SDI or more), especially during periods of extended drought (Demars and Roettgering, 1982; Ferrel,

1986; Kegley et al, 1997; Smith, 1971). Stands would remain very susceptible to catastrophic fir engraver beetle and/or possible Douglas-fir tussock moth outbreaks.

Stand Composition, Structure, and Density

Cumulative Effects

Past, ongoing, and foreseeable actions in the project area are the same as those used for the Alternative 1. Past activities and management in the project area are considered in this analysis because the effects of past treatments are still occurring, such as fire exclusion and white fir ingrowth, improved health and vigor of thinned stands, establishment of pine stands, etc. Management activities and events prior to this are considered in this analysis in so far as they have shaped current stand structure conditions. Cumulative effects of no action would primarily impact conditions of forest health.

The No Action alternative would rely on disturbances such as density-related mortality and fire occurrence, or the lack thereof, to shape forest structure. CWHR size class 1 and 2 account for only 3 percent of the Champs project area forest cover type. Relying on "natural" processes would perpetuate current condition until such events occur and would delay restoration of desired conditions. This would result in maintaining a relatively homogenous forest structure dominated by CWHR size class 4, which currently accounts for approximately 69 percent of the Champs project area forest stands. Alternative 2 would not provide for spatially variable, diverse forest structures across the landscape. There would be no opportunity to improve species, age, and structural diversity by providing a favorable environment for the establishment of shade intolerant pine species.

Some stands within the project area have received previous treatments, but DFPZ network continuity is lacking. This alternative would not treat the currently existing gaps within the network to further complete its connectivity and effectiveness. Additionally, without periodic maintenance, these previously treated areas continue to accumulate biomass, and thus the effect of these treatments would continue to decrease without some type of disturbance (such as, large wildland fire, prescribed fire, or mechanical treatment).

Stand density index in forested stands would remain in the zone of imminent mortality until stress induces a reduction in the population. Tree stocking levels in the unthinned areas would continue to be excessive, resulting in continued growth stagnation, continuing inter-tree competition for limited resources, an overall decrease in stand vigor, and an ever-increasing susceptibility to insects and disease. The high risk for epidemic levels of tree mortality would continue. These conditions cannot be sustained into the future without a major disturbance such as catastrophic tree mortality and/or stand altering wildfire.

Location, severity, and length of drought are important factors in determining mortality levels due to insects and disease. Mortality would typically result in openings that range from less than ¼ to more than 50 acres in size. Mortality related to insects and disease would have multiple possible consequences. There would be fewer large, old trees and fewer mid-diameter trees, which represent the pool from which large trees of the future would come.

The high fuel loadings and ladder fuels created by the exclusion of fire and past management have created prime conditions for wildfire start on National Forest system lands to spread to adjacent private lands. Given current forest structure, the probability of reducing the effect of catastrophic wildfire may be limited. The effects of wildfire on forest vegetation would have multiple possible consequences. Fires today are more intense, burn much larger areas, and result in higher levels of tree mortality. Large fires can contribute to loss of diversity. High intensity, stand-replacing fires can negatively impact long-term soil productivity and site potential for plant growth (Soils Report / Fuels Report, Champs project record).

Excessive white fir ingrowth would continue. Species diversity would decline, as shade intolerant pine species are shaded out of these stands. These forests would remain outside of their range of natural variability in respect to historical species composition, forest structure, and the natural processes of periodic low intensity fire.

The loss of large, old, predominant trees over 30 inches diameter would continue. Species and structural diversity and a valuable seed source would continue to decline across the project area.

Additionally, downed woody material and forest litter would be added to the forest floor annually at a rate that is greater than decomposition. This, combined with continued ingrowth and increasing density, predisposes the landscape to conditions susceptible to stand replacement events such as wildfire (Fuels Report, Champs project record). Research and personal observations have shown high mortality of pre-settlement trees, which can be attributed to fuel loading above the root systems leading to lethal soil temperatures when burned (Covington and Moore, 1992). Similar results have occurred within the Blacks Mountain Experimental Forest when Research Natural Areas (RNAs) when they were underburned with prescribed fire without any previous treatment or management, and in prescribed fires performed in Lassen National Volcanic Park which is not far from the Champs project area. Once high intensity scorching occurs, insect attacks increase, and trees ultimately succumb to the stress and die.

Direct, Indirect, and Cumulative Effects of Harvest Operations and Roads

Road construction, reconstruction, and maintenance would not take place under Alternative 2.

Alternative 3

Introduction

This alternative is similar to, but slightly more prescriptive than Alternative 1. A 20 inch upper diameter limit would be applied to all treatments involving mechanical harvesting, except in rare instances of felling for operability reasons or for safety. Portions of the DFPZs that are currently owl habitat (CWHR eastside mixed conifer 4M, 4D, and 5D), 1,602 acres or 25 percent of the DFPZs involving mechanical harvesting, would be thinned at a slightly lower intensity to retain a minimum canopy closure of 40 percent. The 519 acres of DFPZ treatments within RHCAs proposed in Alternative 1 would convert to the same treatments that adjacent DFPZs would receive. The group selection treatment would not be implemented. Thinning acres would increase by 242 acres where groups are dropped inside of proposed DFPZ thinning units. Making these changes increases acres in DFPZ Prescription A from 5,245 to 5,931,

increases acres in DFPZ Prescription B from 535 to 554, adjusts the prescription for DFPZ Prescription C to be the same as adjacent DFPZs, increases DFPZ Prescription D from 3,103 to 3,162, and abolishes the 489 acres of group selection Prescription F. Unthinned patches or non-treated leave islands would increase slightly to 649 acres.

Only the environmental effects that differ from Alternative 1 or are important to repeat are discussed.

Stand Composition, Stand Structure and Density

Direct and Indirect Effects of All Treatments Involving Mechanical Harvesting

Within all treatments involving mechanical harvesting, specifically A, B, and G, old-growth, legacy trees would typically be retained where they exist on the landscape, and maintained to the extent possible with radial thinning to reduce competition and increase individual legacy tree health and vigor. Research in the southwest has shown positive response to this release (Feeney, 1998). Physiological responses include: increased diameter growth, and greater uptake of carbon, water, and nitrogen. These, in turn, increase the tree's capacity to resist insect attacks and impacts from prescribed fire within the second or third year after the thinning.

Within all treatments involving mechanical harvesting, specifically A, B, and G, trees 20 inches dbh and greater would typically be retained where they exist on the landscape, regardless of species or condition. They would only be cut in situations to facilitate operability. These include trees removed to create landings and skid trails or identified as hazards per OSHA requirements for logging operations. Also, where existing, three of the largest snags per acre 15 inches diameter and greater would be retained, as well as 3 of the largest downed logs 15 inches diameter and greater.

Road construction, reconstruction, and maintenance would remove trees from the road travel-way and ditches. Construction, in the form of realignment, of a 0.4 mile section of Forest system and non-system road would be completed for this project. Non-system roads, totaling 1.5 miles, would be added to the Forest transportation system. The majority of trees to be removed are saplings and seedlings, which have become established since construction or the last road maintenance treatment.

Direct and Indirect Effects of DFPZ Prescriptions A, B, and G

Treatments within 1,602 acres of CWHR eastside mixed conifer 4M, 4D, and 5D would be guided by a minimum retention of 40 percent canopy closure, which would account for a slightly lower thinning intensity in the affected areas than that of Alternative 1. These strata would be thinned to roughly 70 percent of normal basal area per acre, translating to 120 to 145 square feet per acre. Similar to Alternative 1, effects of thinning would be comparable to prescriptions for all eastside mixed conifer, as thinning would primarily not be effective in changing densities enough to benefit stand health over a period of 20 years. Thinning would reduce stocking density in treated strata to a range of 42 to 66 percent of maximum SDI post-treatment, some being just below the zone of imminent mortality. Tree growth and vigor would be severely impacted by inter-tree competition and grow at increasingly slower rates as trees are stressed for resources. This lower intensity thinning, similar to Alternative 1, would be less effective at stocking

control, particularly in eastside mixed conifer and because it is expected that most of these stands would grow back into the zone of imminent mortality in less than 10 years. These strata would remain at risk for density-related tree mortality post-treatment. Maintaining tree stocking levels in the range where there is a potential for high levels of tree mortality could result in increased fuel loading. Residual trees would be more susceptible to mechanical damage from harvest operations and fuels treatments because of the higher tree stocking. White fir, which is a heavy component in these strata, is especially susceptible to damage because of its thin bark. These injuries can provide points of entry for annosus root disease. Remaining large, predominant, overstory trees would remain at risk of mortality from inter-tree competition.

Average residual tree spacing (distance between trees) in this strata would generally be lower because more trees per acre would be retained, increasing the risk for operational mechanical damage. The potential for residual tree damage from equipment increases as average spacing decreases below the minimum range of 18 to 20 feet between trees. Average residual tree spacing post-treatment ranges from 10 to 19 feet, with the majority of the strata being less than 18 feet. This poses severe challenges to fully implementing the mechanical thinning and fuel treatments.

The projected average CBH in this strata would generally range from 3 to 12 feet after thinning. Thinning would raise average crown base heights 0 to six feet. Even though the desired CBH range would not be met, it would be raised from existing in most stands. Ladder fuels that lift fire into the forest canopy would be somewhat altered, but probably not enough to retard potential for damaging crown fires.

Greater potential ladder fuels would be left in this strata as a result of leaving a greater number of smaller diameter trees (intermediates) in the thinned areas. This poses severe challenges to fully implementing underburning.

One difference between Alternative 3 and Alternative 1 that applies to eastside pine and the eastside mixed conifer that does not classify as owl habitat is an upper diameter limit of 20 inches. Because only a small portion of trees above 20 inches would be removed under Alternative 1, FVS modeling indicated that adjusting the prescription for the 20 inch upper diameter limit in Alternative 3 would create only minimal differences that are not worth noting. Thus, conditions and effects for these strata would be the same as those discussed in Alternative 1.

Area thinning Prescription G would enhance biodiversity, in terms of richness and cover, of understory vegetation such as forbs, graminoids, and shrubs, and also create of a floristically rich and productive understory that would support healthier populations of primary consumers, such as nectivores, frugivores, birds, etc. (Factors Influencing Understory Vegetation for Champs EA, Champs project record).

A 20 inch upper diameter limit would slightly compromise creating a stand structure closer to the desired condition needed to initiate an understory vegetation response, as retained basal areas and canopy closures, at the patch scale, could result in an arrangement different than that which is needed to elicit the desired understory response.

The 519 acres of DFPZ treatments within RHCAs proposed in Alternative 1 would convert to the same treatments that adjacent DFPZs would receive. Opportunities expressed in Prescription C of Alternative 1 to improve riparian function and create a floristically rich and productive understory that may support healthier populations of primary consumers, such as nectivores, frugivores, birds, etc would not be initiated; stand densities would not be thinned intensely enough to provide resources and light conditions to elicit an understory vegetation response (Factors Influencing Understory Vegetation for Champs EA, Champs project record). Although, RHCAs would undergo DFPZ prescriptions so all the benefits of reducing fuels and densities would be realized.

FVS modeling predictions give an indication of typical vegetative conditions within DFPZs post-treatment. The information following is presented in general ranges that primarily represent variations between eastside pine and eastside mixed conifer stands. Specific FVS modeling data for a representative eastside pine and eastside mixed conifer stand would follow later in the discussion. Quadratic mean stand diameters would range from 10-19. Residual average canopy cover would range between 30 and 40 percent. CBHs would range from 3 to 32. Residual trees per acre would range from 48 to 412. Spacing to allow for mechanical operations would range from nine to 30 feet post-treatment. DFPZ treatment areas include four acres of CWHR 5D class strata, which would be left as part of the 10 percent retention of unthinned patches, and would thus remain as CWHR 5M class stands post-treatment.

A representative stand was modeled with the FVS to display and compare projected stand conditions with DFPZ thinning treatments and with no treatment. An eastside mixed conifer stand classified as owl habitat was chosen. Stand diameter and canopy cover are measured from trees five inches dbh and above, as per CWHR. Numerous small trees provide some additional understory canopy cover; however, these small trees are subsidiary and do not reflect the dominant stand structure. These stand parameters are near those described as desirable for a DFPZ in the Alternative 3; however, the stand parameters do not reflect undesirable spacing of trees, such as smaller trees growing under or adjacent to overstory trees and serving as ladder fuels. This stand is used as an example of stands that are identified for treatment. The projected results of proposed DFPZ thinning on this stand provides an example of conditions and results for stands at similar and higher densities and otherwise undesirable stand conditions.

Existing conditions of the eastside mixed conifer stand include typing as CWHR 4M with an average stand diameter of 5.8 inches, an average canopy cover of 62 percent, a basal area of 223 square feet per acre, 1,212 trees per acre, six feet of spacing between trees, and a crown base height of six feet. Additionally, stand density is at 139 percent of maximum SDI.

DFPZ Prescription A, for owl habitat, was modeled using FVS with the representative stand described above. After thinning, the eastside mixed conifer stand was still classified as CWHR 4M with an average stand diameter of 12.5 inches, an average canopy cover of 40 percent, a basal area of 145 square feet per acre, 170 trees per acre, 16 feet of spacing between residual trees, and a crown base height of 12 feet. Additionally, stand density is at 66 percent of maximum SDI. This is above 60 percent where overall growth begins to slow and density-related tree mortality has the potential to increase, in fact, is just below 70 percent, which is the zone of imminent mortality.

Stand development at twenty years (year 2026) was also modeled in FVS. Twenty years after thinning, the treated eastside mixed conifer stand still typed out as CWHR 4M with an average stand diameter of 15.3 inches, an average canopy cover of 46 percent, a basal area of 197 square feet per acre, 154 trees per acre, 17 feet of spacing between trees, and a crown base height of 15 feet. Additionally, stand density is at 84 percent of maximum SDI. This is above the zone of imminent mortality.

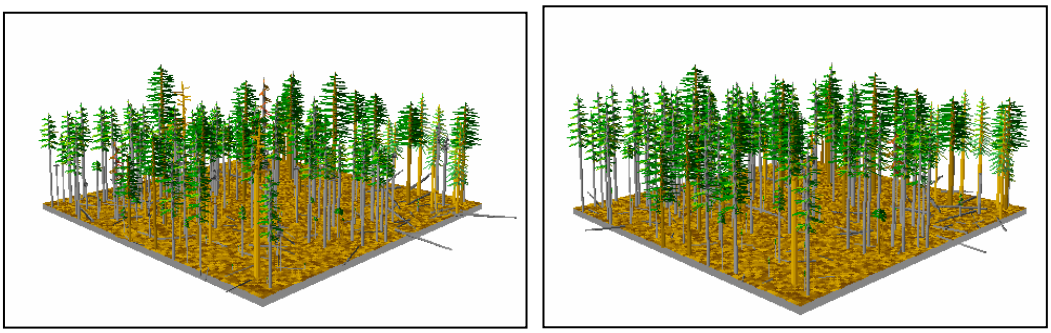
Table 48 displays the projected FVS modeling attributes of Prescription A thinning for eastside mixed conifer CWHR 4M stands, classifying as owl habitat, for existing conditions, post-thinning, and 20 years post-thinning (Alternative 3). Modeling results are displayed in Figure 12 below.

Table 48. FVS modeling attributes of Prescription A thinning for eastside mixed conifer CWHR 4M stands, classifying as owl habitat, for existing conditions, post-thinning, and 20 years post-thinning (Alternative 3).

EMC	CWHR	QMD	CC	BA/AC	TPA	Spacing	CBH	% Maximum SDI
Existing Condition	4M	5.8”	62%	223	1212	6’	6’	139%
Post-thinning	4M	12.5”	40%	145	170	16’	12’	66%
20 Years	4M	15.3”	46%	197	154	17’	15’	84%

Source: Champs FVS output files
Note: CWHR = California Wildlife Habitat Relationship; QMD = quadratic mean diameter; CC = canopy cover; BA/AC = basal area per acre; TPA = trees per acre; Spacing = spacing between trees; CBH = crown base height; % Maximum SDI = percent maximum Stand Density Index

Figure 12. Eastside Mixed Conifer Stand Conditions After DFPZ Prescription A At Year 2006 and 2026 (Alternative 3).



Source: USDA Forest Service, Forest Vegetation Simulator

Table 49 displays the predominant forest cover, and acres of each California Wildlife Habitat Relations (CWHR) class pre- and post-DFPZ treatment. This table shows changes in stand structure and density as a result of DFPZ treatments. Most notable are the decrease of acres of CWHR density class D amongst eastside mixed conifer and the decrease of acres of both CWHR density classes M and D amongst eastside pine and subsequent increases in acres of CWHR density class P. The changes reflect a decrease of canopy densities, particularly in CWHR density class M and D stands, and increases in stand average diameter, moving stands to the larger end of the size class and causing some stands to increase in CWHR size class, as a result of thinning from below. Changes in CWHR size and density classes, as a result of treatments, is further summarized in Table 50 for all treatments combined.

Table 49. Alternative 3 DFPZ Prescriptions: Acres Within Treated Stands Before And After Treatment

Forest Cover	CWHR Class	Pre Treatment Acres	Post Treatment Acres
Eastside Mixed Conifer	1	33	33
	3D	99	19
	3M	404	97
	3P	260	64
	3S	6	0
	4D	484	23
	4M	1,110	1,571
	4P	306	889
	4S	1	7
	5D	4	4
	5P	0	0
Eastside Pine	1	44	44
	3D	236	53
	3M	713	191
	3P	568	130
	3S	21	5
	4D	489	20
	4M	3,035	1,391
	4P	818	4,073
	4S	40	57
Brush/other		1,007	1,007
Total		9,678	9,678

Source: Eagle Lake Ranger District GIS (CALVEG), Champs FVS Output Files

Direct and Indirect Effects of DFPZ Prescriptions A and B and no Group Selection Treatments on CWHR Stand Structure

Adjustments to DFPZ Prescriptions A and B thinning and dropping group selection Prescription F would slightly change the distribution of CWHR classes from Alternative 1. The major differences being that there would be less of an increase in seedling size class stands because no group selections would be implemented, size class 3 strata would increase to 4s, and even though density class strata would decrease overall, more strata would remain at a moderate stocking level in the eastside mixed conifer.

Table 50. Effects of Alternative 3 Treatments On Project Area CWHR Classes

Forest Cover Type	CWHR Class – Acres in Project Area, Pre-Treatment																
	Seedling	Sapling (1" - 5.9" dbh)				Pole (6" – 10.9" dbh)				Small (11" – 23.9" dbh)				Medium/Large (>24" dbh)			
	1	2S	2P	2M	2D	3S	3P	3M	3D	4S	4P	4M	4D	5S	5P	5M	5D
Aspen	0	0	0	0	0	0	11	9	<1	1	5	36	14	0	0	0	0
Eastside Mixed Conifer	234	0	0	0	0	28	597	897	932	182	2,086	4,570	2,235	0	0	0	11
Change	*NC*	*NC*	*NC*	*NC*	*NC*	*-6*	*-197*	*-307*	*-80*	*+7*	*+583*	*+461*	*-461*	*NC*	*NC*	*NC*	*NC*
Eastside Pine	522	0	0	11	0	84	616	1,352	564	543	5,070	4,315	481	0	0	6	8
Change	*NC*	*NC*	*NC*	*NC*	*NC*	*-16*	*-548*	*-642*	*-185*	*+453*	*+3,230*	*-1,823*	*-469*	*NC*	*NC*	*NC*	*NC*
Total Acres	**756**	**0**	**0**	**11**	**0**	**112**	**1,224**	**2,258**	**1,497**	**726**	**7,161**	**8,921**	**2,730**	**0**	**0**	**6**	**19**
Change	**NC**	**NC**	**NC**	**NC**	**NC**	**-22**	**-745**	**-949**	**-265**	**+460**	**+3,813**	**-1,362**	**-930**	**NC**	**NC**	**NC**	**NC**

Source: Eagle Lake Ranger District (CALVEG)
S: sparse cover, 10-24 percent canopy cover
P: open cover, 25-39 percent canopy cover
M: moderate cover, 40-59 percent canopy cover
D: dense cover, 60-100 percent canopy cover
Note: No change to Aspen
Changes in CWHR acres (italics) are the difference between existing CWHR acres (Alternative 2, Table 47) and post-treatment CWHR acres from Alternative 3.

Forest Health

Direct and Indirect Effects to Forest Health

More acres would be maintained at higher stocking levels, predisposing them to greater risks of potential spread of annosus. Associated tree mortality could result in increased fuel loading.

Approximately three hundred fewer acres would be treated with mechanical harvesting, and fewer trees would be cut on 1,602 acres under this alternative; thus, less Sporax would be used.

Conditions and effects for mistletoe and insects would be that same as discussed in Alternative 1.

Cumulative Effects of Proposed DFPZs and Area Thinning

Eastside mixed conifer which qualifies as owl habitat strata thinned under this alternative is expected to grow to undesirable maximum densities less than a decade sooner as compared to the Proposed Action.

Cumulative Effects of Stand Composition, Structure and Density

In eastside mixed conifer, more large, predominant, overstory trees would remain at risk of mortality from inter-tree competition because the post-treatment SDI is approaching or is above 60 percent of maximum. This alternative would be less effective at stocking control because it is expected that most of these stands would grow back into the zone of imminent mortality in a shorter period of time. Openings to regenerate shade intolerant pine would be by natural events. Because of these two factors, opportunities are lost to regenerate shade intolerant pine species and trend these forests closer to their historical species composition and structure.

Alternative 9

Introduction

This alternative contains components of Alternative 1 and Alternative 3. A 20 inch upper diameter limit would be applied to all treatments involving mechanical harvesting, except for Prescriptions C and F, where a 30 inch upper diameter would be applied (as in Alternative 1), and except in rare instances of felling for operability or for safety reasons. Portions of the DFPZs proposed for Prescriptions A and B (731 acres) that are currently typed as suitable California spotted owl habitat (CWHR eastside mixed conifer 4M, 4D, and 5D) would be thinned at a slightly lower intensity to retain a minimum canopy closure of 40 percent. This accounts for less than 13 percent of the DFPZs involving mechanical harvesting. Approximately 341 acres of suitable California spotted owl habitat within Prescription A and B would not be treated.

Prescription A acres would drop to 4,988 and Prescription B acres would drop to 531 acres (as compared to 5,245 and 535 acres respectively in Alternative 1). Prescription B surface fuel treatment would change from mastication to jackpot pile and burn in Alternative 9 only. Prescription C acres would remain the same as Alternative 1 (519 acres).

Non-treated leave islands, in addition to the untreated suitable California spotted owl habitat mentioned previously, would decrease to 556 acres.

Due to dropped groups within DFPZ Prescription D, underburn only acres would increase to 3,115 (as compared to 3,103 acres under Alternative 1).

Group selection harvests (261 acres) would only be implemented outside of suitable California spotted owl habitat and potential habitat (mixed conifer) within the Area of Concern and away from California spotted owl PACs and HRCAs. Groups dropped from inside of proposed DFPZ thinning units would revert to the associated DFPZ prescriptions.

Prescription acres under E, G, and H remain the same in all action alternatives.

A summary of the environmental effects compared to Alternative 1 and 3 will be discussed. Environmental effects that are the same as Alternative 1 and Alternative 3 are noted.

Stand Composition, Stand Structure and Density

Direct and Indirect Effects of All Treatments Involving Mechanical Harvesting

Within all treatments involving mechanical harvesting, specifically Prescriptions A, B, and G, would be the same as described under Alternative 3. Road construction, reconstruction, and maintenance would be the same as described under Alternative 1.

Direct and Indirect Effects of DFPZ Prescriptions A and B

Portions of the DFPZs proposed for Prescriptions A and B (731 acres) that are currently typed as suitable California spotted owl habitat (CWHR eastside mixed conifer 4M, 4D, and 5D), would be thinned at a slightly lower intensity to retain a minimum canopy closure of 40 percent. Approximately 341 acres of suitable California spotted owl habitat within Prescription A and B would not be treated. These strata would be thinned to roughly 70 percent of normal basal area per acre, translating to 120 to 145 square feet per acre. As described under Alternative 3, effects of thinning would be comparable to prescriptions for all eastside mixed conifer, as thinning would primarily not be effective in changing densities enough to benefit stand health for a period of 20 years. Thinning would reduce stocking density in treated strata to a range of 42 to 66 percent of maximum SDI post-treatment, some being just below the zone of imminent mortality. Tree growth and vigor would be severely impacted by inter-tree competition and grow at increasingly slower rates as trees are stressed for resources. This lower intensity thinning, similar to Alternative 1 and the same as Alternative 3, would be less effective at stocking control, particularly in eastside mixed conifer and because it is expected that most of these stands would grow back into the zone of imminent mortality in less than 10 years. These strata would remain at risk for density-related tree mortality post-treatment. Maintaining tree stocking levels in the range where there is a potential for high levels of tree mortality could result in increased fuel loading. Residual trees would be more susceptible to mechanical damage from harvest operations and fuels treatments because of the higher tree stocking. White fir, which is a heavy component in these strata, is especially susceptible to damage because of its

thin bark. These injuries can provide points of entry for heart rot and annosus root disease. Remaining large, predominant, overstory trees would remain at risk of mortality from inter-tree competition.

Average residual tree spacing (distance between trees) in this strata would generally be lower because more trees per acre would be retained, increasing the risk for operational mechanical damage. The potential for residual tree damage from equipment increases as average spacing decreases below the minimum range of 18 to 20 feet between trees. Average residual tree spacing post-treatment would range from 10 to 19 feet, with the majority of the strata being less than 18 feet. This poses severe challenges to fully implementing the mechanical thinning and fuel treatments.

The projected average CBH in these strata would generally range from 3 to 12 feet after thinning. Thinning would raise average crown base heights 0 to 6 feet. Even though the desired CBH range would not be met, it would usually be raised from existing. Ladder fuels that lift fire into the forest canopy would be somewhat altered.

Greater potential ladder fuels would be left in this strata as a result of leaving a greater number of smaller diameter trees (intermediates) in the thinned areas.

Alternative 9 is the same as Alternative 3 for Prescriptions A and B, with the following exceptions. Within suitable California spotted owl habitat, only areas determined as priorities for treatment as discussed in the description of Alternative 9 (Alternatives Considered in Detail), would be proposed for treatment; the remaining suitable California spotted owl habitat areas would be left untreated. Under Prescription B, surface fuel treatment would change from mastication to jackpot pile and burn (in Alternative 9 only), in order to leave more down, woody material strategically placed within the units. In eastside mixed conifer typed as suitable California spotted owl habitat, treatments and effects of Alternative 9 would be the same as those discussed for Alternative 3. In eastside mixed conifer that does not qualify as suitable California spotted owl habitat, treatments and effects of Alternative 9 would be the same as those discussed for Alternative 1.

In thinned eastside pine strata under Prescriptions A and B, trees would be healthy and vigorous as a result of reduced competition and stress, thus diameters would increase faster, and several stands would transition into this larger size class.

FVS modeling of effects within eastside pine and eastside mixed conifer strata would be the same as in Alternatives 1 and 3, as outlined above. With the 20 inch upper diameter limit, in areas or clumps where retention of all such trees exceeds the carrying capacity as measured by basal area, trees would be left at risk of mortality due to the stress of inter-tree competition because this alternative would be less effective at stocking control. When higher densities would be retained, competition and stress would be only slightly alleviated for a shorter period of time, if at all. In particular, some of the very trees that are desired for retention in the larger size class, particularly pines, would succumb to competition and stress, and only a percentage would transition into larger size classes due to decreased health and vigor.

The 519 acres of DFPZ treatments within RHCAs (Prescription C) is the same as proposed in Alternative 1.

Treatments proposed under Prescriptions D and E are the same as those described in Alternative 1, with only slight acreage adjustments due to dropped groups for Prescription D. Direct and indirect effects of these two prescriptions would be the same as those described under Alternative 1.

Table 51 displays the predominant forest cover, and acres of each California Wildlife Habitat Relations (CWHR) class pre- and post-DFPZ treatment. This table shows changes in stand structure and density as a result of DFPZ treatments. Most notable are the decrease of acres of CWHR density class D amongst eastside mixed conifer and the decrease of acres of both CWHR density classes M and D amongst eastside pine and subsequent increases in acres of CWHR density class P. The changes reflect a decrease of canopy densities, particularly in CWHR density class M and D stands, and increases in stand average diameter, moving stands to the larger end of the size class and causing some stands to increase in CWHR size class, as a result of thinning from below. Changes in CWHR size and density classes, as a result of treatments, is further summarized in Table 52 for all treatments combined.

Table 51. Alternative 9 DFPZ Prescriptions: Acres Within Treated Stands Before And After Treatment

Forest Cover	CWHR Class	Pre Treatment Acres	Post Treatment Acres
Eastside Mixed Conifer	1	33	33
	3D	98	20
	3M	402	103
	3P	260	64
	3S	6	0
	4D	483	109
	4M	1,099	1,395
	4P	305	858
	4S	1	7
	5D	4	4
	5P	0	98
Eastside Pine	1	44	44
	3D	230	54
	3M	699	191
	3P	558	130
	3S	21	5
	4D	485	22
	4M	2,949	956
	4P	804	4,372
	4S	40	56
Brush/other		1,007	1,007
Total		9,528	9,528

Source: Eagle Lake Ranger District GIS (CALVEG), Champs FVS Output Files

Group selection treatments (Prescription F) would be implemented, although not at the same density as proposed under Alternative 1. Only groups located outside of suitable California spotted owl habitat and potential habitat (mixed conifer) within the Area of Concern and away from California spotted owl PACs and HRCAs are proposed for treatment. As compared to Alternative 1, fewer acres would be treated using the group selection prescription under Alternative 9. Opportunities and benefits to create

openings to regenerate shade intolerant pine species and improve age-class and structural diversity, both vertically and horizontally, on the landscape in the project area would be reduced as compared to Alternative 1. Alternative 9 would only increase size class 1 strata to 4 percent of the Champs project area coniferous forest cover type. The desired minimum level is 5 percent. Likewise, timber volume outputs that contribute to community stability would decrease under Alternative 9 compared to Alternative 1.

Group selection harvest units that revert to DFPZ prescriptions would have the same conditions and effects as those discussed previously in this section for DFPZ Prescriptions A and B.

Existing CWHR classes would change post-treatment for the areas to be treated with group selection. Group selections are regeneration openings that all classify as CWHR class 1 (seedling) post-treatment. Table 52 displays the acres of each forest cover type and CWHR class that are being changed to the CWHR seedling class. Currently, this structure only account for 756 acres, or 3 percent, of the Champs project area coniferous forest cover type.

Treatments proposed under Prescription G are the same as those described under Alternative 3. Direct and indirect effects of this prescription would be the same as those described under Alternative 3.

Treatments proposed under Prescription H are the same as those described under Alternative 1. Direct and indirect effects of this prescription would be the same as those described under Alternative 1.

Direct Effects of DFPZ Prescriptions A, B, C and Group Selection Prescription F on CWHR Stand Structure

DFPZ thinning under Prescriptions A and B would affect CWHR stand structure as described under Alternative 3. DFPZ Prescription C and Group Selection Prescription F treatments would affect CWHR stand structure the same as Alternative 1, with the exception that fewer group selections would be implemented. This proposal would slightly change the distribution of CWHR classes as compared to Alternatives 1 and 3. The major differences being that there would be an increase in seedling size class stands as compared to Alternative 3 because group selections would be implemented, although not to the extent as in Alternative 1. As in Alternatives 1 and 3, size class 3 strata would increase to 4s, and even though density class strata would decrease overall, more strata under Alternative 9 would remain at a moderate stocking level in the eastside mixed conifer.

Table 52. Effects of Alternative 9 Prescriptions On Project Area CWHR Classes

Forest Cover Type	CWHR Class – Acres in Project Area, Pre-Treatment																
	Seedling	Sapling (1" - 5.9" dbh)				Pole (6" – 10.9" dbh)				Small (11" – 23.9" dbh)				Medium/Large (>24" dbh)			
	1	2S	2P	2M	2D	3S	3P	3M	3D	4S	4P	4M	4D	5S	5P	5M	5D
Aspen	0	0	0	0	0	0	11	9	<1	1	5	36	14	0	0	0	0
Eastside Mixed Conifer	261	0	0	0	0	28	583	901	926	182	2,055	4,405	2,322	0	98	0	11
Change	*+27*	*NC*	*NC*	*NC*	*NC*	*-6*	*-211*	*-303*	*-86*	*+7*	*+552*	*+296*	*-374*	*NC*	*+98*	*NC*	*NC*
Eastside Pine	756	0	0	11	0	84	612	1,335	558	542	5,357	3,823	482	0	0	6	8
Change	*+234*	*NC*	*NC*	*NC*	*NC*	*-16*	*-552*	*-659*	*-191*	*+452*	*+3,517*	*-2,315*	*-468*	*NC*	*NC*	*NC*	*NC*
Total Acres	**1,017**	**0**	**0**	**11**	**0**	**112**	**1,206**	**2,245**	**1,485**	**725**	**7,417**	**8,264**	**2,818**	**0**	**98**	**6**	**19**
Change	**+261**	**NC**	**NC**	**NC**	**NC**	**-22**	**-763**	**-962**	**-277**	**+459**	**+4,069**	**-2,019**	**-842**	**NC**	**+98**	**NC**	**NC**

Source: Eagle Lake Ranger District (CALVEG)
S: sparse cover, 10-24 percent canopy cover
P: open cover, 25-39 percent canopy cover
M: moderate cover, 40-59 percent canopy cover
D: dense cover, 60-100 percent canopy cover
Note: No change to Aspen
Changes in CWHR acres (italics) are the difference between existing CWHR acres (Alternative 2, Table 47) and post-treatment CWHR acres from Alternative 9.

Forest Health

Direct and Indirect Effects to Forest Health

More acres would be maintained at higher stocking levels, predisposing them to greater risks of potential spread of annosus. Associated tree mortality could result in increased fuel loading.

Under Alternative 9, as compared to Alternative 1, approximately five hundred fewer acres would be treated with mechanical harvesting, and fewer trees would be cut on 727 acres, thus less Sporax would be used.

Conditions and effects for mistletoe and insects would be that same as discussed in Alternatives 1 and 3.

Cumulative Effects of Proposed DFPZ, Area Thinning, and Group Selection

Eastside mixed conifer which qualifies as owl habitat strata thinned under this alternative is expected to grow to undesirable maximum densities less than a decade sooner as compared to the Proposed Action.

The cumulative effects of group selections described in Alternative 1 would pertain to this alternative to a lesser degree. Opportunities to create openings to regenerate shade intolerant pine species in groups in the project area would occur, although on fewer acres. CWHR size class 1 seedling stage would still not meet LRMP direction to provide at least 5 percent of the acreage of each vegetation type that occurs in a management area in each seral stage. Group selection treatments in Alternative 9 only moves the CWHR size class 1 seedling stage to 4 percent.

Cumulative Effects of Stand Composition, Structure and Density

In eastside mixed conifer, more large, predominant, overstory trees would remain at risk of mortality from inter-tree competition because the post-treatment SDI is approaching or is above 60 percent of maximum. This alternative would be less effective at stocking control because it is expected that most of these stands would grow back into the zone of imminent mortality in a shorter period of time. Fewer acres of group selection openings to regenerate shade intolerant pine would be realized compared to Alternative 1. Because of these two factors, some opportunities are lost to regenerate shade intolerant pine species and trend these forests closer to their historical species composition and structure.

Soils

Introduction

The Soils Report for the Champs Environmental Assessment is incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

The analysis area considered for cumulative effects of past, ongoing, and reasonably foreseeable future actions on soils is the whole Champs project area. This is the management area where soil disturbing activities are proposed, and is of a practical size for evaluation and management of sub-watersheds, topography and soil family complexes. The Champs Project area boundary was used as the

geographical boundary for cumulative effects because it is land dedicated to growing vegetation where soil productivity standards can be applied. A sufficient number of site specific evaluations were completed to ensure a reasonable determination of existing soil conditions.

Based on the 18 areas sampled, the project area fully meets the applicable LRMP soil standards for cover, soil organic matter, and litter and duff. The LWM standard was met on 61 percent of the areas sampled, and other sampling suggests the project area does not currently meet the LWM standard. The soil standard for porosity was met on 78 percent of the areas sampled, but when projected across treatment units, all but one treatment unit meets the LRMP soil standard for porosity. These soil conditions similar to the pre-treatment conditions for cover, displacement, and soil disturbance on the 11 sites monitored for the HFQLG (McComb and Westmoreland 2006), but levels of compaction observed in the Champs Project sampling are somewhat lower.

Direct Effects of Alternatives 1, 3, and 9

Prescription A, DFPZ Thin & Underburn

The direct effect of underburning would be an immediate reduction in ground cover, possibly below the standard. However, this would be short-term and cover would be reestablished in one or two years. Needle cast following the underburn would provide some immediate cover, depending on the density of the residual stand and the degree of scorch.

Even though existing skid roads and landings would be used where possible, some new skid roads and landings could be expected. Also, biomass processing would require larger landings. But all portions of the larger landings would not be detrimentally compacted. A good portion of each landing would be used to stockpile biomass awaiting processing and would not receive heavy traffic. The application of integrated design features (IDFs), particularly operating when soils are dry and have high strength to resist compactive forces, would mitigate the potential for porosity loss (Alexander and Poff 1985).

Under Alternatives 3 and 9, the diameter of leave trees would be reduced to 20 inches, with the exception of Prescriptions C and F under Alternative 9 (30 inch dbh upper diameter limit). This would result in less total biomass removal, slightly reducing the number of trips on skid trails and the level of use at landings. However, the area in skid trails and landings would be essentially the same, so the effects on soil porosity for both action alternatives would be the same.

Except for portions of some new landings, and the first few hundred feet of main skid roads, a measurable loss of soil organic matter would not be expected. Where losses occurred, they would be within the LRMP soil standard.

As with cover, a direct effect of broadcast burning could be a temporary reduction in litter and duff. The amount of reduction would depend on the specifics of the burn. Under a cool burn prescription it is possible to retain enough duff to meet the standard. If the standard were not met, it would be a short-term effect. The treated areas are thinnings, and the residual trees would provide litter fall and needle cast that would reestablish a litter layer within a few years.

Some large woody material (LWM) would be consumed by fire during underburning. This loss would be partially offset by snag recruitment.

Prescription B, DFPZ Thin & Masticate

The mechanized thinning operations would be the same as for Prescription A. The machines used to masticate would operate over the layer of shredded biomass created. In Alternative 9, mastication will be replaced by jackpot piling and burning.

Mastication would result in an increase in ground cover in Alternatives 1 and 3. Jackpot piling and burning in Alternative 9 would result in no or potentially less ground cover present after operations terminate.

Although the mastication treatment involves additional passes with machinery, operating on the cushion of shredded material created by mastication would mitigate the potential for compaction. Losses in porosity from thinning, yarding, and processing would be the same as for Prescription A. Jackpot piling and burning from Alternative 9 would result in increased machinery traffic, however soil protection IDFs will mitigate excessive compaction occurrence.

Under Alternatives 3 and 9 the diameter of leave trees would be reduced to 20 inches. Overall, this will result in less total biomass removal, slightly reducing the number of trips on skid trails and the level of use at landings. However, the area in skid trails and landings would be essentially the same, so the effects on soil porosity for both action alternatives would be the same.

Except for portions of some new landings, and the first few hundred feet of main skid roads, loss of soil organic matter would not be expected. Where losses occurred, they would be within the standard.

Under this prescription the overall amount and thickness of litter and duff would increase. The mastication operation might create some small areas of bare, disturbed soil, but would be well within the standard. Under Alternative 9, litter and duff amount would remain essentially unchanged due to burning of collected material.

Other than occasional disturbance to existing LWM, particularly decay Class 5 logs, this prescription would cause no change in LWM. The mastication process does not shred large material; only fine material such as brush and small diameter slash. In places, the thinning operations might provide LWM recruitment since fallen snags are protected under the IDFs.

Prescription C, DFPZ Thin & Underburn in RHCA

The direct effect of underburning would be an immediate reduction in cover, possibly below the standard. However, this would be short-term and cover would be reestablished in one or two years. The treated areas are thinnings, and the residual trees would provide litter fall and needle cast that would reestablish a litter layer. Needle cast following the underburn would provide some immediate cover, depending on the density of the residual stand and the degree of scorch. The IDF requirement of 90 percent cover on skid trails would protect soils from erosion. Removal of trees using a 30 inch dbh upper diameter limit, as called for in Alternatives 1 and 9, would result in marginally less litter fall and needle cast.

The IDFs for RHCAs would protect soils from a measurable loss of soil porosity.

This prescription would have no direct effect on soil organic matter.

As with cover, a direct effect of broadcast burning could be a temporary reduction in litter and duff. The amount of reduction would depend on the specifics of the burn.

Under a cool burn prescription it is possible to retain enough duff to meet the standard. If the standard were not met, it would be a short-term effect.

Some LWM would be consumed by fire during underburning. This loss would be partially offset by snag recruitment.

Prescription D, DFPZ Thin & Underburn

The direct effect of underburning would be an immediate reduction in cover, possibly below the standard. However, this would be short-term and cover would be reestablished in one or two years. Needle cast following the underburn would provide some immediate cover, depending on the density of the residual stand and the degree of scorch.

This prescription would have no direct effect on soil porosity.

This prescription would have no direct effect on soil organic matter.

As with cover, a direct effect of broadcast burning could be a temporary reduction in litter and duff. The amount of reduction would depend on the specifics of the burn. Under a cool burn prescription it is possible to retain enough duff to meet the standard. If the standard were not met, it would be a short-term effect.

Some LWM would be consumed by fire during underburning. This loss would be partially offset by snag recruitment.

Prescription E, DFPZ Thin & Masticate

Mastication would result in an increase in ground cover.

Although the mastication treatment involves the use of ground-based machinery, operating on the cushion of shredded material created by mastication would mitigate the potential for compaction.

Mastication would have no direct effect on soil organic matter.

With mastication the overall amount and thickness of litter and duff would increase. The mastication operation might create some small areas of bare, disturbed soil, but would be well within standard for litter and duff.

Other than occasional disturbance to existing LWM, particularly decay Class 5 logs, mastication would cause no change in LWM.

Prescription F, Group Selection

The group selection prescription only occurs under Alternatives 1 and 9; there is no group selection prescription under Alternative 3.

This treatment would result in a loss of ground cover. With very careful machine piling it would be possible to meet the cover standard. Meeting the cover standard would be a function of slope and soil erodability. Slopes in the area are gentle and EHR is low for most soils.

Multiple treatments with machinery increase the risk of a loss of porosity under this treatment. Operation under dry soil conditions, and a moderate to low risk for compaction, mitigate this risk. The groups would need landings. The need for subsoiling to ameliorate detrimental compaction would be assessed on a site-specific basis for the reasons just discussed above.

The risk of a loss of soil organic matter can be high under machine piling. When piling slash, there is a potential to move soil into burn piles. But because whole tree yarding would be used there would be less slash to be piled, and the slash that would be piled would be mostly small diameter material. This reduces the risk of moving topsoil into burn piles. The risk is also mitigated by using machine piling only where needed, by operating when soils are dry, and by piling as little material as necessary to meet fuels objectives. Even though a small amount of soil may be moved in this operation, the standard would still be met.

The direct effect of this treatment would be a reduction in litter and duff

Other than occasional disturbance to existing LWM, particularly decay Class 5 logs, this prescription would have no direct effect on LWM.

Prescription G, Area Thin & Underburn

The direct effect of underburning would be an immediate reduction in cover, possibly below the standard. However, this would be short-term and cover would be reestablished in one or two years. Needle cast following the underburn would provide some immediate cover, depending on the density of the residual stand and the degree of scorch.

Even though existing skid roads and landings would be used where possible, some new skid roads and landings could be expected. Also, biomass processing would require larger landings. But all portions of the larger landings would not be detrimentally compacted. A good portion of each landing would be used to stockpile biomass awaiting processing and would not receive heavy traffic. The application of integrated design features (IDFs), particularly operating when soils are dry, would mitigate the potential for porosity loss.

Under Alternatives 3 and 9, the diameter of leave trees would be reduced to 20 inches. This would result in less total biomass removal, slightly reducing the number of trips on skid trails and the level of use at landings. However, the area in skid trails and landings would be essentially the same, so the effects on soil porosity for both action alternatives would be the same. Under Alternative 1, the upper diameter limit for tree removal is 30” and would result in greater biomass removal. The effects on soil porosity would be mitigated by IDFs, but a minimal increase in bulk density can be expected due to increased machinery operation. This increase in soil bulk density, however, is not expected to generate detrimental effects.

Except for portions of some new landings, and the first few hundred feet of main skid roads, loss of soil organic matter would not be expected. Where losses occurred, they would be within the standard.

As with cover, a direct effect of broadcast burning could be a temporary reduction in litter and duff. The amount of reduction would depend on the specifics of the burn. Under a cool burn prescription it is possible to retain enough duff to meet the standard. If the standard were not met, it would be a short-term effect.

Some LWM would be consumed by fire during underburning. This loss would be partially offset by snag recruitment.

Prescription H, Plantation Hand Thin

The lop and scattering of slash under this treatment would increase ground cover.

This treatment involves no ground-based machinery and would have no direct effect on soil porosity.

Hand thinning would have no direct effect on soil organic matter.

The lop and scattering of slash under this treatment would increase litter and promote the development of a duff layer.

This prescription would have no direct effect on LWM.

Indirect Effects of Alternatives 1, 3, and 9

Any soil compaction associated with new landings and skid trails would decrease infiltration and could reduce hydrologic function, increase soil erosion, and reduce soil buffering capacity.

The canopy reduction resulting from thinning would increase surface soil temperatures. This would increase the rate of oxidation of surface duff and litter and lead to a thinner litter layer. However, a thinner litter layer might be what existed under historical levels of more frequent fires. A thinner litter layer would also result in a faster rate of spread for fire, with shorter residence times. This would deliver less heat to the soil and reduce the potential for soil damage.

The frequent, low intensity fires typical of prescribed burns increase soil productivity over the long term (Klemmendson et al. 1962). Low intensity burns can increase soil nitrogen. Heating and combustion increases ammonia (Dunn and DeBano 1977) making it readily available for plant uptake. Nitrification is also stimulated by reduction of repressive tannins and by increases in ammonium (Powers 1979).

Loss of canopy in group treatments would increase surface soil temperatures. This would increase the rate of oxidation of surface organic matter, reducing ground cover and duff and litter. This effect would persist for 10 to 15 years until newly planted trees begin to shed enough needles to develop surface cover. Where groups are located on steeper slopes the loss of ground cover could lead to erosion and a loss of soil organic matter. Machine piling and burning could lead to concentration of soil nutrients under burn piles.

The thick mulch created by mastication would lower surface soil temperatures. This would promote the accumulation of soil organic matter. The mulch created by mastication would accelerate the recovery of skid trails that are slightly to moderately compacted, including those from previous entries. Mastication

operations would break up and mix the existing duff and litter. This could increase the rate of oxidation of surface organic matter. The mulch created by mastication would result in less intense but longer burning fires. This would deliver more heat to the soil and increase the potential for soil damage.

Jackpot piling and burning would result in less litter and duff material in treatment areas. The burning of jackpot piles, depending on size, would transmit more intense and isolated heat to the soil. Less duff and litter material resulting from jackpot piling and burning may result in the decreased formation of soil organic matter and extend the recovery time for compacted regions of skid trails and landings.

Most of these potential indirect effects on soils would be minor and would not have an effect on long-term soil productivity. Frequent underburning has the potential to increase soil productivity over the long-term.

Cumulative Effects of Alternatives 1, 3, and 9

Present cover is well above the minimum levels in the LRMP soil standards. In spite of short-term losses of cover following prescribed burns, cover is expected to be sufficient to protect soils from erosion. Soils in the project area have low EHRs and slopes are gentle.

Even though there have been numerous harvest entries into the area, the current level of detrimental soil compaction is generally low. This is mainly because soils have a moderate to low susceptibility to compaction because of rock content and soil textures. Planned repeated entries have the potential for additive effects because it is not always possible to confine traffic to existing skid trails and landings. Other projects in the area could incrementally add to soil disturbance and compaction. It is also difficult to predict the effects that changes in technology and economics might have on future equipment to harvest, yard, and process materials. These changes could be either positive or negative in terms of soil impacts. With implementation of the IDFs it should be possible to avoid detrimental effects on soil porosity.

The proposed project and management direction would result in the movement toward historical conditions with more frequent but less intense fires which would increase nutrient cycling (McColl and Powers 1984; Klemmendson et al. 1962; Powers 1979). This would cause soil organic matter to increase over time.

As stands become more open through thinning, and with continued underburning and maintenance underburns, the litter and duff would become thinner, less dense, and more patchy. Current standards would still be met, but the character and qualities of the duff and litter would change.

Overall, LWM standards are currently just barely met4 within the area. Over time, repeated underburns would very likely lead to even lower levels of LWM. Even the best efforts to protect LWM during underburns, thinnings, and group selections would not be 100 percent successful. Over time, the amount of LWM should approach levels more typical of historical fire regimes.

The R-5 Soil Quality Standards recommend that thresholds for LWM be developed by ecosystem type. At this time the historical level of LWM for frequently underburned eastside forests is unknown, but is probably lower than the current LRMP standard. Although LWM is known to provide wildlife habitat,

diversity, and sites of refuge for soil macro- and microorganisms, its contribution to overall soil productivity is unknown and believed to be trivial. Recommended thresholds for LWM would change as research determines the function and appropriate levels of LWM for eastside ecosystems.

At the present time the Champs area meets the Forest standard to limit the areal extent of detrimental soil disturbance to 15 percent or less of the area dedicated to growing vegetation. With the proper application of IDFs, the cumulative effects of past, ongoing, and reasonably foreseeable future actions would not cause this standard to be exceeded.

Indirect and Cumulative Effects of Alternative 2, No Action

The following analysis of the cumulative effects of past, ongoing, and future reasonably foreseeable future actions on soils is for the whole Champs project area. This is the management area where soil disturbing activities are proposed, and is of a practical size for evaluation and management of sub-watersheds, topography and soil family complexes.

Past actions are reflected in the current condition of the soil resource as assessed previously under Affected Environment. The build up of fuels and the risk of a high intensity wildfire has the greatest potential to affect soil productivity.

Increased biological activity associated with the accumulation of a thicker duff and litter layer could accelerate the recovery of compacted soils from previous entries. Although ground cover would also increase, cover is already at levels more than sufficient to protect soils from erosion. LWM would increase gradually over time.

However, increases in duff, litter, and LWM would also be additions to the existing high fuel loading. This high fuel loading would result in abnormally intense wildfires. The effects of wildfire on soils are not the same as for prescribed burns.

Wildfire has a greater potential than prescribed fire to affect long-term soil productivity (McNabb and Cromack 1990). Compared to prescribed burns, wildfires are more intense, consume more organic matter, burn longer, occur when soils are drier, and have higher levels of volatilization and convective losses. Adverse effects of fire on soils increase with increasing burn intensity, and the effects are proportional to the amount of surface duff and soil organic matter consumed (DeBano 1979). Frequent, high intensity fires—except on sites adapted to such fire regimes—reduce nutrient reserves and can initiate a decline in long term soil productivity. Intense wildfires also create large openings. This can result in a loss of host plants for mycorrhizal fungi which can lengthen the time it takes to reinocculate the site (Borchers and Perry 1990). As fire intensity increases, increasing amounts of N—and, to a lesser extent, P and S—are volatilized and lost to the atmosphere. Other nutrients may be lost in large fires of high intensity as convective fly ash in the smoke plume (Clayton and Kennedy 1985).

The plant nutrient most affected by fire is nitrogen. At temperatures below 200°C no measurable N is lost; above 500°C, all N is volatilized. McColl and Powers (1984) summarized N losses for different burn intensities. Under severe burns, N losses ranged from 72 to 99 percent, but under moderate intensity burns, losses ranged from 11 to 38 percent. An intense wildfire may volatilize the equivalent of 200 years

of N input as precipitation (Powers 1979). Losses of sulfur and phosphorus are proportional to nitrogen losses, but smaller, about five to nine percent of nitrogen loss. Sulfur is important in decomposition of organic matter and in nitrogen metabolism. Sulfur is of concern because it is not fixed, but is added to the ecosystem abiotically through precipitation and mineral weathering. The origin of atmospheric S is fossil fuel consumption, acid deposition, and volcanic eruptions. Soils that are subjected to intense wildfire more frequently than every 100 years may experience productivity decline (McNabb and Cromack 1990).

An intense wildfire would destroy soil organic matter near the surface (McNabb and Cromack 1990; Boyer and Dell 1980). The loss of ground cover and the formation of hydrophobic soils following wildfire would increase the risk of accelerated erosion and a consequent loss of topsoil and soil organic matter. The low EHRs and gentle slopes in the Champs Project area mitigate this effect to some extent.

The indirect effects of an abnormally intense wildfire could have a major effect on long-term soil productivity.

Visual Quality

Introduction

The visual resources effects analysis boundary for the Champs Project is the project boundary. Effects to visual resources from project activities are limited to those areas that would be undergoing vegetation management activities.

The visual resource is how the forest looks to those passing through or recreating in it. The LNF utilizes the Visual Management System (1993 LNF LRMP, Appendix N) to classify and manage visual resources. Management direction specifies that project activities meet or exceed Visual Quality Objectives (VQOs) identified in the LRMP. There are three VQOs within the Champs Project area; Partial Retention, Modification, and Maximum Modification.

Approximately 60 percent of the project area is located within the Modification VQO. Within this VQO, management activities may dominate the original landscape, however those activities must borrow from naturally established form, line, color, or texture so completely, that the visual characteristics of the treated area appear natural. Reduction in form, line, color, and texture contrast to meet Modification should be accomplished in the first year after project completion.

Approximately 40 percent of the project area is located within the Partial Retention VQO. Management activities within in this VQO remain visually subordinate to the characteristic landscape. Vegetation management activities may repeat form, line, color, or texture common to the characteristic landscape, and may also introduce form, line, color, or texture which are found infrequently or not at all in the characteristic landscape. Reduction in form, line, color, and texture contrast to meet Partial Retention should be accomplished as soon after project completion as possible or at a minimum within the first year.

Less than 1 percent of the project area is located within the Maximum Modification VQO. Vegetation management activities may dominate the characteristic landscape; however, when viewed as background,

the visual characteristics must be those of natural occurrences within the surrounding area or character type.

Alternatives 1, 3, and 9

Direct and Indirect Effects

Given that DFPZ thinning, area thinning, and some group selections (Alternatives 1 and 9 only) harvests would occur along Forest system roads, direct evidence of management activities would be noticeable to the casual observer during and immediately after treatment. As compared to unthinned stands, noticeable impacts in treated areas would include slash piles, landings, and skid trails (Silviculture Report, Champs project record).

Because varying degrees of canopy closure currently exists along roads, the proposed action would maintain a dominance of mature forest character. The nature of the management activities would serve to create irregular, naturally shaped openings which would minimize the negative contrast with the landscape. Another direct effect of vegetative treatments would be areas of more open forest as compared to unthinned stands (Silviculture Report, Champs project record).

Long-term effects of the proposed action would serve to maintain the VQOs assigned to the project area by reducing fire hazards and creating more open forest areas (Fuels and Silviculture Reports, Champs project record). The removal of slash piles and logging debris as well as the decomposition of stumps would serve to naturalize treated areas.

Vegetation established after treatment through reforestation (Alternatives 1 and 9 only), natural regeneration, understory vegetative growth and needle fall could serve to reduce exposed soils (Silviculture Report, Biological Evaluation For Terrestrial Species, and Factors Influencing Understory Vegetation for Champs EA, Champs project record). Additionally, vegetative treatments would serve to reduce fire hazards and further protect the landscape from the possible effects of wildland fire which could change the visual resources in the project area (Fuel Report, Champs project record).

There would be no measurable differences to visual resources between Alternatives 1, 3, and 9 with regards to the direct, indirect, and cumulative effects of stand thinning. Alternatives 3 and 9 would implement a 20 inch dbh upper diameter limit, and a 40 percent minimum canopy cover requirement in suitable spotted owl habitat areas (outside of HRCAs). Alternative 1 would not implement a 20 inch dbh upper diameter limit or a 40 percent minimum canopy cover requirement in suitable spotted owl habitat areas. Alternatives 1 and 9 would implement a 30 inch dbh upper diameter limit within RHCAs; Alternative 3 would implement a 20 inch dbh upper diameter limit within RHCAs. These different treatments between alternatives would not be very evident to the casual viewer.

There would be a direct difference between Alternatives 1 and 9, as compared to Alternative 3, with regards to group selections because Alternative 3 does not implement group selection harvesting, whereas Alternatives 1 and 9 do. Alternative 9 would implement 228 fewer acres of group selection harvesting as compared to Alternative 1, so less groups would be noticeable. All three alternatives would meet VQO management direction.

Cumulative Effects

Previous and ongoing vegetative treatments, as well as future activities including noxious weed removal, aspen stand enhancement, and further vegetative treatments, would continue to improve forest health and scenic diversity of the project area. With improving forest health and added vegetative diversity occurring on the landscape, the overall trend of the visual resources within the project area would continue to improve. Over a post-treatment period of 20-years, the overall appearance of the landscape would slowly change, but retain similar visual characteristics through the time period

Alternative 2

Direct, Indirect, and Cumulative Effects

This alternative would result in no immediate or discernable change to the visual resource of the eastside pine and eastside mixed conifer community, and little perceived change for years to come. However, inter-tree competition, insect infestation, and tree mortality associated with those conditions, could alter the visual resources of the project area (Silviculture Report, Champs project record).

Without reduction of the fire hazard within the project area, dramatic effects to the scenery could occur in the event of a large-scale wildland fire (Fuels Report, Champs project record). Depending on the size and intensity, wildfire could change the vegetative composition of the forest resulting in a different type of visual appearance for decades thereafter. If a wildfire disturbance event did not occur, the mixed conifer and eastside pine stands would increase in density and continue to dominate the landscape over the next 20 years (Silviculture Report, Champs project record). This would further reduce scenic variety and diversity.

Wildlife

Introduction

This section summarizes the potential affects of the Champs Project proposed action and alternatives to Forest Service Sensitive (FSS) terrestrial wildlife species and terrestrial Management Indicator Species (MIS) species. The Biological Evaluation (BE) for terrestrial species documents potential effects of the proposed activities of each of the alternatives for the Champs Project. Species considered in the BE were determined based on review of the U.S. Fish and Wildlife Service species list (website accessed on 22 February, 2006), and on review of the USDA Forest Service Sensitive species list for Region 5 (Appendix A). Appendix A displays whether the project is within the range of the species, whether suitable habitat is contained within or adjacent to the project, and whether the species has been previously detected within the area.

The following FSS terrestrial wildlife species have been detected in suitable habitats adjacent to or within the project area and are discussed in this section: Northern goshawk (*Accipiter gentilis*), Greater Sandhill crane (*Grus canadensis tabida*), Pallid bat (*Antrozous pallidus*), and Townsend's big-eared bat (*Corynorhinus townsendii*). The California spotted owl (*Strix occidentalis occidentalis*), also a FSS species was discussed in full under the section Environmental Effects of the Significant Issue 1 and is not

repeated here. A full list of Threatened, Endangered, and Sensitive terrestrial wildlife species considered for the Champs Project is contained in Appendix A.

The following MIS wildlife species have been detected in suitable habitats adjacent to or within the project area and are discussed in this section: mule deer, pronghorn, black bear, pileated woodpecker, hairy woodpecker, northern goshawk, and California spotted owl. A full list of MIS aquatic species considered for the Champs Project is contained in Appendix A also.

The Biological Evaluation (BE) for Terrestrial Species for the Champs Environmental Assessment is hereby incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

Forest Service Sensitive

Northern Goshawk

The analysis area contains nest trees of 3 known reproductive sites for northern goshawks. In addition, six additional nest sites are sufficiently close to the analysis area boundary that portions of goshawk PACs (four additional nest sites) or post-fledging areas (PFAs, 2 additional nest sites) fall inside the analysis area boundaries. Therefore, as part of the cumulative effects analysis of the proposed actions, all nine territories would be included within this assessment. Table 53 contains information associated with each territory.

Table 53. Information for northern goshawk protected activity centers (PACs) within the Champs cumulative effects analysis area for goshawks.

Territory Name	Acres within PAC	Nest within or adjacent to project area	Year discovered
Lost Spring	223	Within	2004
Ashurst Mountain	201	Within	1989
Shoestring	201	Within	2001
Cone 2	207	Adjacent	2002
Cone Mountain	201	Adjacent	1985
Barrell Pit	216	Adjacent	1989
Logan Mountain	201	Adjacent	1992
Whitehorse	136	Adjacent	2005
Fleming Well	200	Adjacent	1995

Source: GIS files developed for the Champs project, and Eagle Lake Ranger District wildlife files

The Champs goshawk cumulative effects analysis area includes portions of nine goshawk PACs or PFAs. Because potential effects of management actions routinely include the scale of the PAC and PFA, the cumulative effects analysis area boundary for northern goshawks was expanded from the Champs project area boundary to include the entire PACs and PFAs that have been delineated for each of these territories (approximately 36,760 acres). The cumulative effects analysis area was not extended beyond this due to lack of measurable direct and indirect effects at larger scales, and because goshawk foraging

habitat includes a wide range of forest structural types such that none of the proposed actions would result in loss of foraging habitat.

Alternative 1

Direct and Indirect Effects

This alternative avoids placing group selection harvest units within goshawk post-fledging areas (PFAs). It also avoids entry into spotted owl HRCAs which would mutually benefit goshawks by providing 2,400 acre size areas of undisturbed foraging and nesting habitat.

Analyses of direct, indirect and cumulative effects were completed at four spatial scales: (1) Protected Activity Centers (PACs) of 200 acres; (2) Post-Fledgling Areas (PFAs) circles which ranged in size from 413 to 527 acres; (3) the 33,241 acre Champs Project Area; and (4) a 36,760 acre cumulative effects analysis area. Results of these analyses indicate that no goshawk PACs would be directly affected by proposed projects. The PFA analysis, using the PFA habitat model adopted in USFS Southwestern Region 3 (Reynolds et. al 1992) indicates that Alternative 1 would result in no appreciable change to overall PFA habitat status. The project-scale analysis indicated that the proposed actions would serve to reduce the amount of suitable reproductive habitat within the project by 3,400 acres, from 13,918 acres to 10,518 acres (Table 54), but that these acres would remain as foraging habitat, and there would be benefits from the treatments such as protection from widespread loss of habitat due to high severity wildfires (Fire and Fuels Report, Champs project record), improving the health and vigor of remnant old-growth trees within the DFPZs, increase tree growth and thus provide for the recruitment of a large tree component currently lacking in the Champs area (Silviculture Report, Champs project record), and maintaining 10 percent of DFPZs in non-thinned areas, which would retain night-roosting habitat (Rickman et al 2005) and may provide nest groves in the future.

Table 54. Estimated existing and Alternative 1 post-project acres of CWHR moderate and high value reproductive habitat for northern goshawks.

Strata	Pre-project acres w/in project area	Acres affected by DFPZs & ITS	Acres affected by group selection	Post-project acres w/in project area	Acre Change
ESP4M[1]	6,138	3,113	172	4,250	- 1,888
ESP4D[1]	950	474	27	469	- 481
ESP5M[1]	6	0	0	6	0
ESP5D[1]	8	0	0	8	0
EMC4M[2]	4,109	1,135	61	3,564	- 545
EMC4D[2]	2,696	467	45	2,210	- 486
EMC5M[2]	0	0	0	0	0
EMC5D[2]	11	0	0	11	0
Totals	13,918	5,189	305	10,518	-3,400

Source: GIS and CalVeg files developed for the Champs project. [1]CHWR habitat class of moderate reproductive value for goshawks, [2] CWHR habitat class of high reproductive value for goshawks

Within DFPZs, approximately 10 trees per acre are between 20-24 inches dbh. These are trees that may be most quickly recruited into the >24 inch dbh size class, and thus into the CWHR size class 5.

Alternative 1 would result in a reduction of approximately 3 trees per acre within this size range, a reduction of about 30 percent. Overall, Alternative 1 could reduce the population of all trees > 20 inches dbh from about 16 per acre to about 12 per acre, a 25 percent reduction. Residual trees within the DFPZs would achieve hastened tree growth due to the thinning and resulting reduction in inter-tree competition. Therefore, although about 25 percent of trees >20 inches dbh may be harvested, the thinnings would hasten recruitment of additional medium/large trees (> 24 inches) faster than what would be achieved without stand thinning.

Approximately 305 acres of group selection harvests are proposed within high value reproductive goshawk habitat. These groups are projected to result in the harvest of about 8 trees per acre between 20 to 30 inches dbh. The combined proposal treatments would change about 3,400 acres of goshawk nesting habitat to foraging habitat. However, territorial spacing of nesting pairs is generally greater then a 1.0 mile radius (Woodbridge 2000) and there is little likelihood that much of this habitat is being utilized for nesting.

Cumulative Effects

Historical timber harvest and other mortality factors have through time reduced the numbers of large diameter trees within the analysis area. Scattered and remnant trees >30 inches dbh exist within proposed DFPZs, at a density of about 1 per acre (Silviculture Report, Champs project record). Given the 30 inch dbh upper diameter limit for this project, these trees would be retained, except in rare instances of felling as required for operability reasons or for safety. Therefore, Alternative 1 would not substantially affect the availability of potential nest trees >30 inches dbh. In addition to 30 inch trees, approximately five trees per acre are 24-30 inches dbh. Of these trees, the prescription for thinning within DFPZs would result in the removal of about 1 tree per acre, an approximate 20 percent reduction.

Some DFPZ segments have been constructed within the northern goshawk cumulative effects analysis area within the last three to five years. These DFPZs have the same basic characteristics as the DFPZs proposed by Alternative 1. In addition, ladder fuels within the analysis area have been reduced within past biomass thinning units that removed most trees between 3 and nine inches dbh. Of the nine goshawk nest areas included within the cumulative effects analysis area, four (Cone Water Tank 2, Fleming Well, Shoestring Draw and Logan Mountain) would receive some degree of protection from these past projects. These past DFPZs and biomass units combined with the DFPZs proposed under Alternative 1 would have the effect of increasing the area that could be expected to experience low severity fire behavior and increasing the connectivity and thus the effectiveness of the entire DFPZ network. This cumulative effect would result in increased protection for areas outside of the DFPZ network. An additional 3 goshawk nest areas (Lost Spring, Barrel Pit, and Ashurst Mountain) would receive protection by the DFPZs proposed within Alternative 1, and the cumulative effect of past and proposed DFPZs would confer greater protection to goshawk nesting habitat located outside of the known nest areas. Past biomass units tended to be in discreet units and do not provide a linear, contiguous area of reduced fuels as do DFPZs. As such, these past biomass units were designed more as forest health projects than DFPZs, and would not be expected to effectively reduce fire risk as would a DFPZ.

Within the goshawk cumulative effects analysis area, approximately 56 group selection units totaling approximately 119 acres have been implemented in past years, all in the Harvey Mountain and Cone Mountain areas. These past group selection units have removed approximately 71 acres of goshawk nesting habitat from the analysis area. This includes 18 acres (from 10 units) from within the PFA associated with the Cone Mountain nest site, which resulted in 18 acres of seedling stage habitat within the PFA; the seedling stage comprises an estimated seven percent of this PFA (see BE for Terrestrial Species, Champs project record). This percentage is less than that called for in the R3 goshawk habitat model for PFAs (Reynolds et al 1992) which calls for up to 10 percent of a PFA to be in the seedling stage. Because this past habitat removal, during project planning, all groups proposed in the Champs project were located outside of goshawk PFAs, to ensure there would be no cumulative effect of group selections to the Cone Mountain PFA. Groups proposed in the Champs project would effect an estimated 305 acres of goshawk nesting habitat. Combined, this would bring the cumulative, total reduction of goshawk nesting habitat within the goshawk analysis area due to group selection to 376 acres.

Determination

From the analysis contained in the BE for Terrestrial Species, it is determined that the proposed activities within Alternative 1 of the Champs project may affect individuals of northern goshawks, but is not likely to result in a trend towards federal listing or loss of species viability.

Alternative 2

Direct, Indirect, and Cumulative Effects

There would be no immediate direct effects to current habitat conditions that would result from this alternative. Indirect effects include a continuation of current vegetative trends across the analysis area. As a result, forests would continue to increase in density and canopy cover except in areas of wildfire (Fuels Report, Champs project record) or insect mortality (Silviculture Report, Champs project record). Without thinning, remnant old-growth trees, important to goshawks and their prey, would continue to be at risk of competition-related mortality and risk of widespread habitat loss due to high severity wildfires. Also, growth rates of individual trees would be less than what would be achieved within thinnings to create DFPZs as proposed in Alternative 1, thus slowing recruitment of a large tree component currently lacking within the project area.

Past DFPZs would provide some protection to four of the nine goshawk nest areas included within the goshawk cumulative effects analysis area. However, these past DFPZs and biomass units are not extensive enough or sufficiently connected to provide protection for the bulk of goshawk nesting habitat within the analysis area. In this no action alternative, the risk of widespread habitat loss due to wildfire would remain high.

As noted in Alternative 1, within the goshawk cumulative effects analysis area, approximately 56 group selection units totaling approximately 119 acres have been implemented in past years, all in the Harvey Mountain and Cone Mountain areas. These past group selection units have removed approximately 71 acres of goshawk nesting habitat from the analysis area. This includes 18 acres (from

10 units) from within the PFA associated with the Cone Mountain nest site, which resulted in 18 acres of seedling stage habitat within the PFA; the seedling stage comprises an estimated seven percent of this PFA (see see BE for Terrestrial Species, Champs project record). This percentage is less than that called for in the R3 goshawk habitat model for PFAs (Reynolds et al 1992) which calls for up to 10 percent of a PFA to be in the seedling stage.

Alternative 3

Direct, Indirect, and Cumulative Effects

Alternative 3 was designed to reduce effects to spotted owl habitat and to avoid reduction of trees ≥20 inches dbh. Retention standards for snags and downed logs would be the same between both Alternative 1 and 3, therefore there should be no substantial difference in the effects of Alternative 3 to snags and logs as were already discussed for Alternative 1. Because spotted owl habitat in the Champs project area is a subset of suitable habitat types for northern goshawks, Alternative 3 would also confer greater retention of goshawk habitat than would Alternative 1.

No goshawk PACs would be directly affected by Alternative 3. The project-level analysis indicated that Alternative 3 would serve to reduce the amount of suitable goshawk reproductive habitat within the project by 2,292 acres, due to reduced canopy closure, a 16 percent decline compared to the current amount (Table 55). These 2,292 acres would remain as suitable foraging habitat. Compared to Alternative 1, design standards of Alternative 3 would result in about 1,108 fewer acres of goshawk nesting habitat being reduced to non-nesting habitat status.

There would be benefits from the treatments such as protection from widespread loss of habitat due to severe wildfire (Fuels Report, Champs project record), improving the health and vigor of remnant old-growth trees within the DFPZs, hastening the recruitment of a large tree component currently lacking in the Champs area (Silviculture Report, Champs project record), and maintaining 10 percent of DFPZs in non-thinned areas, which would retain night-roosting habitat (Rickman et al 2005) and may provide nest groves in the future.

Table 55. Estimated existing and Alternative 3 post-project acres of CWHR moderate and high value reproductive habitat for northern goshawks. (All affected acres are by DFPZs and individual tree selection; no group selection harvests are proposed by Alternative 3.)

Strata	Pre-project acres w/in project area	Post-project acres w/in project area	Acre Change
ESP4M[1]	6,138	4,315	- 1,823
ESP4D[1]	950	481	- 469
ESP5M[1]	6	6	0
ESP5D[1]	8	8	0
EMC4M[2]	4,109	4,570	+ 461
EMC4D[2]	2,696	2,235	- 461
EMC5M[2]	0	0	0
EMC5D[2]	11	11	0
Totals	13,918	11,626	-2,292

Source: GIS and CalVeg files developed for the Champs project.
[1]CHWR habitat class of moderate reproductive value for goshawks
[2] CWHR habitat class of high reproductive value for goshawks

Due to the relatively small effects to the PFAs associated with these activity centers by Alternative 1, and because groups proposed in Alternative 1 were already located so as to avoid PFAs, a re-analysis of PFAs was not done for Alternative 3. Such an analysis would yield very similar results to that performed for Alternative 1.

All affected acres are by DFPZs and individual tree selection. No group selection harvests are proposed by Alternative 3. The cumulative effects analysis indicated that there would be no substantive negative cumulative effects, and Alternative 3 would avoid the cumulative loss of additional trees >20 inches dbh.

Determination

From the analysis contained in the BE for Terrestrial Species, it is the determination that the proposed activities within Alternative 3 of the Champs project may affect individuals of northern goshawks, but is not likely to result in a trend towards federal listing or loss of species viability.`

Alternative 9

Direct, Indirect, and Cumulative Effects

Differences between Alternatives 9 and 1 include, 1) dropping DFPZ thinning treatments from 341 acres of eastside mixed-conifer spotted owl habitat, 2) changing post-treatment fuels treatments from mastication to jackpot pile and burn on 531 acres of DFPZ treatment, 3) reduction of 228 acres of group selection harvests, and, 4) an overall 261 acre reduction in DFPZ treatments (Prescriptions A and B).

Due to the relatively small effects to the PFAs associated with the goshawk activity centers included in the analysis for Alternative 1, a re-analysis of PFAs was not done for Alternative 9, which has fewer proposed treatment acres than Alternative 1, and no new areas proposed for treatment that were not

proposed under Alternative 1. Such an analysis would yield very similar results to that performed for Alternative 1.

Retention standards for snags and downed logs would be the same in Alternative 9 as under both Alternative 1 and 3. Therefore there should be no substantial difference in the effects of Alternative 9 to snags and logs as within treatment areas as was previously discussed for the other alternatives. However, Alternative 9 would result in 477 fewer treatment acres than Alternative 1, and 233 fewer acres than Alternative 3. Of these acres, 341 acres are located within eastside spotted owl habitat that typically has more snags per acre than eastside pine due to white fir mortality. Therefore, the net effects to existing snag and downed log levels under Alternative 9 would likely be less than the other two alternatives due to fewer treatment acres.

As indicated in Table 56, Alternative 9 would result in a reduction of 2,861 acres of existing nesting habitat for goshawks, due to reduced canopy closure, a 20 percent decline compared to the current amount. However, these 2,861 acres would remain as suitable foraging habitat. Compared to Alternative 1, the design standards of Alternative 9 would result in about 539 fewer acres of nesting habitat being reduced to non-nesting habitat status, and, relative to Alternative 3, would result in a 569 acre increase in the reduction of nesting habitat due to project activities. Post-treatment, Alternative 9 would retain over 11,000 acres of suitable goshawk nesting habitat within the project area.

Table 56: Estimated existing and Alternative 9 post-project acres of CWHR moderate and high value reproductive habitat for northern goshawks.

Strata	Pre-project acres w/in project area	Acres affected by DFPZs / ITS	Acres affected by group selection	Post-project acres w/in project area	Acre Change
ESP4M[1]	6,138	2,949	143	3,823	- 2315
ESP4D[1]	950	485	5	482	- 468
ESP5M[1]	6	0	0	6	0
ESP5D[1]	8	0	0	8	0
EMC4M[2]	4,109	1,099	0	4,405	+ 296
EMC4D2	2,696	483	0	2,322	- 374
EMC5M2	0	0	0	0	0
EMC5D2	1	0	0	11	11
Totals	13,918			11,057	-2,861

Source: GIS and CalVeg files developed for the Champs project.
[1]CHWR habitat class of moderate reproductive value for goshawks
[2] CWHR habitat class of high reproductive value for goshawks

A primary difference between Alternative 9 relative to Alternative 1 is a 20 inch dbh upper diameter limit within DFPZs and the area thinning (Prescription G) versus the 30 inch upper diameter limit in Alternative 1. As discussed under Alternative 1, the current population of trees within DFPZs that are ≥20 inches dbh is approximately 16 trees per acre. While stand exams indicate approximately 4 (25 percent) of the 16 trees per acre ≥20 inches dbh may be harvested under Alternative 1, all such trees in the area thinning and DFPZs would be retained by Alternative 9. This 20 inch upper diameter limit would likely

serve to retain most potential goshawk nest trees within the treated areas. Alternative 3 also has a 20 inch upper diameter limit within DFPZs and the area thin.

As described under Alternative 1, group selection harvests would result in much reduced canopy closure due to the removal of essentially all trees smaller than 30 inches dbh, and stand modeling indicated that approximately 8 trees per acre in the 20-29 inches dbh range could be removed within group selection units (Silviculture Report, Champs project record). However, of the 261 acres of group selections within Alternative 9, all but 27 acres are within eastside pine. Of the 27 acres in eastside mixed-conifer, none of them occur within goshawk nesting habitat: one acre was within 4P (canopy cover too open for nesting habitat), and the rest were in CWHR size class 3 (too small for nesting habitat). Therefore, there would be no effect to eastside mixed-conifer goshawk nesting habitat by the group selection harvests proposed within Alternative 9. Of the group selection acres in eastside pine, 148 acres occur in goshawk nesting habitat (143 acres in 4M, 5 acres in 4D). This represents just 2.3 percent of the eastside pine 4M in the project area, and 0.5 percent of the eastside pine 4D. Therefore, the effect of group selection harvests on goshawk nesting habitat and the potential for harvest of trees 20-29 inches dbh would be at a minor level across the project area.

Cumulative effects

Cumulative effects to northern goshawk habitat under Alternative 9 are very similar to those described under Alternatives 1 and 3. Due to a smaller upper diameter limit and due to deferring treatment in 341 acres of spotted owl habitat, Alternative 9 would result in reduced thinning as a means of creating DFPZs relative to Alternative 1, and thus would do less to reverse some of the post-settlement trends in the project area.

The retaining of trees ≥20 inches dbh under Alternative 9 within DFPZs and the area thinning would avoid harvest of approximately 25 percent of the existing population of trees of this size, as estimated to occur under Alternative 1. This retention would avoid causing further reduction in the density of trees of this size within the treated areas.

Harvest of trees 20-29 inches dbh would occur within Prescriptions C and F. However, these prescriptions total 228 acres fewer than proposed under Alternative 1, and thus this potential would be reduced relative to Alternative 1. These Prescription C and F acres (a combined 780 acres) would be an increase compared to Alternative 3, which had a 20 inch upper diameter limit throughout and which did not propose group selection harvests. Therefore, given the 20 inch upper diameter limit in the DFPZ and area thinning prescriptions, the potential effect to trees 20-29 inches dbh under Alternative 9 is reduced relative to Alternative 1, and should not substantially add to the cumulative reduction of trees of this size across the analysis area.

Determination

From the analysis contained in the BE for Terrestrial Species, it is the determination that the proposed activities within Alternative 9 of the Champs project may affect individuals of northern goshawks, but is not likely to result in a trend towards federal listing or loss of species viability.`

Greater Sandhill Crane

The Eagle Lake RD has been reported as the ranger district in Region 5 with the greatest amount of habitat and nesting attempts by Sandhill cranes (USDA 2001, Ch. 3, pg 198). Currently, approximately 28 Sandhill crane nesting locations are known within the boundaries of the ELRD. Poison Lake (southwest of the project area) is the only location to date where two pairs have nested within the same year. All other sites have been characterized by a single nesting pair. Within the Champs project area surveys for Sandhill cranes have been conducted within all suitable habitats. Three nest locations for Sandhill cranes have been located within the analysis area, one at Dixie Springs, another at Squaw Valley, and a third on private land within Champs Flat. A fourth nest site, Logan Spring, is located on Pine Creek immediately west of the project boundary, and a fifth nest site, at Ashurst Lake, is within 0.5 miles of the analysis area boundary. Because the Limited Operating Period (LOP) distance for Sandhill crane nests is 0.5 miles, these two adjacent nest sites are included within the cumulative effects analysis of effects for this project. Table 57 contains occupancy information relative to these five territories.

Table 57. Occupancy information for Sandhill crane nest sites located within or adjacent to the Champs analysis area.

Nest name	Nest within or adjacent to analysis area	Year territory discovered	Number of years nest status determined	Number of years with active nest
Dixie Spring	Within	2003	3	1
Champs Flat	Within	1999	5	4
Squaw Valley	Within	1999	5	2
Ashurst Lake	Adjacent	1999	5	2
Logan Spring	Adjacent	2006	1	1

Source: ELRD wildlife files

The cumulative effects analysis area for this species was considered to be the project area boundary, plus any 0.5 mile LOP radius that was at least partially within the project area. This resulted in incorporating two nest sites (Ashurst Lake and Logan Spring) within the cumulative effects area in addition to the three nest sites contained within (Dixie Springs, Squaw Valley and Champs Flat). However, because there are no proposed activities within 0.5 miles of the Ashurst Lake nest site (the nearest is approximately one mile distant), there would be no direct, indirect or cumulative effects to this nest site. There may be indirect effects of disturbance to the Logan Spring nest site, but given the project design feature of the 0.5 mile LOP distance for active nests, this potential for disturbance is extremely slight.

Alternatives 1, 3, and 9

Direct, Indirect, and Cumulative Effects

There would be little direct, indirect or cumulative effects to Sandhill cranes as a result of Alternatives 1, 3, and 9 because: (1) no projects would directly affect meadow nesting habitat; (2) the thinning proposed for DFPZs may indirectly benefit nesting cranes by providing additional foraging opportunities for livestock in upland sites away from meadows if the thinning is sufficient to promote understory vegetation in the treated areas (Range Report, Champs project record). Such thinnings may also reduce the ability of predators, such as coyotes, to approach nest sites unseen through dense forest; (3) direct and indirect negative effects would be limited to disturbance, the potential of which would be reduced by application of LOPs, and (4) there would be no negative cumulative effects other than some potential for increased disturbance to foraging individuals. Alternatives 1, 3, and 9 have similar direct, indirect and cumulative effects to Sandhill crane and its habitat.

Determination

From the analysis contained in the BE for Terrestrial Species, it is determined that the proposed activities within Alternatives 1, 3, and 9 of the Champs project may affect individuals of Sandhill cranes, but is not likely to result in a trend towards federal listing or loss of species viability.

Alternative 2

Direct, Indirect, and Cumulative Effects

Because the projects proposed within Alternatives 1, 3, and 9 would not directly affect crane nesting habitat, there would be little difference in direct or indirect effects to Sandhill crane habitat as a result of the No Action alternative. Trends along forested edges of large meadow systems would continue conifer densification and encroachment upon meadow edges potentially reducing habitat in the long-term through loss of meadow habitat (Historical Assessment, Champs project record).

There would be no change in existing condition related to potential for livestock impacts to nesting cranes. This alternative would not result in changes to long-term trends of forest densification around meadow edges, or provide opportunities to encourage dispersed livestock foraging away from nesting habitat (Range Report, Champs project record).

Potential wildfire events (Fire and Fuels Report, Champs project record) may have little effect on the structure of Sandhill crane habitat, which is non-forested and generally in the wetter areas of meadows, which would not be likely to burn during such fires.

Pallid Bat

Pallid bats roost in caves, rock and cliff crevices, as well as in snags or green trees having cavities, cracked bark or other deformities that provide roost structure. Primary prey species are large terrestrial arthropods, crickets and beetles. Conservation measures for this species include reducing overstocked

forest conditions and implementing vegetation treatments to create open understories that allow for unencumbered flight (USDA 2001, Vol. 3, Chapter 3, pg 55).

In 2001 thru 2004 bat surveys, using mist nets, were conducted on the Eagle Lake RD. Approximately 80 sites were surveyed and approximately 2,613 individual bats were trapped. A total of 112 pallid bat individuals were caught at 37 of these sites (Duff et. al in prep.), including 16 individuals at seven sites within or adjacent to the Champs project area. Thirteen pallid bat maternity roosts were located on the ELRD using radio-telemetry. All the maternity roosts were in trees, including one aspen, 3 incense-cedars, 8 ponderosa pines and 1 Jeffrey pine. Average diameter of the roost trees was 30.3 inches dbh. The smallest diameter roost was the 12.7 inch dbh aspen. The smallest diameter conifer roost tree was a 23.5 inch dbh ponderosa pine. One roost, in a 27 inch dbh ponderosa pine, was located within the Champs project area, on the north side of Champs Flat. Preliminary findings from these surveys suggest that pallid bats select for medium to large trees, with naturally created crevices, as maternity roost sites.

The established Champs project area boundary was considered sufficient as a cumulative effects analysis area for pallid bats because: (1) no spatially-oriented standards and guidelines or Limited Operating Periods are associated with this species; (2) pallid bats form maternity colonies and thus individuals do not have defined spatial territories that can be mapped or assessed; and (3) there are no areas within or adjacent to the analysis area that represent unique habitat opportunities for these species that would warrant expanding analysis beyond the project area.

Alternative 1

Direct, Indirect, and Cumulative Effects

One pallid bat maternity roost, located in a 27 inch dbh ponderosa pine, is known from the project area on the north side of Champs Flat. This roost tree is located in an area proposed for DFPZ thinning and underburning. This tree, as a known, tagged roost tree, would specifically be identified for retention in the DFPZ. However, even if not known and tagged, a tree of this size and old-growth characteristics would be retained in DFPZ - thinning from below prescriptions. Thinning around this remnant old-growth tree should improve its health and vigor (Skov et al 2004, Latham and Tappeiner 2002, McDowell et al 2003, Wallin et al 2004), reducing its vulnerability to insects, drought and wildfire. Also, a limited operating period for the pallid bat maternity roost would be established. The limited operating period would be for an area extending 1/8 mile (660 ft) from the nest tree, and would restrict timber harvest from the dates of March 15 to August 31.

Scattered, remnant > 30 inch dbh trees exist within proposed DFPZs, at a density of about 1 tree per acre (see Champs Silviculture report). Given the 30 inch upper diameter limit for this project, Alternative 1 would not affect the availability of potential maternity roost trees >30 inch dbh. In addition to 30 inch trees, approximately five trees per acre are 24-30 inches dbh. Of these trees, the prescription for thinning within DFPZs would result in the removal of about 1 tree per acre, an approximate 20 percent reduction. The smallest diameter conifer in which a pallid bat maternity roost was found on the ELRD was 23.5

inches dbh, indicating that some roost trees may be vulnerable to this reduction of trees from 24-30 inches dbh.

Within DFPZs, approximately 10 trees per acre are between 20-24 inches dbh. These are trees that may be most quickly recruited into the >24 inch size class, and thus into the CWHR size class 5. Alternative 1 would result in a reduction of approximately 3 trees per acre within this size range, a reduction of about 30 percent. However, these younger trees may not contain the structural defects (such as lightening strikes and other naturally created crevices) that older trees contain. Tree size (i.e. dbh) alone, may not be a good predictor of a potential roost tree. Also, group selection harvests are projected to harvest about 8 trees per acre between 20 inches and 30 inches dbh.

The proposed actions are consistent with current direction, and are consistent with conservation measures identified by the 2001 FEIS (USDA 2001, Vol. 3, chapter 3, page 55). Group selections would remove some medium to large trees. However, retention of mature and decadent trees meeting the habitat criteria described in the Proposed Action and large trees > 30 inch dbh would reduce this risk of removing potential preference roost trees. Group selection harvests are proposed in just 1.9 percent of the forested area within the analysis area. More importantly, thinning associated within DFPZs and area thinning would reduce the vulnerability of large, old trees to mortality from insects, drought and sever wildfire conditions.

Past group selection harvests within the Champs project area include approximately 46 group selection units, totaling about 101 acres. Combined with the group selection harvests proposed in this project, these treatments would cumulatively increase the acres of foraging habitat for this species until such time as the planted trees grow sufficiently dense to again begin shading out the non-coniferous vegetation.

Determination

From the analysis contained in the BE for Terrestrial Species, it is determined that the proposed activities within Alternative 1 of the Champs project may affect individual pallid bats, but is not likely to result in a trend towards federal listing or loss of species viability.

Alternative 2

Direct, Indirect, and Cumulative Effects

This alternative would continue the current habitat condition for this species. Little immediate change would likely occur in the existing habitat values for this species. Opportunities to enhance foraging habitat, by reducing vulnerability to large, old trees mortality from insects, drought and wildfire would not occur.

Cumulative effects of this alternative would result in a continuation of long-term vegetative trends that have resulted in loss of large trees, in-growth of young trees, and loss of understory vegetation (Eastside Historical Assessment, Champs project record). Remnant large, old trees across the Champs project area would remain vulnerable to competition-related mortality factors (Biondi 1996), and large

pines have decreased faster than their rate of recruitment within Blacks Mountain Experimental Forest, located immediately west of the Champs area (Dolph et al 1995). Due to this decline, the authors state that, given the effects of increasing stand densities, characteristics or functions of old-growth stands cannot be guaranteed in perpetuity by simply preserving existing old-growth tracts, and that old-growth must be managed for desired attributes. Potential for widespread fire loss would also remain at current levels. Therefore, this alternative would continue the current vulnerability of large, old trees vulnerable to mortality from insects, drought and wildfire, resulting in reduced numbers of living and dead trees available for maternity roosts for this species.

Past DFPZ projects would confer some protection to pallid bat habitat within the project area. However, these past projects, without some type of cohesive network to connect them, would not be expected to effectively reduce fire risk as would a DFPZ. Nor would the decreased flame lengths and fire line intensity that would result from that network give firefighters a better chance of halting the progress of a wildland fire and keeping the final amount of acres burned to a minimum.

Past group selection harvests and resulting understory production, has likely increased invertebrate populations within the treated areas. However, as planted conifers become larger and begin to again dominate the growing space, much of this forage has been or would become ephemeral as the conifers dominate the growing space.

Alternative 3

Direct, Indirect, and Cumulative Effects

One pallid bat maternity roost, located in a 27 inch dbh ponderosa pine, is known from the project area on the north side of Champs Flat. This roost tree is located in an area proposed for DFPZ thinning and underburning. This tree, as a known, tagged roost tree, would specifically be identified for retention in the DFPZ. However, even if not known and tagged, a tree of this nature due to its size and old-growth characteristics are those routinely retained in DFPZ thinning from below prescriptions. Thinning around this remnant old-growth tree should improve its health and vigor (Skov et al 2004, Latham and Tappeiner 2002, McDowell et al 2003, Wallin et al 2004), reducing its vulnerability to insects, drought and wildfire.

The 20 inch dbh upper diameter limit in Alternative 3 would likely remove any risk regarding the potential harvest of pallid bat roost trees. As compared to Alternative 1, lack of group selection harvests within eastside pine stands would reduce ability to increase foraging habitat. The maintenance of higher canopy closure in mixed-conifer habitats would likely be of little consequence or cumulative effect because pallid bats would be found primarily in lower elevation pine habitats. Otherwise, potential direct, indirect and cumulative effects of Alternative 3 would be very similar to pallid bats as would Alternative 1.

Determination

From the analysis contained in the BE for Terrestrial Species, it is determined that the proposed activities within Alternative 3 of the Champs project may affect individuals of pallid bats, but is not likely to result in a trend towards federal listing or loss of species viability.

Alternative 9

Direct, Indirect, and Cumulative Effects

The effects of Alternative 9 to the pallid bat maternity roost are the same as described under Alternatives 1 and 3. The 20 inch dbh upper diameter limit in Alternative 9 would likely remove the risk regarding the potential harvest of pallid bat roost trees within DFPZs, and fewer group selection acres would also reduce the risk to large trees relative to Alternative 1. Group selection harvests within eastside pine stands would increase foraging habitat, but would do so on 60 fewer acres than would Alternative 1. Otherwise, potential effects to pallid bats under Alternative 9 would be very similar to Alternative 1.

Determination

From the analysis contained in the BE for Terrestrial Species, it is determined that the proposed activities within Alternative 9 of the Champs project may affect individuals of pallid bats, but is not likely to result in a trend towards federal listing or loss of species viability.

Townsend's Big-Eared Bat

Included in the 2001-2004 surveys, a total were three individuals of Townsend's big-eared bat, all females, were trapped at a pond near Summit Camp, at the north foot of Antelope Mountain, and outside the project area. Individuals were trapped in each of two years, two in 2003 and one in 2004. Occurrence in both years, and because one female in 2003 was lactating, indicate that these were more than just transient bats. The nearest potential roosting habitat to this site is the Brockman Flat lava flow area on the west side of Eagle Lake, located about four miles (about 6 km, or about 3.7 miles) to the west of the trap location. This is within the foraging range of females from roosts, albeit towards the upper end of the range (Dobkin et al 1995, Pierson et al 1999). This trap location is approximately 1.7 miles southeast from the project area boundary and about 3.25 miles southeast from the nearest area proposed for treatment. The species has not been detected within the project area and no caves or cave analogs (such as old buildings or mines) are known within or adjacent to the project area. Therefore, given the distance of the project area from potential roost habitat at Brockman Flat (7 miles, or about 11 km), the lack of roost habitat in the area, and the fact that no individuals have been trapped within the Champs project area, it seems unlikely that this species would be routinely found within the project area. Nevertheless, the project area may provide suitable foraging habitat for this species.

The established Champs project area boundary was considered sufficient as a cumulative effects analysis area for this species because: (1) no spatially-oriented standards and guidelines or Limited Operating Periods are associated with this species; (2) Townsend big-eared bats form maternity colonies and thus individuals do not have defined spatial territories that can be mapped or assessed; and (3) there

are no areas within or adjacent to the analysis area that represent unique habitat opportunities for these species that would warrant expanding analysis beyond the project area.

Alternatives 1, 3, and 9

Direct, Indirect, and Cumulative Effects

No roosting habitat (caves or cave analogs) are known in the project area, and the nearest potential roosting habitat is about seven miles distant from activities proposed by in the Champs project. Therefore, there would be no direct, indirect or cumulative adverse effects to roosting habitat. Thinning, group selection harvests (Alternatives 1 and 9 only), and underburning may provide for a beneficial indirect effect by improving foraging habitat by opening stands and promoting understory vegetation, which may lead to increased moth populations (prey species of this bat). Alternative 9 would see a slight reduction in understory response relative to Alternative 1 due to reduced DFPZ and group selection acres acres.

Determination

From the analysis contained in the BE for Terrestrial Species, it is determined that the proposed activities within Alternatives 1, 3, and of the Champs project, may affect individuals of Townsend's big-eared bats, but is not likely to result in a trend towards federal listing or loss of species viability.

Alternative 2

Direct, Indirect, and Cumulative Effects

The No Action alternative would continue the status quo for this species. Little immediate change would likely occur in the existing habitat values for this species. Vegetative trends would continue, including continued densification of forests (Silviculture Report, Champs project record) and reductions in understory vegetation, which would continue to reduce potential foraging values for this species. The cumulative effects would be similar to indirect, in that long-term vegetative trends would continue unabated, causing further densification of forests and reductions in understory vegetation.

Past DFPZ projects would confer some protection to Townsend's big-eared bat habitat within the project area. However, these past projects, without some type of cohesive network to connect them, would not be expected to effectively reduce fire risk as would a DFPZ. Nor would the decreased flame lengths and fire line intensity that would result from that network give firefighters a better chance of halting the progress of a wildland fire and keeping the final amount of acres burned to a minimum. Potential loss of forested habitats may not have as substantial impact to this species as others, such as goshawks, since big-eared bats roost in caves or cave-like structures and forage in open stand conditions.

For Alternative 3, indirect beneficial effects in creating foraging habitat would not be realized in the absence of placing groups within eastside pine stands on approximately 294 acres. This is a relatively minor amount of potential additional foraging habitat given the large size of the project area (over 30,000 acre).

Terrestrial Management Indicator Species

Introduction

The Report for Terrestrial Management Indicator Species for the Champs Environmental Assessment is hereby incorporated by reference and is located in the Champs Project record, Eagle Lake Ranger District office.

Mule Deer

Alternative 1: Relationship of project-level effects to Forest-scale mule deer habitat and distribution trends

It is anticipated that implementation of Alternative 1, in combination with past, present, and reasonably foreseeable future actions, would result in a net increase in the amount of suitable habitat for mule deer within the analysis area, primarily a result of increased acreage of forested stands that meet a forage condition for deer. This increase in forage condition would total approximately 4,672 acres. In addition, based on forested CWHR strata, Alternative 1 would result in a 772 acre increase in CWHR structural classes that provide moderate to high habitat value for mule deer (Table 58).

Table 58. Alternative 1 pre- and post-project CWHR habitat acres of moderate or high composite habitat value for mule deer.

CWHR habitat stages	2M	3S	3P	3M	4S	4P	4M	5P	Totals
High or Moderate	M	M	H	M	M	M	M	M	
Pre-project acres	11	134	1,958	3,198	265	3,343	10,247	0	19,156
Post-project acres	11	112	1,191	2,220	725	7,756	7,814	99	19,928
Change in acres	0	- 22	-767	-978	+460	+4,413	-2,433	+99	+772

Source: CWHR 8.0, GIS files developed for the Champs project.

CWHR values for each habitat stage were identical for eastside pine and mixed-conifer. This increase in deer habitat would be small when compared to over 400,000 acres of suitable mule deer habitat that currently exist on the Forest (Table 59). However, the proposed vegetation management activities would serve to reverse post-settlement vegetative trends within the project area, and would bring the project area slightly above LRMP (1993) direction for Medium habitat capability in regards to the proportion of an area to be managed in a “forage condition”.

Table 59. GIS output for mule deer habitat status on the Lassen NF, utilizing composite CWHR habitat values.

Scale	High capability habitat	Moderate capability habitat	Total
Total Potential Suitable Acres	76,297	508,575	584,872
Lassen NF	60,266	358,267	418,533
Non-NFS lands within Lassen NF admin boundaries	16,031	150,308	166,339

Source: GIS files, developed for the Champs Project

Population estimates provided by the California Department of Fish and Game for the pertinent Deer Assessment Units (DAUs) and LNF monitoring have shown a decline in deer numbers on the Forest since

the peak in herd numbers in the 1950s, and a continued declining or stable trend since the LNF initiated monitoring in the 1990s. The small increase in deer habitat relative to Forest-wide levels would likely do little to alter the current distribution of deer across the Forest, though there may be some changes in density within the treated areas providing enhanced forage. Past DFPZ projects would confer some protection to mule deer habitat within the project area.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the project-level habitat effects of Alternative 1 would result in some alteration of existing Forest-wide trends in mule deer habitat, but would not be expected to alter current distribution of mule deer across the Forest.

Alternative 2: No action effects to Forest-scale mule deer habitat and distribution trends

There would be no direct effects to deer from this alternative.

This alternative would result in the continuation of current vegetative trajectories, including increased forest densification and reduction in understory vegetation that, over time, have reduced the quality and quantity of deer forage in the project area. Long-term declines in deer populations have been attributed largely to vegetative trends; this alternative would do nothing to positively reverse those trends or to benefit deer forage.

As discussed in the Fuels Report (Champs project record), the absence of fuels treatment and prescribed fire would allow continued increases in fuel loading and ladder fuels, and anticipated fire behavior and effects would become more severe. These factors, individually and combined, would cause an increase in the probability of stand replacement in the event of a wildfire. In the event of a wildland fire in the project area under existing fuel conditions and extreme fire weather, large-scale loss of key ecosystem components could result. Wildland fires, by reducing the amount of dense forest, and by increasing shrub and other understory species may benefit this species and increase forage, especially at higher elevations. However, widespread wildland fires at low elevations could result in negative impacts to forage if the fires resulted in widespread loss of bitterbrush communities. Past DFPZ projects would confer some protection to mule deer habitat within the project area.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the project-level habitat effects of Alternative 2 would result in the continuation of some negative Forest-wide trends in deer habitat, such as increasing densities within forests, but would not be expected to alter current distribution of mule deer across the Forest.

Alternative 3: Relationship of project-level effects to Forest-scale mule deer habitat and distribution trends

It is anticipated that implementation of Alternative 3, in combination with past, present, and reasonably foreseeable future actions, would result in a net increase of 3,506 acres in suitable foraging habitat for

mule deer within the analysis area, and an increase of 1,195 acres in forested CWHR structural classes that provide moderate to high habitat values for mule deer (Table 60).

Table 60. Alternative 3 pre- and post-project CWHR habitat acres of moderate or high composite habitat value for mule deer.

CWHR habitat stages	2M	3S	3P	3M	4S	4P	4M	Totals
High or Moderate	M	M	H	M	M	M	M	
Pre-project acres	11	134	1,958	3,198	265	3,343	10,247	19,156
Post-project acres	11	112	1,213	2,249	725	7,156	8,885	20,351
Change in acres	0	- 22	-745	-949	+460	+3,813	-1,362	+1,195

Source: CWHR 8.0, GIS files developed for the Champs project.

Increase in deer habitat would be small when compared to the over 400,000 acres of suitable mule deer habitat that currently exist on the Forest (Table 59). However, this alternative would serve to reverse some post-settlement vegetative trends within the project area, and would result in a condition within LRMP direction (1993) for Medium habitat capability in regards to the proportion of an area to be managed in a "forage condition".

Population estimates provided by the California Department of Fish and Game for the pertinent DAUs, and LNF monitoring have shown a decline in deer numbers on the Forest since the peak in herd numbers in the 1950s, and a continued declining or stable trend since the LNF initiated monitoring in the 1990s. The small increase in deer habitat relative to Forest-wide levels would likely do little to alter the current distribution of deer across the Forest, although there may be some changes in density within the treated areas providing enhanced forage.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the project-level habitat effects of Alternative 3 would result in some alteration of existing Forest-wide trends, but would not be expected to alter current distribution of mule deer across the Forest.

Alternative 9: Relationship of project-level effects to Forest-scale mule deer habitat and distribution trends

It is anticipated that implementation of Alternative 9, in combination with past, present, and reasonably foreseeable future actions, would result in a net increase of 4,528 acres in suitable foraging habitat for mule deer within the analysis area, and an increase of 762 acres in forested CWHR structural classes that provide moderate to high habitat values for mule deer (Table 61).

Table 61. Alternative 9 pre- and post-project CWHR habitat acres of moderate or high composite habitat value for mule deer.

CWHR habitat stages	2M	3S	3P	3M	4S	4P	4M	Totals
High or Moderate	M	M	H	M	M	M	M	
Pre-project acres	11	134	1,958	3,198	265	3,343	10,247	19,156
Post-project acres	11	112	1,195	2,236	724	7,412	8,228	19,918
Change in acres	0	- 22	- 763	- 962	+459	+4,069	-2,019	+ 762

Source: CWHR 8.0, GIS files developed for the Champs project.

Increase in deer habitat would be small when compared to the over 400,000 acres of suitable mule deer habitat that currently exist on the Forest (Table 59). However, this alternative would serve to reverse some post-settlement vegetative trends within the project area, and would result in a condition slightly above LRMP direction for Medium habitat capability in regards to the proportion of an area to be managed in a "forage condition".

Population estimates provided by the California Department of Fish and Game for the pertinent DAUs, and Lassen NF monitoring have shown a decline in deer numbers on the Lassen NF since the peak in herd numbers in the 1950s, and a continued declining or stable trend since the Lassen NF initiated monitoring in the 1990s. The small increase in deer habitat relative to Forest-wide levels would likely do little to alter the current distribution of deer across the Forest, although there may be some changes in density within the treated areas providing enhanced forage.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the project-level habitat effects of Alternative 9 would result in some alteration of existing Forest-wide trends, but would not be expected to alter current distribution of mule deer across the Forest.

Pronghorn

Alternatives 1, 3, and 9: Relationship of project-level effects to Forest-scale pronghorn habitat and distribution trends

There is spring, summer and fall pronghorn range within the Champs project area. Winter range is north and east of the forest boundary, towards and into Nevada. Most of the habitat criteria for habitat capability is in reference to meadow and sage vegetation types; eastside pine itself was considered Low capability. Mixed-conifer was not considered a habitat type for pronghorn (LRMP p. O-18). Because this alternative is not proposing seeding, planting or other treatments within large meadow and sage flat areas, such as Champs Flat, opportunities to achieve High capability are outside the scope of this project. Although eastside pine is considered to be of Low habitat quality for pronghorn, the proposed actions would likely represent an overall improvement to pronghorn habitat by increasing herbaceous understory vegetation within the thinned and prescribed burned areas along meadow edges. Implementation would include 676 acres of area thin resulting in reduced conifer encroachment and lower tree densities adjacent to open valleys and along the migratory route into Champs Valley from eastern Lassen County.

Effects of the past DPFZ projects to antelope habitat has been minimal since many of these past projects have been in upland locations away from margins of large valleys and meadows.

Similar to Alternative 1, there should be a slight improvement to pronghorn habitat as a result of Alternatives 3 and 9, but that this would be minor since Alternatives 3 and 9 would not affect the interior of the valleys and sage flats in which this species inhabits.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the project-level habitat effects of Alternatives 1, 3, and 9 would result in some alteration of existing Forest-wide pronghorn habitat trends, but would not alter current distribution of pronghorn across the Forest.

Alternative 2: No action effects to Forest-scale pronghorn habitat and distribution trends

There would be no direct effects to pronghorn from this alternative. There would be indirect effects given that current vegetative trends within forested stands would continue, leading to further densification and reductions in understory vegetation. Forested areas along the pronghorn migratory corridor south into the project area along Forest Service road 35N04 would continue to increase in density, which in time would continue to reduce the ability of pronghorn to utilize this corridor.

Effects of these past DFPZ projects to antelope habitat has been minimal since many of these past projects have been in upland locations away from margins of large valleys and meadows. Similarly, the approximate 101 acres of group selection harvests within the Champs project area have had little to no effect on pronghorn habitat due to their locations being in upland locations.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that Alternative 2 would not directly alter existing Forest-wide habitat trends, and would not immediately or directly alter the current population distribution trends. However, if the migratory route over the west side of Harvey Mountain becomes too densely forested for pronghorn to travel through, the no action would indeed ultimately affect population distribution on the Forest.

Black Bear

Alternative 1: Relationship of project-level effects to Forest-scale black bear habitat and distribution trends

The proposed DFPZs within the Champs project would interconnect many of the past biomass units as well as past DFPZ units to create a cohesive DFPZ network. As discussed in the Fuels Report (Champs project record), the completed DFPZ network that would be achieved with the additional DFPZs in the Champs projects would reduce the amount of acres burned in the event of a wildland fire. This effect would result in increased protection for areas outside of the DFPZ network, conferring a greater level of protection to black bear habitat. However, wildfires could benefit black bear habitat along and within the margins of the fire by providing a pulse of downed logs and understory species, especially shrub species like manzanita that would enhance forage values. Detrimental effects of wildland fire would include the potential loss of security cover across large areas. A completed DFPZ network could thus benefit black bear habitat by limiting the size of wildfires that occur, and reducing the risk of extensive wildfires. Effects to stand structure and black bear habitat as a result of these past thinnings have been very similar as described for DFPZs proposed by this project.

It is anticipated that implementation of Alternative 1, in combination with past, present, and reasonably foreseeable future actions, would result in an approximate 305 acre increase in the CWHR structural classes providing moderate to high reproductive habitat, as well as a 489 acre increase in foraging habitat due to the group selection harvests, resulting in a total increase of 794 acres (Table 62).

Table 62. CWHR habitat stages of moderate or high reproductive habitat value for black bear, and Alternative 1 pre- and post-project acres for each at the project scale.

CWHR habitat tages	3M	3D	4S	4P	4M	4D	5S	5P	5M	5D	Totals
High or Moderate	M	M	M	M	M	M	M	M	H	M	
Pre-project acres	3,198	1,761	265	3,343	10,247	3,646	0	0	6	19	22,485
Post-project acres	2,220	1,472	725	7,756	7,814	2,679	0	99	6	19	22,790
Change in acres	-978	-289	+460	+4,413	-2,433	-967	0	+99	0	0	+305

Source: CWHR 8.0, GIS files developed for the Champs project.
Note: CWHR values for each habitat stage were identical for eastside pine and mixed-conifer, so acres for each in project area were combined.

The proposed vegetation management activities would serve to reverse some post-settlement vegetative trends within the project area, and may provide some benefits to foraging habitat for black bear due to an increase in understory vegetation, but would also be expected to reduce densities of trees >20 inches dbh. However, these altered conditions are minor when compared to the over 700,000 acres of reproductive habitat and over 200,000 acres of foraging habitat estimated to currently exist on the Lassen NF (Tables 63 and 64).

Table 63. Current potential suitable black bear reproductive habitat at the forest scale.

Scale	High capability habitat	Moderate capability habitat	Total
Total Potential Suitable Acres	30,622	969,123	999,745
Lassen NF owned	25,617	730,851	756,468
Non-NFS lands within Lassen NF admin boundaries	5,005	238,272	243,277

Source: GIS files, Champs Project Record.

Table 64. Current potential suitable black bear foraging habitat at the forest scale.

Scale	High capability habitat	Moderate capability habitat	Total
Total Potential Suitable Acres	93,909	175,308	269,217
Lassen NF owned	74,748	132,187	206,935
Non-NFS lands within Lassen NF admin boundaries	19,161	43,121	62,282

Source: GIS files, Champs Project Record.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the project-level habitat effects of Alternative 1 would result in some alteration of existing Forest-wide black bear habitat trends, but would not alter current distribution of black bear across the Forest.

Alternative 2: No action effects to Forest-scale black bear habitat and distribution trends

This alternative would not result in direct effects to this species, but would result in a continuation of current vegetative trends within the analysis area. Forests would continue to increase in density and understory vegetation would continue to decrease over time as a result. Therefore, cover values would continue to be increased at the potential cost of reduced herbaceous foraging habitat. However, forest decadence and down wood, supporting an ant population food source, may be enhanced by these same trends.

The absence of thinning and prescribed fire would allow continued increases in fuel loading and ladder fuels, and anticipated wildfire behavior and effects would become more severe. These factors, individually and combined, would cause an increase in the probability of stand replacement in the event of a wildfire. Such fires could benefit black bear habitat along and within the margins of the fire by providing a pulse of downed logs and understory species, especially shrub species like manzanita that would enhance forage values. Detrimental effects of wildland fire would include the potential loss of security cover across large areas.

As discussed in the Fuels Report (Champs project record), the completed DFPZ network would reduce the amount of acres burned in the event of a wildland fire, would result in increased protection for areas outside of the DFPZ network, conferring a level of protection to black bear habitat. The absence of thinning and prescribed fire in the no action alternative would allow continued increases in fuel loading and ladder fuels, and anticipated wildfire behavior and effects would become more severe. These factors, individually and combined, would cause an increase in the probability of stand replacement in the event of a wildfire. Such fires could benefit black bear habitat along and within the margins of the fire by providing a pulse of downed logs and understory species, especially shrub species like manzanita that would enhance forage values. Detrimental effects of wildland fire would include the potential loss of security cover across large areas.

Past group selection harvests in the project area (totaling approximately 46 units and 101 acres) have responded in grasses and shrubs. The degree and ultimate duration of this understory response would depend on the density of planted trees within the site and the timing of subsequent thinnings. These past group selection harvests are located on the southwest flanks of Harvey Mountain and have provided foraging habitat for black bears within this area.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the project-level habitat effects of Alternative 2 would not directly alter existing Forest-wide trends, and would not be expected to directly alter current distribution of black bear across the Forest.

Alternative 3: Relationship of project-level effects to Forest-scale black bear habitat and distribution trends

It is anticipated that implementation of Alternative 3, in combination with past, present, and reasonably foreseeable future actions, would result in a 767 acre increase in the CWHR structural classes providing moderate to high reproductive habitat (Table 65).

Table 65. CWHR habitat stages of moderate or high reproductive habitat value for black bear, and Alternative 3 pre- and post-project acres for each at the project scale.

CWHR habitat stages	3M	3D	4S	4P	4M	4D	5S	5P	5M	5D	Totals
High or Moderate	M	M	M	M	M	M	M	M	H	M	
Pre-project acres	3,198	1,761	265	3,343	10,247	3,646	0	0	6	19	22,485
Post-project acres	2,249	1,496	725	7,156	8,885	2,716	0	0	6	19	23,252
Change in acres	- 949	- 265	+460	+3,813	-1,362	- 930	0	0	0	0	+ 767

Source: CWHR 8.0, GIS files developed for the Champs project.
Note: CWHR values for each habitat stage were identical for eastside pine and mixed-conifer, so acres for each in project area were combined.

The proposed vegetation management activities would serve to reverse some post-settlement vegetative trends within the project area, and may provide some benefits to foraging habitat for black bear due to an increase in understory vegetation. However, these increases are minor when compared to overall Forest trends and to the over 700,000 acres of reproductive habitat and over 200,000 acres of foraging habitat estimated to currently exist on the LNF (Tables 63 and 64). Given the relatively small influence Alternative 3 would have on Forest-wide black bear habitat trends and habitat, Alternative 3 would not be expected to result in changed distribution of black bear across the Forest.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the project-level habitat effects of Alternative 3 would result in some alteration of existing Forest-wide trends in black bear habitat, but would not alter current distribution of black bear across the Forest.

Alternative 9: Relationship of project-level effects to Forest-scale black bear habitat and distribution trends

It is anticipated that implementation of Alternative 9, in combination with past, present, and reasonably foreseeable future actions, would result in a 428 acre increase in the CWHR structural classes providing moderate to high reproductive habitat, and, as a result of group selections, a 261 acre increase in forage habitat (Table 66).

Table 66. CWHR habitat stages of moderate or high reproductive habitat value for black bear, and Alternative 9 pre- and post-project acres for each at the project scale.

CWHR habitat stages	3M	3D	4S	4P	4M	4D	5S	5P	5M	5D	Totals
High or Moderate	M	M	M	M	M	M	M	M	H	M	
Pre-project acres	3,198	1,761	265	3,343	10,247	3,646	0	0	6	19	22,485
Post-project acres	2,236	1,484	724	7,412	8,228	2,804	0	0	6	19	22,913
Change in acres	- 962	- 277	+459	+4,069	-2,019	- 842	0	0	0	0	+ 428

Source: CWHR 8.0, GIS files developed for the Champs project.

Note: CWHR values for each habitat stage were identical for eastside pine and mixed-conifer, so acres for each in project area were combined.

The proposed vegetation management activities would serve to reverse some post-settlement vegetative trends within the project area, and may provide some benefits to foraging habitat for black bear due to an increase in understory vegetation. However, these increases are minor when compared to overall Forest trends and to the over 700,000 acres of reproductive habitat and over 200,000 acres of foraging habitat estimated to currently exist on the Lassen NF (Tables 63 and 64). Given the relatively small influence Alternative 9 would have on Forest-wide black bear habitat trends, Alternative 9 would not be expected to result in changed distribution of black bear across the Forest.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the project-level habitat effects of Alternative 9 would result in some alteration of existing Forest-wide trends in black bear habitat, but would not alter current distribution of black bear across the Forest.

Pileated Woodpecker

Alternative 1: Relationship of project-level effects to Forest-scale pileated woodpecker habitat and distribution trends

The proposed vegetation management activities would serve to reverse some post-settlement vegetative trends within the project area. It is anticipated that implementation of Alternative 1, in combination with past, present, and reasonably foreseeable future actions, would result in a reduction of 932 acres of suitable reproductive habitat for pileated woodpeckers as per CWHR habitat stages due to reduction in canopy cover, though 826 of these DFPZ acres would likely remain suitable as foraging habitat post-treatment (Table 67). The 932 acre reduction is roughly equivalent to a single pileated woodpecker home range.

Table 67. CWHR habitat stages of moderate or high reproductive habitat value for pileated woodpecker, and pre- and Alternative 1 post-project acres for each.

CWHR habitat stages	4M	4D	5P	5D	Total
High (H) or Moderate (M)	M	M	M	H	
Pre-project acres	4,109	2,696	0	11	6,816
Post-project acres	3,564	2,210	99	11	5,884
Change in acres	- 545	- 486	+ 99	0	- 932

Source: CWHR 8.0, GIS and silvicultural files developed for the Champs Project.
Note: The CWHR system provides moderate or high reproductive values only for pileated woodpeckers in mixed-conifer, not in eastside pine.

However, because about 89 percent of these acres would remain as foraging habitat, and because this reduction of reproductive habitat would be distributed across a large project area, the reduction in reproductive habitat may not result in the loss of any pileated woodpecker territories.

A 932 acre reduction in reproductive habitat represents just a 0.2 percent reduction in the estimated 478,047 acres of suitable pileated woodpecker reproductive habitat that currently exists on the Lassen NF (Table 68). There should be no substantial reduction in snag or downed log densities as a result of this

alternative. However, DFPZs could be expected to reduce the current population of trees ≥20 inches dbh from about 16 to 12 per acre, plus result in about 8 trees per acre of this size being harvested in group selection harvests within pileated woodpecker habitat.

Table 68. Current potential suitable pileated woodpecker reproductive habitat at the forest scale

Scale	High capability habitat	Moderate capability habitat	Total
Total Potential Suitable Acres	132,105	508,111	640,216
Lassen NF owned	111,948	366,099	478,047
Non-NFS lands within Lassen NF admin boundaries	20,157	142,012	162,169

Source: GIS files, Champs Project Record

As discussed in the Fuels Report (Champs project record), the completed DFPZ network would reduce the amount of acres burned in the event of a wildland fire, and would result in increased protection for areas outside of the DFPZ network, conferring a greater level of protection to pileated woodpecker habitat.

Within the Champs project area, approximately 46 group selection units totaling 101 acres have been implemented in past years, all in the Harvey Mountain vicinity in the Champs project area. Eighteen (39 percent) of these groups wholly or largely overlap pileated woodpecker habitat. These groups removed approximately 40 acres of pileated woodpecker habitat. Combined with the estimated 106 acres of pileated woodpecker habitat that would be removed by Alternative 1, group selection would remove a cumulative total of approximately 146 acres of pileated woodpecker habitat within the Champs analysis area.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the effects of Alternative 1 would not substantially alter the existing Forest-wide trend in pileated woodpecker habitat, or the existing Forest-wide population distribution trend for pileated woodpecker.

Alternative 2: No action effects to Forest-scale pileated woodpecker habitat and distribution trends

This alternative may not be in the species best interest in terms of the maintenance of a large tree component, due to old trees being more susceptible to competition-related mortality (Biondi 1996). This was also discussed in detail under Issue 2. In Blacks Mountain Experimental Forest on the ELRD, Dolph et al (1995) documented a rate of mortality in old pines that was in excess of their rate of recruitment. Due to this decline, the authors state that, given the effects of increasing stand densities, characteristics or functions of old-growth stands cannot be guaranteed in perpetuity by simply preserving existing old-growth tracts, and that old-growth must be managed for desired attributes. In today's fire-suppressed, dense stands, thinning the competing in-growth of young trees is important if the remnant old-growth trees are to be maintained and perpetuated on the landscape. Also, growth rates of individual trees would

be less than what would be achieved within thins to create DFPZs as proposed in the Alternative 1, thus slowing recruitment of a large tree component currently lacking within the project area.

Increased densification of stands since heavy historical livestock grazing and fire suppression has predisposed stands to increased mortality during periods of drought (Savage 1994, 1997, Guarin and Taylor 2005), and old pines are more susceptible to competition-induced mortality than are young trees (Biondi 1996). Past salvage harvests have led to declines in snag densities within the project area. Therefore, the no action could for a short-term lead to increased snag recruitment as the old trees continue to decline in health due to increased forest densities. However, this rate of mortality may exceed recruitment of live trees into the large tree size classes (Dolph et al 1995), thus in time leading to a future deficit of large diameter snags.

The absence of fuels treatment and prescribed fire would allow continued increases in fuel loading and ladder fuels, and anticipated fire behavior and effects would become more severe. These factors, individually and combined, would cause an increase in the probability of stand replacement in the event of a wildfire. A large stand-replacing fire may result in a short-term pulse of large numbers of large-diameter snags and downed logs, which for a time may provide foraging substrates for this species. However, it is questionable as to how much use pileated woodpeckers would make of these snags and logs when in the interior of a large stand replacing burn that was deficient in canopy cover. In such cases, it would take decades or centuries for large trees to be replaced, thus stand-replacing wildland fires could result in long-term deficits of large trees in the landscape.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that Alternative 2 would continue the existing Forest-wide trend in pileated woodpecker habitat, but should not directly alter the existing Forest-wide population distribution trend for pileated woodpeckers.

Alternative 3: Relationship of project-level effects to Forest-scale pileated woodpecker habitat and distribution trends

The proposed vegetation management activities would serve to reverse some post-settlement vegetative trends within the project area. It is anticipated that implementation of Alternative 3, in combination with past, present, and reasonably foreseeable future actions, would result in no net loss of the existing amount of CWHR structural classes that provide moderate to high reproductive pileated woodpecker habitat (Table 69).

Table 69. CWHR habitat stages of moderate or high reproductive habitat value for pileated woodpecker, and pre- and post-project acres for each.

CWHR habitat stages	4M	4D	5P	5M	5D	Total
High (H) or Moderate (M)	M	M	M	H	H	
Pre-project acres	4,109	2,696	0	0	11	6,816
Post-project acres	4,570	2,235	0	0	11	6,816
Change in acres	+ 461	- 461	0	0	0	0

Source: CWHR 8.0, GIS and silvicultural files developed for the Champs Project.
Note: The CWHR system provides moderate or high reproductive values only for pileated woodpeckers in mixed-conifer, not in eastside pine.

Also, as in Alternative 3, there should be no substantial reduction in snag and downed log densities as a result of the proposed projects, and trees >20 inches dbh would be retained. Because of the above, there should be no change in the distribution of pileated woodpeckers as a result of Alternative 3.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the proposed projects of Alternative 3 would not substantially alter the existing Forest-wide trend in pileated woodpecker habitat, nor would they alter the existing Forest-wide population distribution trend for pileated woodpecker.

Alternative 9: Relationship of project-level effects to Forest-scale pileated woodpecker habitat and distribution trends

The proposed vegetation management activities would serve to reverse some post-settlement vegetative trends within the project area. It is anticipated that implementation of Alternative 9, in combination with past, present, and reasonably foreseeable future actions, would result in a net loss of 78 acres of existing CWHR structural classes that provide moderate to high reproductive pileated woodpecker habitat (Table 70).

Table 70. CWHR habitat stages of moderate or high reproductive habitat value for pileated woodpecker, and pre- and post-project acres for each.

CWHR habitat stages	4M	4D	5P	5M	5D	Total
High (H) or Moderate (M)	M	M	M	H	H	
Pre-project acres	4,109	2,696	0	0	11	6,816
Post-project acres	4,405	2,322	0	0	11	6,738
Change in acres	+ 296	- 374	0	0	0	- 78

Source: CWHR 8.0, GIS and silvicultural files developed for the Champs Project.
Note: The CWHR system provides moderate or high reproductive values only for pileated woodpeckers in mixed-conifer, not in eastside pine.

Also, there should be no substantial reduction in snag and downed log densities as a result of the proposed projects, and trees ≥20 inches dbh within pileated woodpecker habitat would be retained. A 78 acre reduction in reproductive habitat represents a 0.02 percent reduction in the estimated 478,047 acres of suitable pileated woodpecker reproductive habitat that currently exists on the Lassen NF (Table 68).

Because of the above, there should be no change in the distribution of pileated woodpeckers as a result of Alternative 9.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the proposed projects of Alternative 9 would not substantially alter the existing Forest-wide trend in pileated woodpecker habitat, nor would they alter the existing Forest-wide population distribution trend for pileated woodpecker.

Hairy Woodpecker

Alternative 1: Relationship of project-level effects to Forest-scale hairy woodpecker habitat and distribution trends

It is anticipated that implementation of Alternative 1, in combination with past, present, and reasonably foreseeable future actions, would result in an increase of 1,572 acres of suitable reproductive habitat for hairy woodpeckers as per CWHR habitat stages (Table 71).

Table 71. CWHR habitat stages of moderate or high reproductive habitat value for hairy woodpecker, and pre- and post-project acres for each for Alternative 1.

CWHR habitat stages	4S	4P	4M	4D	5S	5P	5M	5D	Totals
High or Moderate	H	H	H	M	H	H	H	M	
Pre-project acres	265	3,343	10,247	3,646	0	0	6	19	17,526
Post-project acres	725	7,756	7,814	2,679	0	99	6	19	19,098
Change in acres	+460	+4,413	-2,433	-967	0	+99	0	0	+1,572

Source: CWHR 8.0, GIS files developed for the Champs project.
Note: CWHR values for each habitat stage were identical for eastside pine and mixed-conifer, so acres for each forest type in the project area were combined.

This 0.2 percent increase in reproductive habitat is small compared to the current existing amount of potential reproductive habitat on the Lassen NF, estimated at over 700,000 acres (Table 72). Also, approximately 25 percent of the current population of trees >20 inches dbh could be removed in DFPZs, and approximately eight trees per acre of this size would be removed by group selections.

Table 72. Current potential suitable reproductive habitat for hairy woodpeckers on the LNF.

Scale	High capability habitat	Moderate capability habitat	Total
Total Potential Suitable Acres	384,916	546,275	931,191
Lassen NF owned	258,056	447,897	705,953
Non-NFS lands within Lassen NF admin boundaries	126,860	95,378	222,238

Source: GIS files, Lassen NF. All high reproductive habitat is also high feeding habitat. All moderate reproductive habitat is also moderate feeding habitat.

As discussed in the Fuels Report (Champs project record), the completed DFPZ network would reduce the amount of acres burned in the event of a wildland fire, and would result in increased protection

for areas outside of the DFPZ network, conferring a greater level of protection to hairy woodpecker habitat.

Within the Champs project area, approximately 46 group selection units totaling 101 acres have been implemented in past years, all in the Harvey Mountain vicinity in the Champs project area. Similar to the proposed group selection harvests, many of these past group selection harvests have retained a large tree and snag component, and thus would still provide foraging habitat for hairy woodpeckers.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the effects of Alternative 1 would serve to reverse some long-term vegetative trends on the Forest, but would not substantially alter the existing Forest-wide trend in hairy woodpecker habitat, and should not affect the existing Forest-wide population distribution trend of hairy woodpecker.

Alternative 2: No action effects to Forest-scale hairy woodpecker habitat and distribution trends

As was previously stated, this alternative may not be in the best interest of hairy woodpecker in terms of the ecology of the planning area for the species; nor in the maintenance of a large tree component due to old trees being more susceptible to competition-related mortality (Biondi 1996).

Past salvage harvests have led to declines in snag densities within the project area. Therefore, the no action could for a short-term lead to increased snag recruitment as the old trees continue to decline in health due to increased forest densities. However, this rate of mortality may exceed recruitment of live trees into the large tree size classes (Dolph et al 1995), in time leading to a future deficit of large diameter snags.

The absence of fuels treatment and prescribed fire would allow continued increases in fuel loading and ladder fuels, and anticipated fire behavior and effects would become more severe. These factors, individually and combined, would cause an increase in the probability of stand replacement in the event of a wildfire. A large stand-replacing fire may result in a short-term pulse of large numbers of large-diameter snags which, for a time, may provide foraging substrates and nest snags for this species. However, it is questionable as to how much use hairy woodpeckers would make of this overabundance of snags when in the interior of a large stand-replacing fire. In such cases, it would take decades or centuries for large trees to be replaced, thus stand-replacing wildland fires would result in long-term deficits of large trees in the landscape.

Past DFPZ projects would confer some protection to pallid bat habitat within the project area. However, these past projects, without some type of cohesive network to connect them, would not be expected to effectively reduce fire risk as would a DFPZ. Nor would the decreased flame lengths and fire line intensity that would result from that network give firefighters a better chance of halting the progress of a wildland fire and keeping the final amount of acres burned to a minimum.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the effects of Alternative 2 would serve to continue long-term vegetative trends on the Forest, but would not substantially alter the existing Forest-wide trend in habitat or the existing Forest-wide population distribution trend of hairy woodpeckers.

Alternative 3: Relationship of project-level effects to Forest-scale hairy woodpecker habitat and distribution trends

It is anticipated that implementation of Alternative 3, in combination with past, present, and reasonably foreseeable future actions, would result in an increase of 1,981 acres of suitable reproductive habitat for hairy woodpeckers as per CWHR habitat stages (Table 73).

Table 73. CWHR habitat stages of moderate or high reproductive habitat value for hairy woodpecker, and pre- and post-project acres for each for Alternative 3.

CWHR structural classes	4S	4P	4M	4D	5S	5P	5M	5D	Totals
High or Moderate	H	H	H	M	H	H	H	M	
Pre-project acres	265	3,343	10,247	3,646	0	0	6	19	17,526
Post-project acres	725	7,156	8,885	2,716	0	0	6	19	19,507
Change in acres	+ 460	+3,813	-1,362	- 930	0	0	0	0	+1,981

Source: CWHR 8.0, GIS files developed for the Champs project.
Note: CWHR values for each habitat stage were identical for eastside pine and mixed-conifer, so acres for each in project area were combined.

This 0.3 percent increase in reproductive habitat is small compared to the currently existing amount of potential reproductive habitat on the Lassen NF, estimated at over 700,000 acres (Table 72).

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the effects of Alternative 3 would serve to reverse some long-term vegetative trends on the Forest, but would not substantially alter the existing Forest-wide trend in hairy woodpecker habitat, and should not affect the existing Forest-wide population distribution trend of hairy woodpecker.

Alternative 9: Relationship of project-level effects to Forest-scale hairy woodpecker habitat and distribution trends

It is anticipated that implementation of Alternative 9, in combination with past, present, and reasonably foreseeable future actions, would result in an increase of 1,765 acres of suitable reproductive habitat for hairy woodpeckers as per CWHR habitat stages (Table 74).

Table 74. CWHR habitat stages of moderate or high reproductive habitat value for hairy woodpecker, and pre- and post-project acres for each for Alternative 9.

CWHR structural classes	4S	4P	4M	4D	5S	5P	5M	5D	Totals
High or Moderate	H	H	H	M	H	H	H	M	
Pre-project acres	265	3,343	10,247	3,646	0	0	6	19	17,526
Post-project acres	724	7,412	8,228	2,804	0	98	6	19	19,291
Change in acres	+ 459	+4,069	-2,019	- 842	0	+98	0	0	+1,765

Source: CWHR 8.0, GIS files developed for the Champs project.
Note: CWHR values for each habitat stage were identical for eastside pine and mixed-conifer, so acres for each in project area were combined.

This 0.3 percent increase in reproductive habitat is small compared to the currently existing amount of potential reproductive habitat on the Lassen NF, estimated at over 700,000 acres (Table 72).

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that the effects of Alternative 9 would serve to reverse some long-term vegetative trends on the Forest, but would not substantially alter the existing Forest-wide trend in hairy woodpecker habitat, and should not affect the existing Forest-wide population distribution trend of hairy woodpecker.

Northern Goshawk

Alternative 1: Relationship of project-level effects to Forest-scale northern goshawk habitat and population distribution trends

As was shown under the northern goshawk effects discussion for Forest Service Sensitive species, Alternative 1 would result in the reduction of approximately 3,400 acres of reproductive habitat, from 13,918 acres to 10,518 acres, a 24 percent reduction, due to reductions in canopy cover as a result of the thinnings and group selections (Table 54). Post-project, all treated acres would remain suitable as foraging habitat. The reduction of 3,400 acres is approximately 0.5 percent of the estimated 643,594 acres of reproductive habitat on the LNF (Table 75). No goshawk PACs would be affected by the proposed actions. Project design features, such as snag and down log retention and leaving 10 percent of DFPZs in unthinned patches, would help mitigate this minor reduction in reproductive habitat.

Table 75. Current potential suitable northern goshawk reproductive habitat at the forest scale.

Scale	High capability habitat	Moderate capability habitat	Total
Total Potential Suitable Acres	649,637	195,793	845,430
Lassen NF owned	480,581	163,013	643,594
Non-NFS lands within Lassen NF admin boundaries	169,056	32,780	201,836

Source: GIS files, Champs Project Record

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that Alternative 1 would not substantially affect or alter Forest-wide northern goshawk habitat trends, and should not alter Forest-wide population distribution trends for the northern goshawk.

Alternative 2: No action effects to Forest-scale northern goshawk habitat and distribution trends

As was shown under the northern goshawk effects discussion for Forest Service Sensitive species, there would be no direct effects to current habitat conditions that would result from this alternative. Indirect effects include a continuation of current vegetative trends across the analysis area. As a result, forests would continue to increase in density and canopy cover except in areas of wildfire or insect mortality. As previously discussed, without thinning remnant old-growth trees, important to goshawks and their prey, would continue to be at risk of competition-related mortality. Also, growth rates of individual trees would be less than what would be achieved within thins to create DFPZs as proposed in Alternative 1, thus slowing recruitment of a large tree component currently lacking within the project area.

The no action alternative may not be in the best interest of northern goshawk in terms of the ecology of the planning area (Eastside Historical Assessment, Champs project record); nor in the maintenance of a large tree component due to old trees being more susceptible to competition-related mortality (Biondi 1996).

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that Alternative 2 would not directly affect or alter Forest-wide northern goshawk habitat trends, and should not directly alter Forest-wide population distribution trends for the northern goshawk.

Alternative 3: Relationship of project-level effects to Forest-scale northern goshawk habitat and distribution trends

As was shown under the northern goshawk effects discussion for Forest Service Sensitive species, Alternative 3 would result in the reduction of approximately 2,292 acres of reproductive habitat, from 13,918 acres to 11,626 acres. This 16 percent reduction is due to reductions in canopy cover as a result of the thinnings (Table 55). Post-project, all treated acres would remain suitable as foraging habitat. The reduction of 2,292 acres is approximately 0.4 percent of the estimated 643,594 acres of goshawk reproductive habitat on the LNF. No goshawk PACs would be affected by the proposed actions. Project design features, such as snag and down log retention and leaving 10 percent of DFPZs in unthinned patches, would help mitigate this minor reduction in reproductive habitat.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that Alternative 3 would not substantially alter Forest-wide northern goshawk habitat trends, and should not alter Forest-wide population distribution trends for the northern goshawk.

Alternative 9: Relationship of project-level effects to Forest-scale northern goshawk habitat and distribution trends

Alternative 9 would result in the reduction of approximately 2,861 acres of reproductive habitat, from 13,918 acres to 11,057 acres, a 20 percent reduction, due to reductions in canopy cover as a result of thinnings and group selections (Table 56). Post-project, all treated acres would remain suitable as foraging habitat. The reduction of 2,861 acres is approximately 0.4 percent of the estimated 643,594 acres of goshawk reproductive habitat on the Lassen NF (Table 39, in Terrestrial and Aquatics MIS Report). No goshawk PACs would be affected by the proposed actions. Project design features such as snag and down log retention and leaving 10 percent of DFPZs in unthinned patches would help mitigate this minor reduction in reproductive habitat.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that Alternative 9 would not substantially alter Forest-wide northern goshawk habitat trends, and should not alter Forest-wide population distribution trends for the northern goshawk.

California spotted owl

Alternative 1: Relationship of project-level effects to Forest-scale California spotted owl habitat and distribution trends

As discussed under Issue 1 and in the Terrestrial Species BE for the Champs project (Champs project record), there would be no direct effect to spotted owl habitat at three scales associated with the three spotted owl activity centers, the 300 acre Protected Activity Centers (PACs), 1,062 acre circles, and 2,400 acre Home Range Core Areas (HRCAs).

Within the project area, about 15 percent (1,031 acres) of the currently available spotted owl habitat would be reduced to non-habitat status by Alternative 1, while approximately 5,785 acres of suitable habitat would be retained (Table 19). Therefore, although there would be a decline of habitat, the actions proposed within Alternative 1 would likely not forfeit the ability of dispersing spotted owls to access the Blacks Mountain and Ashurst Mountain activity centers, and should not forfeit the ability of owls to access or disperse from Logan Mountain. Cumulatively, project activities would reverse some long-term vegetative trends within the project area; DFPZs would confer some protection against widespread habitat loss due to severe wildfire, which may be important in this “area of concern” for spotted owls.

The CWHR system provides moderate or high reproductive values only for California spotted owls in mixed-conifer, not in eastside pine. Alternative 1 should not result in substantial changes to existing spotted owl trends on the LNF because, 1) there would be no effects to three different scales of habitat

retention around each of the spotted owl activity centers, 2) project design provided mitigation measures are consistent with current direction, 3) and because 85 percent of existing spotted owl habitat would be retained in the project area, and, 4) the 1,031 acres of reduced habitat represents about 0.2 percent of the estimated 485,840 acres (Table 76) of spotted owl habitat currently existing on the LNF. Alternative 1 could result in about a 25 percent reduction of the current population of trees >20 inches dbh, further cumulatively reducing this larger tree component.

Table 76. Current potential suitable spotted owl habitat on Lassen NF

	REPRODUCTION			FORAGING		
Scale	High Capability Habitat	Moderate Capability Habitat	Total Acres	High Capability Habitat	Moderate Capability Habitat	Total Acres
Total Potential Suitable Acres	147,419	658	148,077	148,076	503,106	651,182
NFS Lands	127,340	489	127,829	127,828	358,012	485,840
Non-NFS lands within Lassen NF admin boundaries	20,079	169	20,248	20,248	145,094	165,342

Source: GIS files, Champs Project Record

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that Alternative 1 would not substantially alter Forest-wide California spotted owl habitat trends, and should not alter Forest-wide population distribution trends for the California spotted owl.

Alternative 2: No action effects to Forest-scale California spotted owl habitat and distribution trends

As discussed under Issue 1 and in the Terrestrial Species BE for the Champs project the no action alternative would have little immediate or short-term impacts to spotted owls or their habitat within the project area. Indirectly, the continuation of dense stand condition may result in increased tree mortality and high levels of future snag and downed log recruitment, which could benefit some aspects of habitat for spotted owls and their prey.

Alternative 2 would not create DFPZs, and thus would not provide a level of protection to widespread loss of owl habitat from severe wildfire as would DFPZ creation as in Alternative 1. Such widespread habitat loss would be an important factor within this “area of concern” (Verner et al 1992) for California spotted owls.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that Alternative 2 would not directly alter Forest-wide California spotted owl habitat trends, and should not directly alter Forest-wide population distribution trends for the California spotted owl.

Alternative 3: Relationship of project-level effects to Forest-scale California spotted owl habitat and distribution trends

As discussed under Issue 1 and in the Terrestrial Species BE for the Champs project, there would be no direct effect to spotted owl habitat at three scales associated with the three spotted owl activity centers, the 300 acre PACs, 1,062 acre circles, and 2,400 acre HRCAs.

Within the project area, there would be no net loss of the currently available spotted owl habitat that would be reduced to non-habitat status by Alternative 3, although there would be a decline of habitat quality be reducing existing canopy in 461 acres to >40 percent canopy closure, the lower threshold for spotted owl foraging habitat (Table 20). The actions proposed within Alternative 3 would likely not forfeit or substantially alter the ability of dispersing spotted owls to access or disperse between the three activity centers addressed within this document, or to disperse in and out of the project area. Cumulatively, project activities would reverse some long-term vegetative trends within the project area, and the DFPZs would confer some protection against widespread habitat loss due to severe wildfire, which may be important in this "area of concern" for spotted owls. The CWHR system provides moderate or high reproductive values only for California spotted owls in mixed-conifer, not in eastside pine.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that Alternative 3 would not substantially alter Forest-wide California spotted owl habitat trends, and should not alter Forest-wide population distribution trends for the California spotted owl.

Alternative 9: Relationship of project-level effects to Forest-scale California spotted owl habitat and distribution trends

As discussed under Issue 1 and in the Terrestrial Species BE for the Champs project, there would be no direct effect to spotted owl habitat at three scales associated with the three spotted owl activity centers, the 300 acre PACs, 1,062 acre circles, and 2,400 acre HRCAs.

Alternative 9 would result in an approximate 78 acre net loss of existing spotted owl habitat within the Champs project area, and, relative to Alternative 1, would reduce effects to northern flying squirrel habitat to just a 5 percent reduction within mixed-conifer habitats, similar to Alternative 3 (Table 21). The actions proposed within Alternative 9 would likely not forfeit or substantially alter the ability of dispersing spotted owls to access or disperse between the three activity centers addressed within this document, or to disperse in and out of the project area. Cumulatively, project activities would reverse some long-term vegetative trends within the project area, and the DFPZs would confer some protection against widespread habitat loss due to wildfire, which is important in this "area of concern" for spotted owls.

Conclusion

The Report for Terrestrial and Aquatic Management Indicator Species concludes that Alternative 9 would not substantially alter Forest-wide California spotted owl habitat trends, and should not alter Forest-wide population distribution trends for the California spotted owl.

Consultation and Coordination

The Forest Service consulted the following individuals, Federal, state and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

Federal, State, and Local Agencies:

The Forest Service coordinates its activities with Federal, County, and State of California regulatory agencies, including air quality management districts, and water quality control boards. Permits would be required from the air quality management districts prior to prescribed burning. Conditional waivers of the requirement to file a report of waste discharge for timber harvest activities on National Forest System lands would be required from the appropriate water quality control boards. Applicators of Sporax must be licensed (State of California), and Sporax use must be reported to the County in which it is applied.

The Internet site of the Sacramento Field Office, US Department of the Interior, Fish and Wildlife Service (USFWS) was consulted on February 6, 2007 (plant species), and November 14, 2006 (terrestrial and aquatic species) for an updated list of proposed and listed Threatened and Endangered species that may be present on the LNF. No Threatened and Endangered wildlife, aquatic, or plant species are known to exist within the Champs Project area. (See the Terrestrial, Aquatic, and Plant Biological Evaluations for further discussions.)

Tribes:

In addition, as part of the public scoping process, the Eagle Lake Ranger District presented the Proposed Action to the Pit River Tribe on March 1, 2006, on April 12, 2006, on July 5, 2006, and then again on July 3, 2007, and to the Susanville Indian Rancheria on February 14, 2006 and November 7, 2007 (presentations were in addition to the scoping letters sent to the Pit River Tribe and Susanville Indian Rancheria). No comments were received from the Pit River Tribe. The Susanville Indian Rancheria expressed concerns about the protection of cultural resources, such as artifacts, features, and human remains; and land, air, water, ethno botanicals, and wildlife, during harvest and prescribed burning. These concerns are addressed in the Proposed Action (including Integrated Design Features) and Purpose and Need, and in the environmental consequences section of all resource reports for this project.

Others:

The Proposed Action was presented to the Lassen County Fire Safe Council on February 6, 2006. The Council offered their support of the project.

Appendix A

Introduction

Appendix A contains documentation of all aquatic, plant, and wildlife Threatened, Endangered and Sensitive (TES) species considered in the Biological Evaluations for the Champs Project, as well as all aquatic, plant, and wildlife Management Indicator Species (MIS) considered in the MIS reports for the Champs Project.

Aquatic Species

Aquatic TES species

Species considered in the Aquatics BE were determined based on review of the U.S. Fish and Wildlife Service species list (website accessed on 12 February, 2007), and on review of the USDA Forest Service Sensitive species list for Region 5 (Table A1). Table A1 displays whether the project is within the range of the species, whether suitable habitat is contained within or adjacent to the project, and whether the species has been previously been detected within the area.

Table A1. Aquatic species considered in the Champs Project Analysis.

Species Name	Status	Species Addressed in the Analysis? If No, why?
Central Valley steelhead DPS* (*Oncorhynchus mykiss*)	FT	No: Project area is outside species' geographic range.
Central Valley spring-run Chinook salmon ESU** (*Oncorhynchus tshawytscha*)	FT	No: Project area is outside species' geographic range.
Delta smelt (*Hypomesus transpacificus*)	FT	No: Project area is outside species' geographic range.
Winter-run chinook salmon ESU** (*Oncorhynchus tshawytscha*)	FE	No: Project area is outside species' geographic range.
California red-legged frog (*Rana aurora draytonii*)	FT	No: Project area is outside species' geographic range.
Shasta Crayfish (*Pacifastacus fortis*)	FE	No: Project area is outside species' geographic range.
Conservancy fairy shrimp (*Branchinecta conservatio*)	FE	No: Project area is outside species' geographic range.
Vernal pool fairy shrimp (*Branchinecta lynchi*)	FT	No: Project area is outside species' geographic range.
Vernal pool tadpole shrimp (*Lepidurus packardi*)	FE	No: Project area is outside species' geographic range.
Giant garter snake (*Thamnophis gigas*)	FT	No: Project area is outside species' geographic range.
Foothill yellow-legged frog (*Rana boylii*)	FSS	No: Project area is outside species' geographic range. General area has been surveyed for amphibians with no observations of this species reported.
Mountain yellow-legged frog (*Rana muscosa*)	FSS	No: Project area is outside species' geographic range. General area has been surveyed for amphibians with no observations reported.
Cascades frog (*Rana cascadae*)	FSS	No: The project area is not within the known historical range of these species. General area has been surveyed for amphibians with no observations of this species reported.
Northwestern pond turtle (*Clemmys marmorata marmorata*)	FSS	No: Project area is outside species' geographic range.

Species Name	Status	Species Addressed in the Analysis? If No, why?
California floater (*Anodonta californiensis*)	FSS	No: Project area lacks suitable habitat (slow, perennial rivers and large lakes with mud-sand substrate, at low elevation). General area has been surveyed for mollusks with no observations of this species reported.
Great Basin Rams-horn (*Helisoma newberryi newberryi*)	FSS	No: Project area lacks suitable habitat (larger lakes, large, slower rivers, large spring sources and spring-fed creeks; with cold, highly oxygenated water, mud substrate, and slow water velocities). General area has been surveyed for mollusks with no observations of this species reported..
Scalloped Juga (*Juga occata*)	FSS	No: Project area lacks suitable habitat (large rivers with swift, unpolluted, cold, well-oxygenated waters with cobble/boulder substrates). General area has been surveyed for mollusks with no observations of this species reported.
Topaz Juga (*Juga acutifilosa*)	FSS	Yes: Project area within range of species. Potential suitable habitat occurs. Surveys have been conducted in potential suitable habitat within the project area with no observations reported.
Montane Peaclam (*Pisidium ultramontanum*)	FSS	No: Project area lacks suitable habitat (larger, perennial water bodies (spring-influenced rivers, streams, lakes, and spring pools) with sand or gravel substrate). General area has been surveyed for mollusks with no observations of this species reported.
Nugget pebblesnail (*Fluminicola seminalis*)	FSS	No: Project area lacks suitable habitat (large creeks and rivers with cool, clear, flowing water and gravel-cobble substrate). General area has been surveyed for mollusks with no observations of this species reported.
Eagle Lake rainbow trout (*Oncorhynchus mykiss aquilarum*)***	FSS	Yes: Project area is within species' geographic range.
Central Valley fall/late-fall-run Chinook salmon ESUs** (*Oncorhynchus tshawytscha*)	FSS	No: Project area is outside species' geographic range.

Source: U.S. Fish and Wildlife Service species list website accessed on 12 February, 2007), USDA Forest Service Sensitive species list for Region 5; Symbols used: FT = Federally listed as Threatened, FE = Federally listed as Endangered, FSS = Forest Service Sensitive; * Distinct Population Segment, ** Evolutionarily Significant Unit, *** Resident rainbow trout within perennial streams, potentially including resident Eagle Lake rainbow trout, are management indicator species for the Forest. Consideration as a management indicator species is addressed in the Report For Terrestrial And Aquatic Management Indicator Species.

Botany

Introduction

A species list was retrieved off the internet from the Sacramento Field Office of the United State Department of the Interior, Fish and Wildlife Service, dated February 6, 2007, that provides proposed and listed Endangered and Threatened species that may be present within the LNF.

Botany TES species

Table A2. Botany Species Considered in the Champs Project Analysis

Species Name	Status*	Species Addressed in the Analysis? If No, why?
Limnanthes floccosa ssp. californica – Butte County meadowfoam	FE	No. Habitat of vernal pools in Central Valley and Sierra Nevada foothills, including designated critical habitat, not in project area; 100-3000 ft.
Orcuttia tenuis – slender Orcutt grass	FT	No. Habitat of vernal pools, including designated critical habitat, not in project area; 4900-5760 ft.
Tuctoria greenei – Greene's tuctoria	FE	Habitat of vernal pools, including designated critical habitat, not in project area; 4900-5760 ft.
Arabis constancei – Constance's rock cress	FSS	No. Habitat of serpentine soils or rock outcrops not in project area; 3500-6750 ft.
Astragalus pulsiferae var. suksdorfii – Suksdorf's milk-vetch	FSS	No. Habitat of sandy volcanic soil in sagebrush or pines near Lassen Volcanic National Park not in project area; 4500-6500 ft.
Botrychium ascendens -upswept moonwort	FSS	No. Springs, seeps, and streambanks in mixed coniferous forests well-surveyed, but habitat determined to be unsuitable due to the lack of perennially wet areas required for this species; 5200-6240 ft.
Botrychium crenulatum – scalloped moonwort	FSS	No. Springs, seeps, and streambanks in mixed coniferous forests well-surveyed, but habitat determined to be unsuitable due to the lack of perennially wet areas required for this species; 5040-6000 ft.
Botrychium lunaria – common moonwort	FSS	No. Habitat of moist subalpine meadows, stream banks, springs or seeps not present in the project area. 7000-10000 ft.
Botrychium minganense – Mingan moonwort	FSS	No. Springs, seeps, and streambanks in mixed coniferous forests well-surveyed, but habitat determined to be unsuitable due to the lack of perennially wet areas required for this species; 5240-6250 ft.
Botrychium montanum – western goblin	FSS	No. Springs, seeps, and streambanks in mixed coniferous forests well-surveyed, but habitat determined to be unsuitable due to the lack of perennially wet areas required for this species; 5200-6250 ft.
Botrychium pinnatum– western goblin	FSS	No. Streambanks in mixed coniferous forests well-surveyed, but habitat determined to be unsuitable due to the lack of perennially wet areas required for this species; 5200-6250 ft.
Bruchia bolanderi Bolander's bruchia	FSS	No. Habitat of bare soil along westside montane stream banks in mixed conifer forests not present in the project area. 3800-8200 ft.
Buxbaumia viridis green big-on-a-stick	FSS	No. Habitat of highly decayed logs, peaty soil or humus in westside, moist, shaded conditions not present in the project area.
Calochortus longebarbatus var. longebarbatus – long haired star tulip	FSS	No. Habitat of eastside seasonally wet meadows north of Highway 299 (Hat Creek Ranger Dist.) not in project area; 4000-6300 ft.
Calystegia atriplicifolia ssp. buttensis – Butte County morning glory	FSS	No. Habitat of dry openings in low elevation westside mixed conifer or pine forests not in project area; 2000-4000 ft.
Clarkia gracilis ssp. albicaulis- white-stemmed clarkia	FSS	No. Habitat of low elevation westside foothill open areas not in project area; 500-3600 ft.
Clarkia mildrediae ssp. mildrediae Mildred's clarkia	FSS	No. Habitat of sandy, often granitic or disturbed soils in lower montane mixed conifer forests not present in the project area. 1500-5200 ft.
Collomia larsenii- talus collomia	FSS	No. Alpine fell-field habitat not present in the project area. 7250-11500 ft.
Cryptantha crinita silky cryptantha	FSS	No. Habitat of foothill gray pine forest and blue oak woodlands near the Ishi Wilderness not present in the project area. Below 3700 ft.
Cypripedium fasciculatum – clustered lady's-slipper	FSS	No. Habitat of mid to late seral westside mixed conifer forest south of Lake Almanor not in project area; 2000-6000 ft.
Cypripedium montanum – mountain lady's-slipper	FSS	No. Habitat of moist mixed coniferous forest and riparian areas with high canopy cover, north of Burney (Hat Creek RD) not in project area; 2800-6000 ft.
Eriogonum prociduum – Prostrate	FSS	Yes. Species present, and analyzed in Biological Evaluation.

Species Name	Status*	Species Addressed in the Analysis? If No, why?
buckwheat		
Eriogonum spectabile – Barron buckwheat	FSS	No. Habitat of glaciated andesite soil in open red fir/lodgepole forest not in project area; 6600-6640 ft.
Fritillaria eastwoodiae – Butte County fritillary	FSS	No. Habitat of lower westside mixed conifer or brushy areas not in project area; 100-4000 ft.
Helodium blandowii – Blandow's bog moss	FSS	No. Habitat of wet meadows, seeps or fens in westside subalpine coniferous forest or alpine lakes not [present in the project area. 6000-8100 ft.
Hydrotheria venosa – veined water lichen	FSS	No. Habitat of cool, clear and shallow spring-fed westside streams not present in the project area.
Juncus leiospermus var. *leiospermus* – Red Bluff dwarf rush	FSS	No. Habitat of lower elevation vernal pool or seasonally wet flats north of Hwy 299 not present in the project area; 175-3300 ft.
Lewisia kelloggii ssp. hutchisonii- Hutchison's lewisia	FSS	No. Habitat of ridge tops or relatively high elevations not present in the project area. 5100-7000 ft.
Limnanthes floccosa ssp. bellingeriana – Bellinger's meadowfoam	FSS	No. Habitat of seasonally wet areas in oak or oak/juniper woodlands north of Highway 299 not present in the project area. Below 3600 ft.
Lomatium roseanum – adobe parsley	FSS	No. Habitat of shallow, rocky soil on open, wind-swept ridge tops on the Diamond Mountains not present in the project area. 5880-7280 ft.
Lupinus dalesiae – Quincy lupine	FSS	No. Habitat of dry, often rocky slopes in mixed conifers on the southeastern part of the Almanor RD not in project area; 2500-5580 ft.
Meesia triquetra – Three-ranked hump moss	FSS	No. Habitat of westside fens not in the project area; 4200-8300 ft.
Meesia uliginosa – Broad-nerved hump moss	FSS	No. Habitat of logs in westside fens not in the project area; 4300-8200 ft.
Mimulus evanescens – ephemeral monkeyflower	FSS	No. General habitat of seasonal lake margins or seasonally wet areas in sagebrush/juniper zone well surveyed and species not found. Project area determined to be unsuitable habitat. 3900-5580 ft.
Monardella follettii – Follett's monardella	FSS	No. Habitat of serpentine soil not in project area; 4100-4500 ft.
Monardella stebbinsii – Stebbin's monardella	FSS	No. Habitat of north-facing talus serpentine slopes not present in the project area; 2500-3600 ft.
Oreostemma elatum – Plumas aster	FSS	No. Habitat of westside wet meadows and fens not in project area; 3800-6200 ft.
Packera eurycephala var. *lewisrosei* – cut-leaved ragwort	FSS	No. Habitat of serpentine soil not in project area; 1000-4600 ft.
Penstemon personatus – closed-throated beardtongue	FSS	No. Habitat of north-facing slopes in upper mixed conifer forest on the southern Almanor RD not in project area; 4500-6500 ft.
Penstemon sudans – Susanville beardtongue	FSS	No. Habitat of open, often rocky volcanic soils in juniper woodlands or yellow pine forest near Susanville not present in the project area 3900-5600 ft.
Phacelia inundata – playa phacelia	FSS	No. Habitat of eastside subalkaline flats not in project area; 5000-6600 ft.
Ptilidium californicum – California fuzzwort	FSS	No. Habitat of old-growth mixed coniferous stands, or stands with old-growth legacy components, in the northwest portion of the Hat Creek RD not in project area; below 5000 ft.
Rorippa columbiae – Columbia yellow cress	FSS	No. Habitat of large, open, seasonally wet eastside flats (playas) not in project area; 4000-5950 ft.
Rupertia hallii – Hall's rupertia	FSS	No. Habitat of lower westside mixed conifer forest in Campbellville/ Butte Meadows area (Almanor RD) not in project area; below 4800 ft.
Scheuchzeria palustris var. americana – American Scheuchzeria	FSS	No. Habitat of floating sphagnum fens in cold, moderately high elevation lakes not in project area; 3000-9000 ft.
Sedum albomarginatum – Feather River stonecrop	FSS	No. Habitat of serpentine rock outcrops not in project area; 1500-6400 ft.

Species Name	Status*	Species Addressed in the Analysis? If No, why?
Silene occidentalis ssp. longistipitata – long-stiped campion	FSS	No. Habitat of openings in mid-elevation, westside mixed coniferous forests not in project area; 3300-6100 ft.
Thelypodium howellii ssp. howellii Howell's thelypody	FSS	No. Habitat of alkaline meadows, seeps and pastures or sagebrush/rabbitbrush scrub not present in project area. 4100-6700 ft.

Symbols used:FT = Federally listed as Threatened, FE = Federally listed as Endangered, FSS = Forest Service Sensitive

Wildlife

Terrestrial TES species

Species considered in the BE were determined based on review of the U.S. Fish and Wildlife Service species list (website accessed on 22 February, 2006), and on review of the USDA Forest Service Sensitive species list for Region 5 (Table A3). Table A3 displays whether the project is within the range of the species, whether suitable habitat is contained within or adjacent to the project, and whether the species has been previously been detected within the area.

Table A3. Terrestrial Wildlife Species Considered in the Champs Project Analysis

Species name	Status	Species Addressed in the Analysis? If No, why?
Northern bald eagle *(Haliaeetus leucocephalus)*	FSS	No, due to lack of suitable fish or waterfowl producing areas within area
Northern spotted owl *(Strix occidentalis caurina)*	FT	No, project is outside range of species
Valley elderberry longhorn beetle *(Desmocerus californicus dimorphus)*	FT	No, project is outside range of species
Great gray owl *(Strix nebulosa)*	FSS	No, lack of suitable meadow foraging sites
Swainson's hawk *(Buteo swainsonii)*	FSS	No, lack of suitable habitat within Project area
Willow flycatcher *(Empidonax traillii)*	FSS	No, lack of suitable habitat within Project area
California spotted owl *(Strix occidentalis occidentalis)*	FSS	Yes Project area within range of species.
Northern goshawk *(Accipiter gentilis)*	FSS	Yes Project area within range of species.
Greater sandhill crane *(Grus canadensis tabida)*	FSS	Yes Project area within range of species.
Sierra Nevada red fox *(Vulpes vulpes necator)*	FSS	No, lack of suitable habitat within Project area
Pacific fisher *(Martes pennanti)*	FSS	No, lack of suitable habitat within Project area
American marten *(Martes americana)*	FSS	No, lack of suitable habitat within Project area
California wolverine *(Gulo gulo luteus)*	FSS	No, lack of remote, high elevation habitat
Pallid bat *(Antrozous pallidus)*	FSS	Yes Project area within range of species.
Townsend's big-eared bat *(Corynorhinus townsendii)*	FSS	Yes Project area within range of species.
Western red bat (Lasiurus blossevillii)	FSS	No lack of suitable habitat within Project area

Source: USFWS web site, accessed 22 Feb., 2006; Region 5's Sensitive species list
Symbols used: FT = Federally listed as Threatened, FSS = Forest Service Sensitive

Aquatic and Terrestrial Management Indicator Species

Selection of Project-Level MIS

Terrestrial and aquatic MIS for the LNF were identified in the LRMP (USDA 1993). The MIS to be analyzed for the Champs Project were selected from this list of MIS identified in the LRMP, as indicated below in Table A4. In addition, Table A4 identifies the seral stage and special habitat preference for which each MIS was identified in the LRMP, and discloses whether or not the MIS is potentially affected by the Champs Project. Those species identified as Category 3 for project analysis would be addressed in this analysis.

Table A4. Seral stage and specific habitat preference for Lassen NF management indicator species (MIS).

MIS	Seral Stage	Special Habitat Preference	Category for Project Analysis
American marten	Late	Large snags, snags general, downed wood, riparian	1
Bald Eagle	Late	Large snags, snags near water, water	1
Black bear	Early and Late	Snags general, downed wood, hardwoods (oaks), riparian, water	3
Bufflehead	N/A	Snags near water, meadows, water	1
Northern spotted owl	Late	Large snags, downed wood	1
CA spotted owl	Late	Large snags, downed wood	3
Hairy woodpecker	Late	Large snags, snags general	3
Mallard	N/A	Riparian, water	1
Mule Deer	Early	Hardwoods (oaks), meadows, riparian	3
Northern goshawk	Late	Downed wood, riparian	3
Osprey	Late	Large snags, snags near water, riparian, water	1
Pacific fisher	Late	Large snags, snags general, downed wood, riparian	1
Peregrine Falcon	N/A	Cliffs, riparian	1
Pileated woodpecker	Late	Large snags	3
Pronghorn	Early	Meadows	3
Western gray squirrel	Late	Snags general, hardwoods (oaks)	1
Rainbow trout	N/A	Riparian, water	1
Steelhead Trout and Chinook Salmon	N/A	Riparian, water	1

Source: LRMP, Table 3-9, p. 3-43.
Category 1: MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.
Category 2: MIS whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.
Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

Botany Management Indicator Species

Selection of project level MIS

Management Indicator Species for the LNF plant species are identified in the LRMP, Response to Comments (USDA 1993). The MIS analyzed for the Project were selected from this list of MIS identified

in the LRMP, as indicated below in Table A5. In addition, Table A5 identifies the reason each MIS was identified in the LRMP (habitat indicator) and discloses whether or not the MIS is potentially affected by the Champs Project (category). Those species identified as Category 3 for project analysis would be addressed in this analysis.

Table A5. Management Indicator Species, Lassen NF, and Selection of MIS for Project-Level Analysis for the Champs Project.

Management Indicator Species	LRMP Habitat Indicator	Category for Project Analysis
Willows	Riparian	2
Alders	Riparian	1
Cottonwoods	Riparian	2
Aspen	Riparian	2
Bitterbrush	Eastside Pine	3

Category 1: MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.
Category 2: MIS whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.
Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

Appendix B

Past, Ongoing and Reasonably Foreseeable Future Actions Summary

(PORFFA Summary)

Champs Project

ELRD, LNF

Appendix B summarizes the analysis area and the temporal scale (time) considered for cumulative effects within the Champs Environmental Assessment (EA). Each resource considered in the EA has disclosed specific cumulative effects for that particular resource area. Refer to the applicable EA sections and resource reports for a specific discussion of cumulative effects.

Scope of the Cumulative Effects Area (CEA)

The cumulative effects area would be at a minimum the project area. In addition, some resources would use a larger CEA such as subwatersheds (Figure B-9 to B-17). The time period used for including past actions is 30 years before present (1975-2006).

Past, Ongoing, and Reasonably Foreseeable Future Actions

The following list of cumulative effects actions are considered for the Champs Project. Tables B-1 through B-6 summarize those past, ongoing and reasonably foreseeable future actions, with a description of the activity and the acres affected. Guidance on cumulative effects, in particular, past actions, was considered, based on Connaughton (2005), hereby incorporated by reference. In addition, those areas considered for cumulative effects are shown in Figures 1 through 15. All map feature locations are approximate. The following is a list of all the Tables and Figures presented in this document:

<u>Tables</u>

- Table B-1, Past activities within the cumulative effects analysis area for the Champs Project
- Table B-1A. Summary of acres of past vegetation management actions on National Forest System land by treatment type (from Table B-1)
- Table B-2, Ongoing activities within the cumulative effects analysis area for the Champs Project
- Table B-2A. Summary of acres of ongoing vegetation management actions on National Forest System land by treatment type (from Table B-2)
- Table B-3, Reasonably Foreseeable Future Activities within the cumulative effects analysis area for the Champs Project
- Table B-4. Potential Maintenance Treatments
- Table B-5. Summary of Acres of Potential Maintenance Treatments
- Table B-6. Summary of acres of reasonably foreseeable future vegetation management actions on National Forest System land by treatment type

Figures

- Figure B-1, Champs Potential DFPZ Maintenance
- Figure B-2, Alternative 1 – Proposed Action (DFPZs, group selection, and area thinning)
- Figure B-3, Alternative 1 – Proposed Action Road Management / Transportation System Activities
- Figure B-4, Past Activities (1975-1985)
- Figure B-5, Past Activities (1986-1995)
- Figure B-6, Past Activities (1996-2006)
- Figure B-7, Ongoing Activities
- Figure B-8, Reasonably Foreseeable Future Activities
- Figure B-9, Hydrology, Soils, Fire/Fuels CEA area
- Figure B-10, California spotted owl CEA area
- Figure B-11, Northern goshawk CEA area
- Figure B-12, Sandhill crane CEA area
- Figure B-13, Antelope CEA area
- Figure B-14, Silviculture, Heritage, Recreation, Visuals, and Botany CEA area
- Figure B-15, Range CEA area
- Figure B-16, Eagle Lake rainbow trout CEA area
- Figure B-17, Topaz juga CEA area

In order to understand the contribution of past actions to the cumulative effects of the alternatives, this analysis assumes that current environmental conditions are a result of effects from past actions. This is because existing conditions reflect the aggregate effect of all previous human actions and natural events that have affected the environment and might contribute to cumulative effects.

Cumulative effects discussions contained in the Champs EA and resource reports do not try to quantify the effects of past actions by adding up all previous actions on an action-by-action basis. There are several reasons for not adhering to this approach. They are as follows:

1) Existing conditions are a result of numerous actions (i.e. timber harvesting, road construction, grazing, off highway vehicle use) over the past decades, and trying to isolate the individual actions that continue to have residual effects would be impractical.
2) Revealing specifics of past actions on an individual basis would not be advantageous in determining the cumulative effects of the proposed action or other alternatives. Focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental effects of individual past actions, and one can not reasonably determine each and every action over past decades that has contributed to current conditions. Also, it is uncertain how the effects of past natural events, together with human caused events, have cumulatively shaped the current landscape. By looking at existing conditions, we are more likely to convey the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects.
3) Public scoping for this project did not identify any public interest or need for detailed information on individual past actions, and
4) Finally, the Council on Environmental Quality issued an interpretive memorandum (Connaughton (2005) regarding analysis of past actions, which states, “agencies can conduct an adequate

cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

For these reasons, the analysis of past actions in the Champs EA and resource reports is based on current environmental conditions.

Table B-1, Past Activities within the cumulative effects analysis area for the Champs Project

Past Activities (Table B-1 continued)		Cumulative Effects Analysis Area	
Timber			
Activity Name	**Year**	**Acres of Project**	**Activity Description within cumulative effects analysis area**
Ashurst GMA Insect Salvage	1992	226	Timber harvest using the following silvicultural prescription: insect salvage on 193 acres (approximately 2.6 MBF/ac).
Ashurst Salvage Sale	1985	5,175	Timber harvest using the following silvicultural prescription: insect salvage on 4,800 acres (approximately 0.1 MBF/ac).
Aspen Flat SSTS Insect Salvage Sale	1988	14,519	Timber harvest using the following silvicultural prescription: insect salvage on approximately 83 acres (approximately .05 MBF/ac).
Barrel Pit Fuelwood Sale	1983	87	Timber harvest using the following silvicultural prescription: individual tree selection and deck logs sold in a fuelwood small sale on 5 acres (136 cords).
Blacks Road Salvage SSTS	1993	130	Timber harvest using the following silvicultural prescription: 130 acres of roadside salvage of hazard trees associated with road maintenance.
Burgess Insect Salvage SSTS	1989	14,519	Timber harvest using the following silvicultural prescription: insect salvage on approximately 100 acres (approximately 1 MBF/ac).
Cal Burgess Insect Salvage	1985	2,593	Timber harvest using the following silvicultural prescription: insect salvage on approximately 50 acres (approximately 1 MBF/ac).
Camp Logan Resale	1989	1,585	Timber harvest using the following silvicultural prescription: individual tree selection on 1,585 acres.
Cone Insect Salvage SSTS	1989	4,055	Timber harvest using the following silvicultural prescription: insect salvage on approximately 500 acres (approximately 0.4 MBF/ac).
East Salvage	1976	61,736	Timber harvest using the following silvicultural prescription: insect salvage on approximately 61,700 acres (approximately 0.015 MBF/ac).
Flat Timber Sale	1984	88	Timber harvest using the following silvicultural prescription: clearcutting on 23.3 acres and individual tree selection on 31.7 acres.
Fred Insect Salvage Sale SSTS	1993	77	Timber harvest using the following silvicultural prescription: insect salvage on approximately 77 acres (approximately 2.3 MBF/ac).
Gorden Insect Salvage	1989	8,389	Timber harvest using the following silvicultural prescription: insect salvage on 30 acres

Past Activities (Table B-1 continued)		Cumulative Effects Analysis Area	
SSTS			(approximately 1 MBF/ac).
Harvey 100%	1988	580	Timber harvest using the following silvicultural prescription: overstory removal on approximately 105 acres and approximately 218 of individual tree selection.
Harvey Timber Sale	1979	1,684	Timber harvest using the following silvicultural prescription: clearcutting on approximately 80 acres, 1,560 acres of individual tree selection, and 5 acres of specified road clearing.
Hurst Insect Salvage Resale	1992	1,885	Timber harvest using the following silvicultural prescription: insect salvage on 1,241 acres (approximately 0.7 MBF/ac).
Ice Cave 100 % Timber Sale	1987	193	Timber harvest using the following silvicultural prescription: individual tree selection on 193 acres (approximately 1.8 MBF/ac).
Indian Well Timber Sale	1986	2,118	Timber harvest using the following silvicultural prescription: clearcutting on 68 acres, 1400 acres of individual tree selection, and 8 acres of specified road clearing.
Lake Timber Sale	1986	1,943	Timber harvest using the following silvicultural prescription: clearcutting on 13 acres, and 1,873 acres of individual tree selection, and 2 acres of specified road clearing.
Late Salvage Timber Sale	1977	62,563	Timber harvest using the following silvicultural prescription: insect salvage on approximately 1,340 acres (approximately 0.5 MBF/ac).
Logan Insect Salvage SSTS	Unknown	5,839	Timber harvest using the following silvicultural prescription: insect salvage on 5,839 acres (approximately 0.1 MBF/ac).
Logan SSTS Insect Salvage	1988	13,257	Timber harvest using the following silvicultural prescription: insect salvage on approx. 50 acres (approximately 0.5 MBF/ac).
McCoy Flat Timber Sale	1989	596	Timber harvest using the following silvicultural prescription: individual tree selection on 250 acres.
North Logan Timber Sale	1978	8,130	Timber harvest using the following silvicultural prescription: individual tree selection 6,330 acres (approx 3.1 MBF/ac), and 39 acres of specified road clearing.
Patterson Timber Sale	1987	47	Timber harvest using the following silvicultural prescription: individual tree selection on 44 acres.
Phillips Beauchamp Negotiation	1983	455	Timber harvest using the following silvicultural prescription: individual tree selection on 455 acres (0.18 MBF/ac).
Quintessence Salvage	1982	84	Timber harvest using the following silvicultural prescription: insect salvage on approximately 21 acres (approximately 0.8 MBF/ac).
Salt Cabin Timber Sale	1983	70	Timber harvest using the following silvicultural prescription: clearcutting on 21 acres, and 30

Past Activities (Table B-1 continued)		Cumulative Effects Analysis Area	
			acres of individual tree selection.
Shays Hole Timber Sale	Unknown	5,864	Timber harvest using the following silvicultural prescription: approx. 4,704 acres of individual tree selection, and 35 acres of specified road clearing.
Solstice Salvage Timber Sale	1990	882	Timber harvest using the following silvicultural prescription: individual tree selection (insect salvage) on approx. 882 acres (approx 0.71 MBF/ac).
South Logan Timber Sale	1997	642	Timber harvest using the following silvicultural prescription: approx. 550 acres of individual tree selection, and 10 acres of specified road clearing.
Sow Timber Sale	1990-1995	800	Timber harvest using the following silvicultural prescription: overstory removal on 20 acres and 750 acres of individual tree selection.
Squaw Valley Salvage Timber Sale	1990	8,061	Timber harvest using the following silvicultural prescription: individual tree selection (insect salvage) on approx. 2,000 acres (approx 0.25 MBF/ac).
Standford SSTS Insect Salvage	1988	19,784	Timber harvest using the following silvicultural prescription: insect salvage on approximately 80 acres (approximately 0.5 MBF/ac).
Stanford Springs Timber Sale	1992	7,235	Timber harvest using the following silvicultural prescription: individual tree selection (insect salvage) on 1,673 acres (approx 0.64 MBF/ac).
Sunny Insect Salvage	1993	3,680	Timber harvest using the following silvicultural prescription: insect salvage on approximately 3,680 acres (approximately 1.5 MBF/ac).
Timber Harvest on Private Lands (Fruit Growers Timber Company)	Pre-2000	698	Timber harvest with thinning on 10% of the private land approximately every 10 years.
Timber Harvest on Private Lands (Fruit Growers Timber Company)	1995-2000	698	Timber harvest on approximately 100 acres through clearcutting.
Whaleback Insect Salvage SSTS	1989	672	Timber harvest using the following silvicultural prescription: insect salvage on approximately 50 acres (approximately 1 MBF/ac).
Whaleback Timber Sale	1978	12,079	Timber harvest using the following silvicultural prescription: approx. 250 acres of individual tree selection, and 10 acres of specified road clearing.
Fuels			
Ashurst Lake	1990	147	Underburning; Spring and Fall; Control lines along roads and meadows;147 acres.

Past Activities (Table B-1 continued)		Cumulative Effects Analysis Area	
Aspen Flat	1987	85	Underburning; Spring and Fall; Control lines along roads and meadows; 85 acres.
Blacks	1997	4	Underburning; Spring and Fall; Control lines along roads and meadows; 5 acres.
Champs 1996	1996	787	Underburning; Spring and Fall; Control lines along roads and meadows; 787 acres.
Champs 1998	1998	2,091	Underburning; Spring and Fall; Control lines along roads and meadows; 2091 acres.
Dow Butte	2003	43	Underburning; Spring and Fall; Control lines along roads and meadows; 43 acres.
Fleming Well_2002	2002	388	Underburning; Spring and Fall; Control lines along roads and meadows, and some dozer line construction; 388 acres.
Fleming Well 2003	2003	699	Underburning; Spring and Fall; Control lines along roads and meadows, and some dozer line construction; 699 acres.
Grays	1998	1,972	Underburning; Spring and Fall; Control lines along roads and meadows; 1972 acres.
Indian Well	2003	242	Underburning; Spring and Fall; Control lines along roads and meadows; 242 acres.
Standford Spring	1997	453	Jackpot pile and burning; Spring and Fall; Control lines along roads and meadows; 453 acres.
T-Rex Fuel Reduction	2000	1,332	Underburning; Spring and Fall; Control lines along roads and meadows; 1332 acres.
T-Rex	2005	184	Hand thinning; 184 acres.
Wildlife			
Camp 10 Aspen Enhancement	2005	11	Conifer removal: Fenced; 10.80 acres.
Camp 10 Aspen Enhancement	2006	3	Conifer removal: To be fenced; 2.59 acres.
Aspen Flat Aspen Enhancement	1999	7	Conifer removal: Hand Thinned; 7.25 acres.

Past Activities (Table B-1 continued)		Cumulative Effects Analysis Area	
Aspen Flat Aspen Enhancement	1996	2	Conifer removal: Hand Thinned; 1.99 acres.
Ashurst Lake Aspen Enhancement	1997	0	Conifer removal: Hand Thinned and fenced; 0.37 acres.
Ashurst Lake Aspen Enhancement	1997	4	Conifer removal: Hand Thinned and fenced; 4.15 acres.
Shays Hole Aspen Enhancement	1995	3	Conifer removal: Hand Thinned and fenced; 2.63 acres.
Road Decommissioning	1980's		Roads Decommissioned: 5.02 miles
Lands			
Land Exchange	1991	625	Land acquired by LNF
Botany			
Spotted Napweed	1998-2005		Weeds Pulled
Pepperweed	2001-2003		Weeds Pulled
Spotted Napweed	1998		Weeds Pulled (not seen since)
Range			
Water Development	1995		Well & Trough
Water Development	1977		Waterhole
Water Development	1977		Waterhole
Water Development	2000		Waterhole

Past Activities (Table B-1 continued)		Cumulative Effects Analysis Area	
Water Development	2000		Waterhole
Water Development	1996, 1997		Dam built 1996, Washed out 1997
Timber (continued)			
Ashurst GMA Plantations	1999-2000	89	Timber harvest using the following silvicultural prescription: Site preparation, planting, and pre-commercial thinning on 89 acres.
Ashurst Pre-Commercial Thinning	2002-2003	61	Timber harvest using the following silvicultural prescription: Pre-commercial thinning on 61 acres.
Aspen Flat Biomass	1984 & 1989	327	Timber harvest using the following silvicultural prescription: Overstory removal on 189 acres (1984); pre-commercial thinning on 327 acres (1989).
Aspen Harvey Plantation	1984-1997	303	Timber harvest using the following silvicultural prescription: Overstory removal on 19 acres (1984). Overstory removal on 278 acres and clearcut on 19 acres (1995). Site preparation on 44 acres (1996). Planting on 303 acres (1997).
Barltes Plantation	1995-1997	41	Timber harvest using the following silvicultural prescription: Clearcut in 1995; site preparation in 1996; and planted in 1997, on 41 acres.
Barrel Biomass	1993-1996	536	Timber harvest using the following silvicultural prescription: Biomass thinning on 536 acres.
Blacks ERP	1979-1998	1,575	Timber harvest using the following silvicultural prescription: Stand clearcutting, pre-commercial thinning, and planting on 200 acres (1979-1983); biomass thinning on 1,374 acres (1997-1998).
Blacks TSI	1987-1989	253	Timber harvest using the following silvicultural prescription: Biomass thinning on 245 acres.
Burgess Biomass	1985-1987	332	Timber harvest using the following silvicultural prescription: Biomass thinning on 332 acres.
Camp 10 Aspen Enhancement	2005	27	Timber harvest using the following silvicultural prescription: Conifer removal on 27 acres.
Cone Mountain Plantation	2000-2001	188	Timber harvest using the following silvicultural prescription: Pre-commercial thinning and pruning on 188 acres.
Cone/Crater Group Selection	2002-2004	20	Timber harvest using the following silvicultural prescription: Group selection harvest on 20 acres (2002); site preparation 18 of these acres (2003); planting all 20 acres (2004).

Past Activities (Table B-1 continued)		Cumulative Effects Analysis Area	
Crash Plantation	1996-2000	435	Timber harvest using the following silvicultural prescription: Pre-commercial thinning on 380 acres (1996); site preparation on 300 of these acres (1997-1998), and planting 346 acres (1998-2000).
Crater Plantation / Pre-commercial Thinning	1977-2000	186	Timber harvest using the following silvicultural prescription: Pre-commercial thinning on 209 acres (1977-1980); pre-commercial thinning on 50 acres (2000); site preparation on 27 acres (1989); planting on 50 acres (1990).
Dow Butte Plantation	1988-2002	54	Timber harvest using the following silvicultural prescription: Overstory removal on 3 acres (1988); site preparation on 3 acres (1996); planting on 3 acres (1998); biomass thinning on 51 acres (1999-2002).
Eagle Aspen Enhancement	1999	5	Timber harvest using the following silvicultural prescription: Conifer removal on 5 acres.
Flat Plantation	1986-1987	35	Timber harvest using the following silvicultural prescription: Site preparation and planting on 35 acres.
Fleming Well	1993-2005	962	Timber harvest using the following silvicultural prescription: Overstory removal / single tree selection on 962 acres (1993); site preparation on 94 acres (1995); planting no 332 acres (1996); biomass thinning on 723 acres (1995-1997); pre-commercial thinning on 238 acres (2005).
Gravel Biomass	1991-2001	231	Timber harvest using the following silvicultural prescription: Overstory removal on 231 acres (1991); biomass thinning on 231 acres (1998-1999); site preparation on 164 acres (1999-2000); planting on 164 acres (2001).
Harvey DFPZ	2002-2004	1,277	Timber harvest using the following silvicultural prescription: Group selection harvest (2002); site preparation (2003) and planting (2004) on 93 acres; biomass thinning on 990 acres (2002-2003), and conifer removal in aspen stand (6 acres, 2002).
Harvey SLB	1991-1997	1,072	Timber harvest using the following silvicultural prescription: Biomass thinning on 1,072 acres (1991-1993); planting on 323 acres (1996-1997).
Harvey2 DFPZ	2001-2003	72	Timber harvest using the following silvicultural prescription: Biomass thinning on 72 acres (2001) and planting on 55 acres (2003).
Indian Well Biomass	1990-1991	422	Timber harvest using the following silvicultural prescription: Biomass thinning on 414 acres (1990); site preparation and planting on 54 acres (1990-1991).
James Plantation	1996-1998	43	Timber harvest using the following silvicultural prescription: Shelterwood harvest on 35 acres (1996); site preparation and planting on 35 acres (1997-1998).

Past Activities (Table B-1 continued)		Cumulative Effects Analysis Area	
Lake Plantation	1987-1992	62	Timber harvest using the following silvicultural prescription: Clearcut in 1987 on 62 acres; site preparation and planting on 62 acres (1991-1992).
Little Ant	1993-2000	91	Timber harvest using the following silvicultural prescription: Single tree selection on 91 acres (1993); biomass thinned on 91 acres (1999-2000).
Little Harvey	1986	95	Timber harvest using the following silvicultural prescription: Biomass thinning on 89 acres.
Logan Biomass	1996-2000	1,384	Timber harvest using the following silvicultural prescription: Biomass thinning on 1,384 acres (1996); underburning on 740 acres (2000).
Logan DFPZ	1993-2005	299	Timber harvest using the following silvicultural prescription: Single tree selection on 84 acres (1993); biomass thinning on 84 acres (2005).
Lost	1986-2001	656	Timber harvest using the following silvicultural prescription: Overstory removal on 655 acres (1986-1990); mechanical site preparation on 171 acres (1988); planting on 628 acres (1988-1993); pre-commercial thinning on 516 acres (1999-2001).
Lost Springs Biomass	1984-1989	75	Timber harvest using the following silvicultural prescription: Overstory removal on 75 acres (1984); biomass thinning on 75 acres (1989).
Mower GMA	2000	90	Timber harvest using the following silvicultural prescription: Biomass thinning on 90 acres.
Mowers	2000-2001	18	Timber harvest using the following silvicultural prescription: Pre-commercial thinning on 18 acres (2000); site preparation and planting on 18 acres (2000-2001).
North Crater West	2004-2005	137	Timber harvest using the following silvicultural prescription: Biomass thinning on 120 acres (2004-2005); conifer removal for aspen enhancement on 17 acres (2004-2005).
Rock Cabin Pre-commercial Thinning	1999	30	Timber harvest using the following silvicultural prescription: Pre-commercial thinning on 30 acres.
Salt Plantation	1984-1987	53	Timber harvest using the following silvicultural prescription: Site preparation and planting on 53 acres (1984); pre-commercial thinning on 53 acres (1987).
Shoestring Biomass	1985	365	Timber harvest using the following silvicultural prescription: Biomass thinning on 365 acres.
Signal Small Log DFPZ	2000	46	Timber harvest using the following silvicultural prescription: Biomass thinning on 46 acres.
Sow Plantation	1991-1995	19	Timber harvest using the following silvicultural prescription: Clearcut on 19 acres (1991); site preparation and planting on 19 acres (1993-1995).

Past Activities (Table B-1 continued)		Cumulative Effects Analysis Area	
Stray Plantation	1999-2000	334	Timber harvest using the following silvicultural prescription: Site preparation on 58 acres (1999); planting on 141 acres (2000); biomass thinning on 307 acres (1999-2000).
Summit Small Log DFPZ	2000-2005	939	Timber harvest using the following silvicultural prescription: Biomass thinning on 939 acres (2000-2005).
Well Plantation	1994-1999	647	Timber harvest using the following silvicultural prescription: Overstory removal on 647 acres (1994); site preparation on 513 acres (1996); planting on 582 acres (1998-1999); pre-commercial thinning on 490 acres (1996).
Whaleback Plantation	1981-1983	3	Timber harvest using the following silvicultural prescription: Clearcut on 3 acres (1981); site preparation on 3 acres (1982); planting on 3 acres (1983).

Table B-1A. Summary of Acres of Past Vegetative Management Actions on National Forest Land by Treatment Type (from Table B-1)

Treatment Type	Acres Treated
Salvage harvest	84,519
Fuelwood removal	5
Individual tree selection	20,224
Clearcutting	649
Overstory removal	3,184
Specified road clearing	109
Group selection harvest	113
Single tree selection	175
Shelterwood harvest	35
Underburning	8,531
Jackpot pile and burn	453
Hand thinning	184
Conifer removal for aspen enhancement	86
Site preparation	1,894
Planting	3,649
Pre-commercial thinning	2,849
Biomass thinning	9,700

Source: Table B-1

Table B-2, Ongoing Activities within the cumulative effects analysis area for the Champs Project

Ongoing Activities (Table B-2 continued)		Cumulative Effects Analysis Area
Timber		
Activity Name	**Year**	**Activity Description**
Lyons	ongoing	Timber harvest using the following silvicultural prescription: DFPZ construction utilizing thinning from below on 1,343 acres, and conifer removal within aspen stands on 280 acres.
Kybos DFPZ Thinning	ongoing	Timber harvest using the following silvicultural prescription: DFPZ construction utilizing thinning from below on 199 acres.
Logan	ongoing	Timber harvest using the following silvicultural prescription: DFPZ construction utilizing thinning from below on 299 acres.
Timber harvest on private lands (Fruit Growers Timber Company)	ongoing	Estimated at 10% of land harvested, using an intermediate cut per decade. Harvest resemble area thinning with an upper diameter limit.
Recreation		
Activity Name	**Year**	**Activity Description**
Ungroomed Snowmobile Route	ongoing	Route is not groomed as it is along the Forest System Roads. Snowmobile route used generally between December and March.
German Shorthair Trials	ongoing	Summer June or July, approx. 1 week, 50 people camping and field trials.
Recreational Use	ongoing	OHV use on Forest roads; hunting; dispersed camping driving for pleasure, sightseeing, family firewood gathering and Christmas tree cutting.
Range		
Activity Name	**Year**	**Activity Description**
Harvey Valley Allotment	ongoing	Cattle grazing allotment, Cow/Calf operation, 500 pair, grazing season from 6/1 to 10/15.(allotment size 33,072 acres)
Champ's Flat Allotment (Includes private land located in T33N, R9E, S13, 14, 24)	ongoing	Cattle grazing allotment, Cow/Calf operation, 475 pair, grazing season from 6/1 to 9/30. (allotment size 27,835 acres)
Fence	ongoing	Cattle exclosure on Burgess Spring
Botany		
Activity Name	**Year**	**Activity Description**
Noxious weed treatment for pepperweed and Spotted knapweed	ongoing	Weed Treatment
Transportation		
Activity Name	**Year**	**Activity Description**

Ongoing Activities (Table B-2 continued)		Cumulative Effects Analysis Area
Road Maintenance	ongoing	Annual road maintenance, grading of roads and ditches culvert clean out, hazard tree removal.

Table B-2A. Summary of Acres of Ongoing Vegetative Management Actions on National Forest System land by Treatment Type (from Table B-2)

Treatment Type	Acres Treated
DFPZ thinning (thinning from below)	1,841
Conifer removal for aspen enhancement	280

Table B-3, Reasonably Foreseeable Future Activities within the cumulative effects analysis area for the Champs Project

Reasonably Foreseeable Future Activities (Table B-3 continued)		Cumulative Effects Analysis Area
Fuels		
Activity Name	**Year**	**Activity Description**
T-Rex Fuel Reduction (DFPZ Maintenance)	2010-2012	Underburning; Spring and Fall; Control lines along roads and meadows (1,010 acres).
Harvey 2 DFPZ Maintenance	2015-2020	DFPZ maintenance underburning on approximately 72 acres.
Logan DFPZ Maintenance	2015-2020	DFPZ maintenance underburning on approximately 299 acres.
Signal Small Log DFPZ Maintenance	2015-2020	DFPZ maintenance underburning on approximately 46 acres.
Summit Small Log DFPZ Maintenance	2015-2020	DFPZ maintenance underburning on approximately 939 acres.
Kybos DFPZ Maintenance	2015-2020	DFPZ maintenance underburning on approximately 199 acres.
Lyons DFPZ Maintenance	2015-2020	DFPZ maintenance underburning on approximately 1,343 acres.
Harvey Mtn. Lookout Site Clearing Project	2007	Thinning and site clearing around Harvey Mtn. Lookout (37 acres).
Houseman DFPZ project (this project is not within the Champs Project boundary or within the cumulative effects analysis boundary for any resource for the Champs Project)	2007	Timber harvest using the following silvicultural prescription: DFPZ construction utilizing thinning from below on approx. 1,300 acres.
Champs DFPZ Maintenance	see Champs DFPZ Maintenance	
Botany		
Activity Name	**Year**	**Activity Description**
Noxious weed treatment for pepperweed and Spotted knapweed	foreseeable	Weed Treatment
Wildlife		
Activity Name	**Year**	**Activity Description**
Aspen Restoration	2007-2010	Conifer removal within aspen stands.
Gordon Aspen Enhancement	2007	Conifer removal within aspen stands (1.4 acres)
Timber		
Activity Name	**Year**	**Activity Description**

Reasonably Foreseeable Future Activities (Table B-3 continued)		Cumulative Effects Analysis Area
Campbell EA	2009	DFPZ construction utilizing thinning from below on 305; area thinning utilizing thinning from below on 1,690 acres; group selection harvest on approximately 300 acres.
Gooch EA		DFPZ construction utilizing thinning from below on 5,000; area thinning utilizing thinning from below on 1,242 acres; group selection harvest on approximately 209 acres; underburning on 1,147 acres.
Transportation		
Activity Name	**Year**	**Activity Description**
Road Decommissioning	2008-2010	Decommission non-system and system roads not needed for future management, or designated for OHV use.
OHV Route Designation	2008	Roads/ Routes designated for OHV use.
Range		
Activity Name	**Year**	**Activity Description**
Impounded Structure	2006	water impoundment structure - rebuild
Hydrology		
Activity Name	**Year**	**Activity Description**
Channel Work	2011	Pine Creek Channel Restoration

Champs DFPZ Maintenance

Expected DFPZ maintenance treatments are tiered to the Herger-Feinstein Quincy Library Group Final Supplemental Environmental Impact Statement (HFQLG FSEIS, 2003) (USDA FS, 2006d). The proposed DFPZ treatment units were analyzed using GIS to identify predicted post treatment vegetation conditions and maintenance regimes identified under the SEIS. Approximately 252 acres of maintenance are identified for initial treatment at 5 years, with the remaining 9,587 acres identified for initial treatment at 10 years (see Figure B-1, Potential DFPZ Maintenance). The expected interval for subsequent maintenance treatments are listed in Table B-4. Secondary maintenance treatments would be conducted similarly to initial maintenance treatments. Post treatment evaluation and monitoring would be conducted to further confirm and/or adjust proposed maintenance treatments based on local existing and projected fuel conditions. Potential maintenance treatments are described below and summarized in Table B-5:

Table B-4. Potential Maintenance Treatments

Maintenance Treatment	Time of Initial Maintenance	Time of Secondary Maintenance	Acres
Hand Treatment	10 year	10 year	71
Prescribed Fire Treatment	10 year	10 year	7,547
Mechanical Treatment	5 year	5 year	252
Mechanical Treatment	10 year	10 year	1,969
Total			9,839

Hand Treatment: Hand treatments would entail the use of hand tools such as hoes, or mechanized brush cutters to cut brush and young trees. Small brush may be grubbed out, removing their root systems. Sprouting brush species are expected to re-sprout after hand cutting. This material would then be hand piled and burned according to a prescribed burn plan. Hand treatment would be performed in sensitive areas, such as RHCAs. Hand treatments could cause minor soil disturbance but should not create any off-site soil movement. The burning of hand piles could pose a risk of scorching to smaller residual trees. Potential damage to the stand from the hand treatments and pile burning are expected to be very minor and most likely immeasurable.

Prescribed Fire Treatment: Prescribed underburning would be used to remove small trees, as well as brush and accumulated surface fuels, such as needle caste. Underburning would reduce duff layer thickness, but not remove it entirely. Occasional “torching” could occur causing small group (4 - 8 trees) or individual tree mortality in trees upwards of 24 inches dbh. At the extreme, prescribed burning could kill up to 10 percent of stand basal area, predominantly in smaller trees less than 12 inches dbh. Stand growth between prescribed burning treatments would exceed burn mortality, such that stand density and average dbh would continue to increase over time. Burning would be conducted according to a prescribed fire plan developed for the maintenance project. Fire prescriptions would be developed to meet resource objectives, including retention levels of desirable small and midstory trees. Prescribed burning would not be expected to measurably alter stand overstory structure or canopy closure, but would remove most understory vegetation, including most seedlings and young trees less than 4 inches dbh.

Mechanical Treatment: Mechanical treatments would vary depending on the type of establishing vegetation and ground conditions, such as amount of surface rock. Most likely, mastication or tractor crushing would be used to treat small trees and woody shrubs. Stands containing predominantly herbaceous or young, non-sprouting vegetation may be treated by discing. Discing would only be used where soil and watershed Best Management Practices (BMPs) could be applied, so that the effects of soil disturbance would be minimized. Concentrations of dead fuels may be machine piled and burned according to a prescribed burn plan. Dozer-type equipment may cause minor soil compaction or soil disturbance, particularly where track equipment makes turns. Equipment would only operate when soils are dry such that the risk of compaction is minimized. Discing could cause damage to tree roots. Extensive discing on the Eagle Lake Ranger District indicates root damage from discing is generally minimal and produces little to no observable affects. Residual trees could be damaged by equipment accidentally rubbing up against them, or by accidentally crushing or running over smaller "leave' trees. Damage to the overstory is expected to be rare because of the relatively wide tree spacing. Areas of desirable regeneration would be avoided by equipment to provide protection.

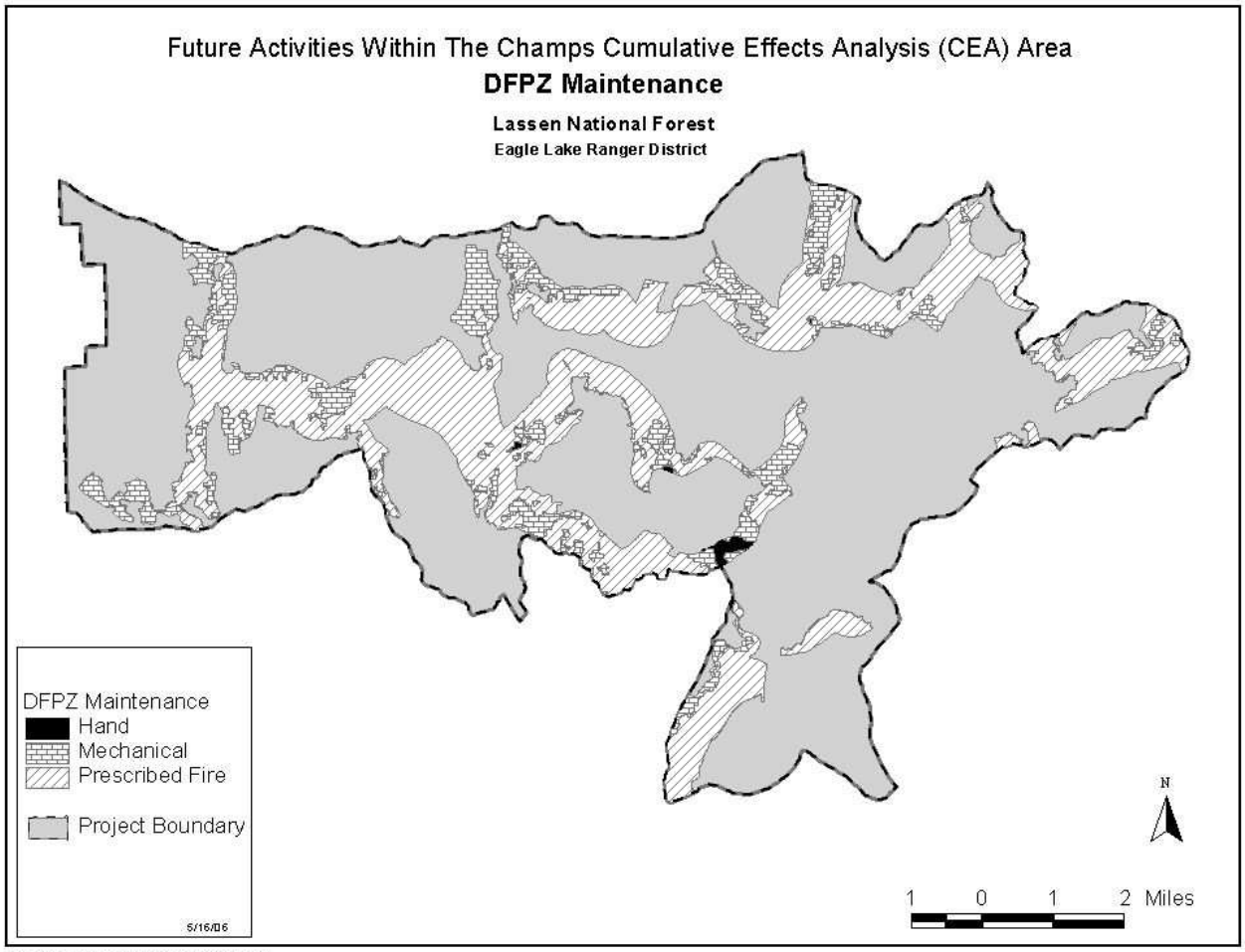
Table B-5. Summary of Acres of Potential Maintenance Treatments

Treatment Type	Acres Treated
Hand Treatment	71
Prescribed Fire Treatment	7,547
Mechanical Treatment	2,221
Total	9,839

Table B- 6. Summary of Acres of Reasonably Foreseeable Future Vegetative Management Actions on National Forest System land by Treatment Type (from Table B-3 and B-5)

Treatment Type	Acres Treated
Underburning	1,147
DFPZ thinning (thin from below)	5,305
Group selection	509
Area thinning (thin from below)	2,932
Aspen enhancement	2
Fire lookout site clearing	37
DFPZ maintenance	
Underburning	11,455
Hand treatments	71
Mechanical treatments	2,221

Figure B-1 – Potential DFPZ Maintenance



Source: Eagle Lake Ranger District GIS Shop

Figure B-2, Alternative 1 – Proposed Action (DFPZs, group selection, and area thinning)

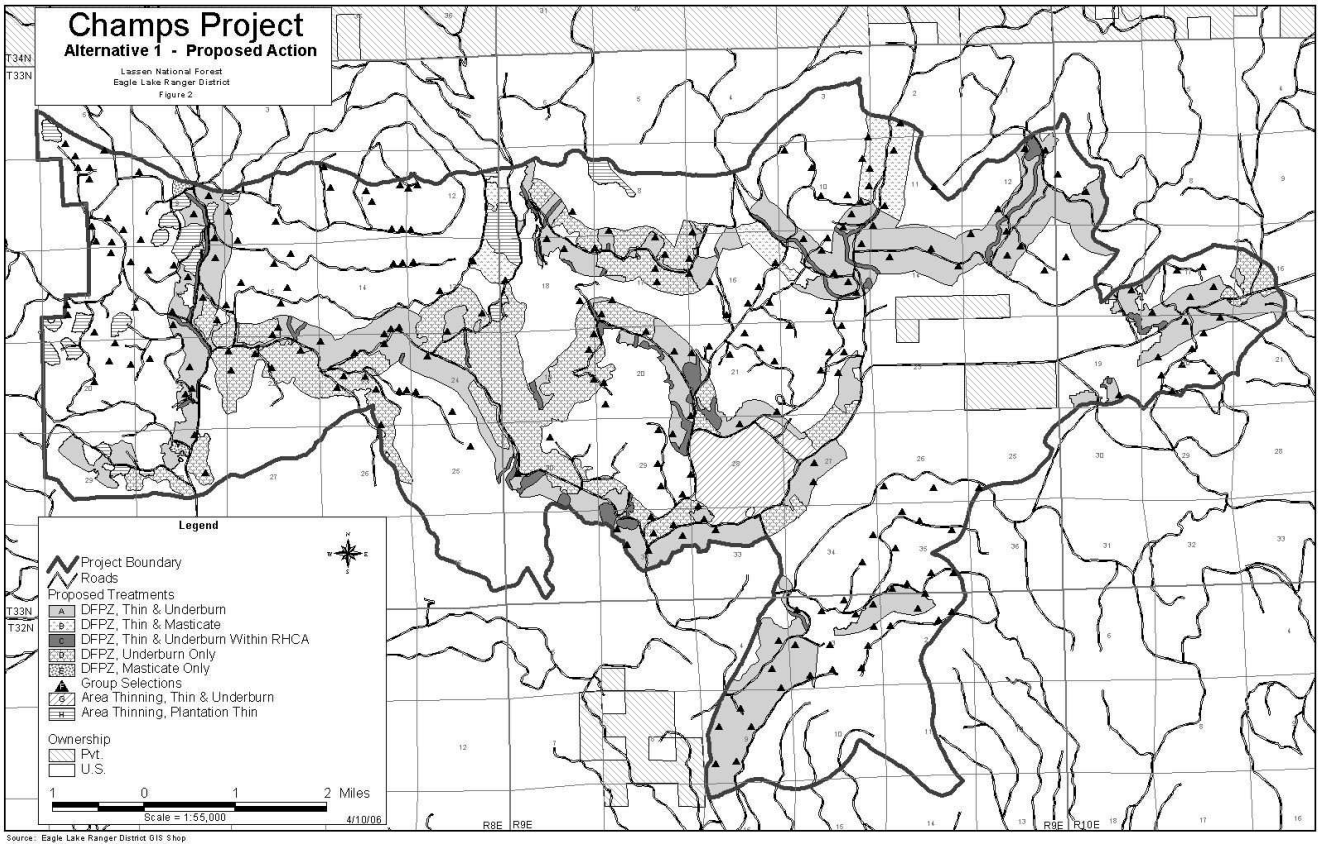


Figure B-3, Alternative 1 – Proposed Action (transportation system)

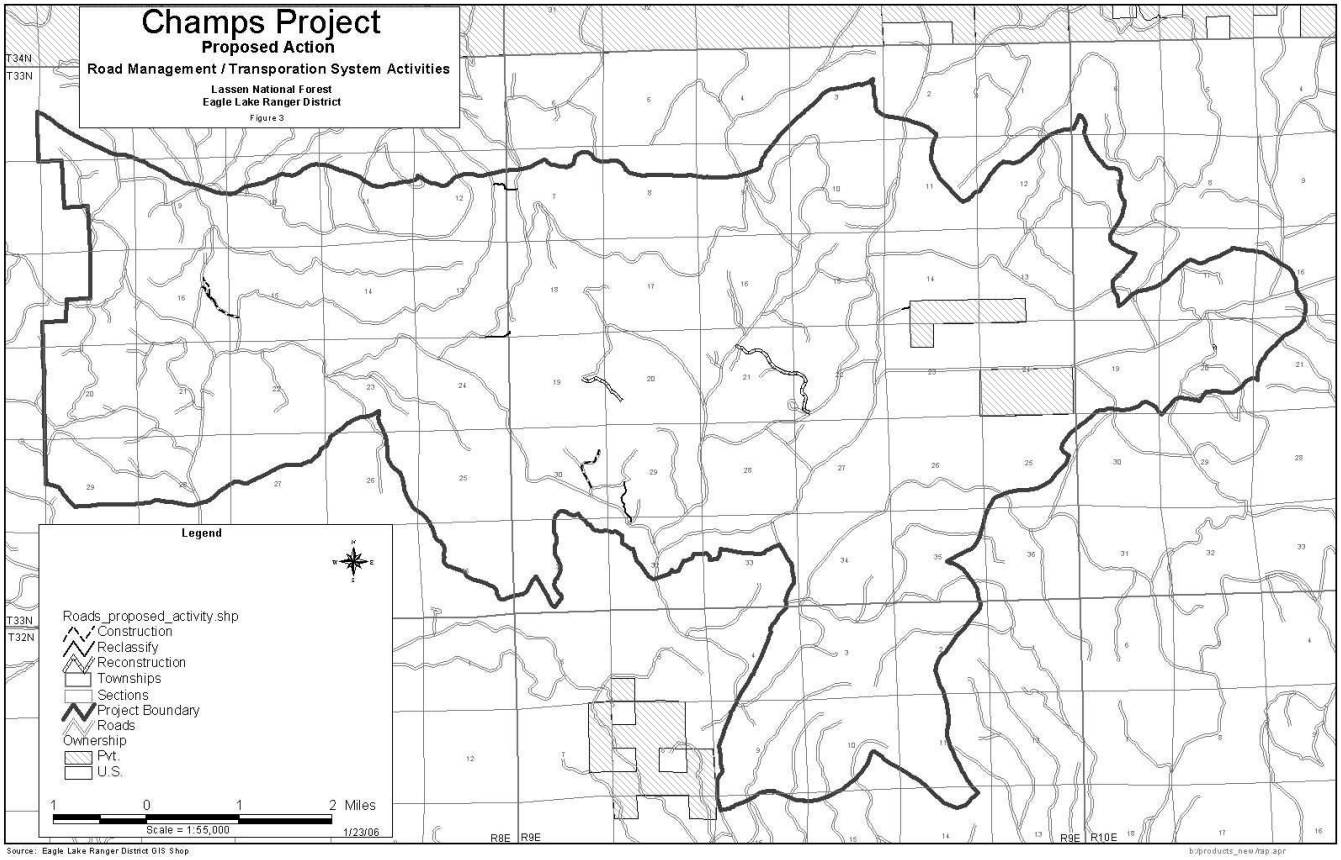
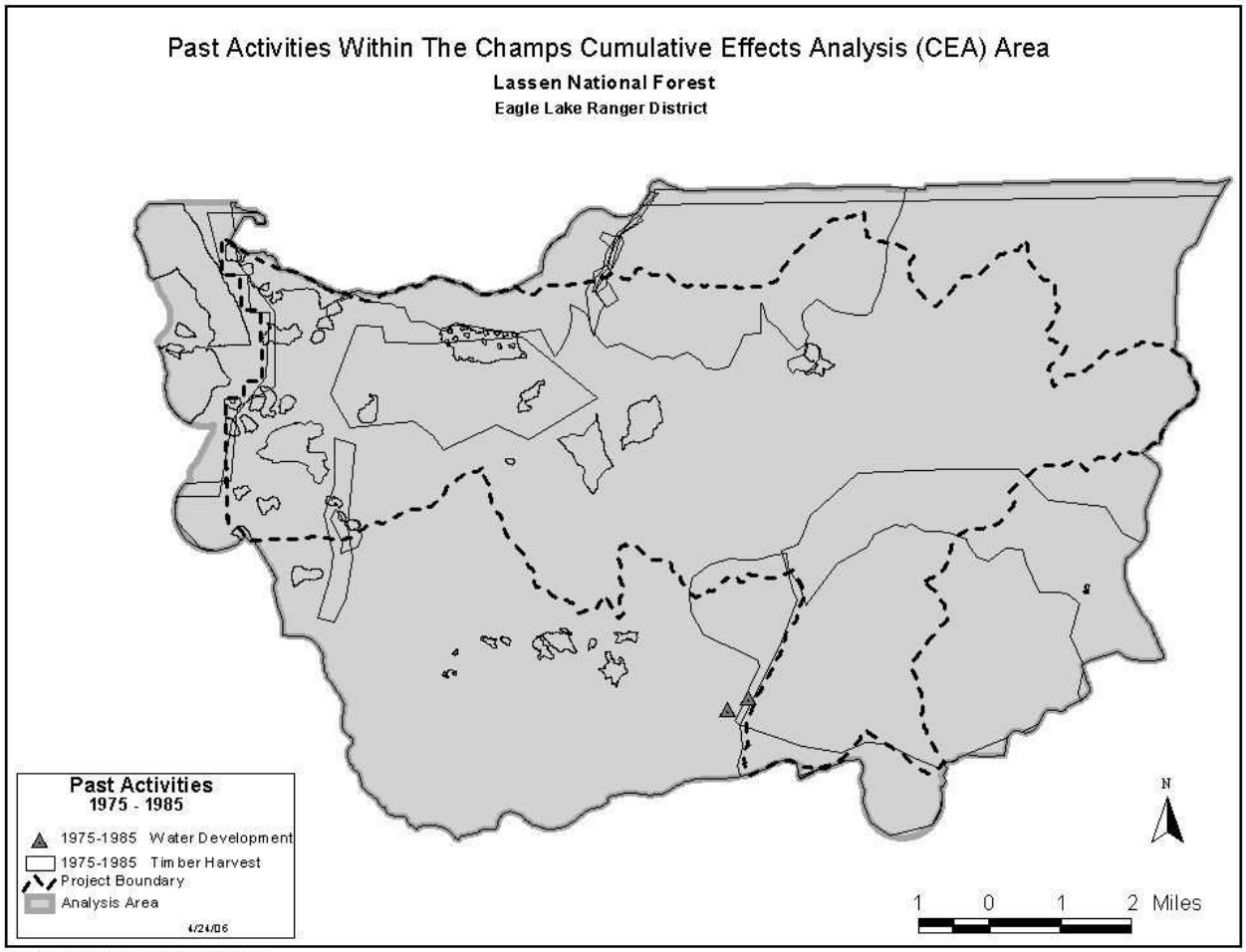
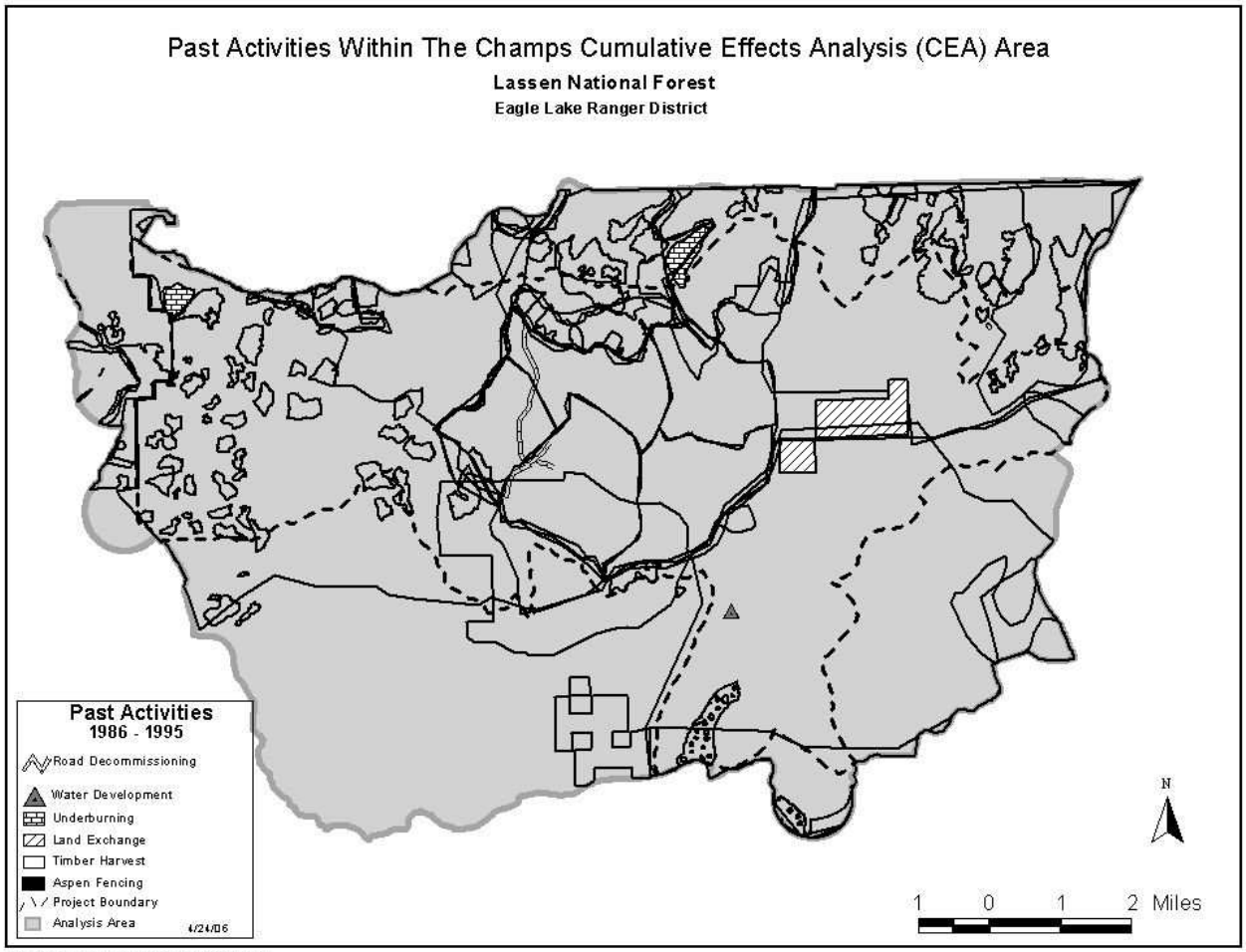


Figure B-4, Past Activities (1975-1985)



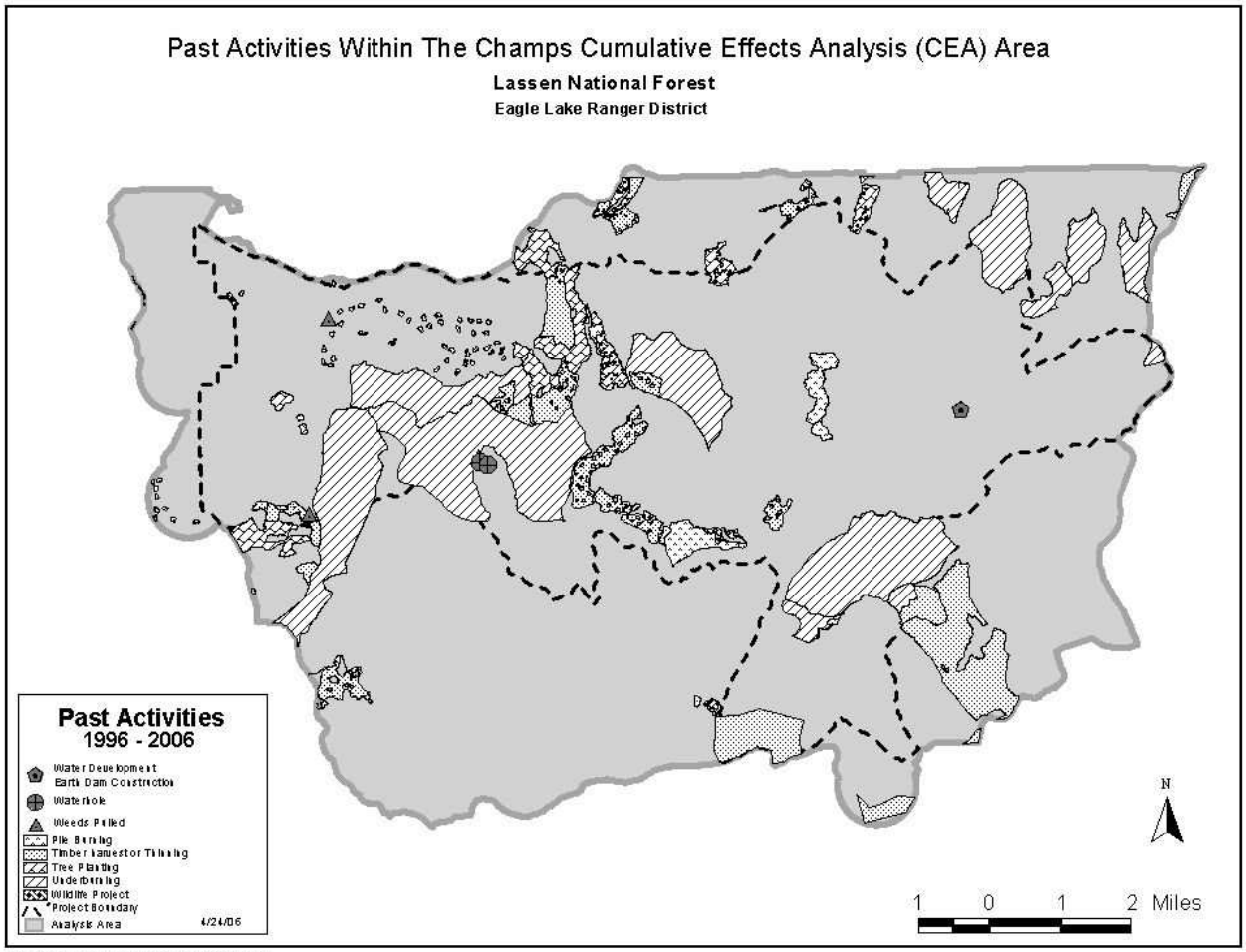
Source: Eagle Lake Ranger District GIS Shop

Figure B-5, Past Activities (1986-1995)



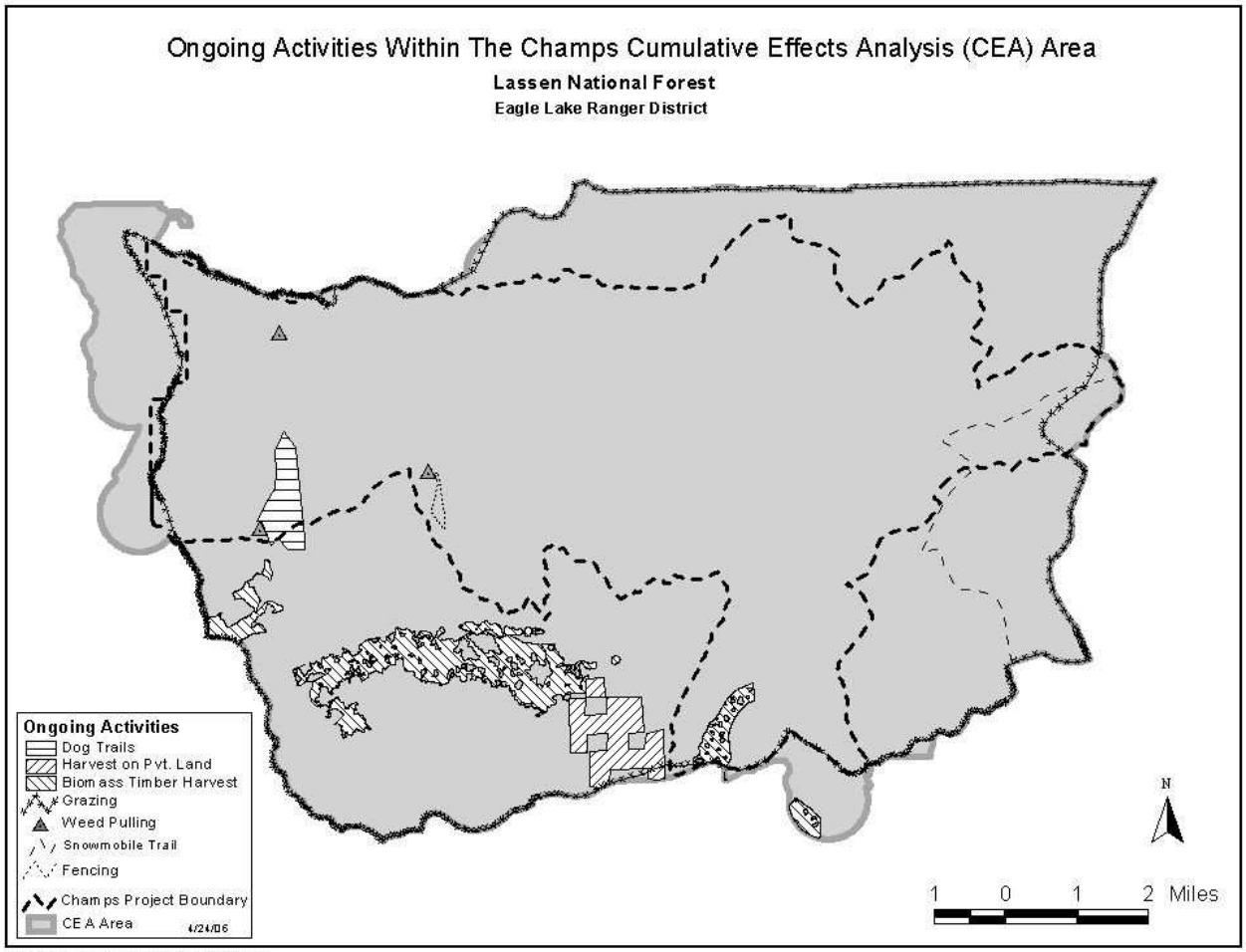
Source: Eagle Lake Ranger District GIS Shop

Figure B-6, Past Activities (1996-2006)



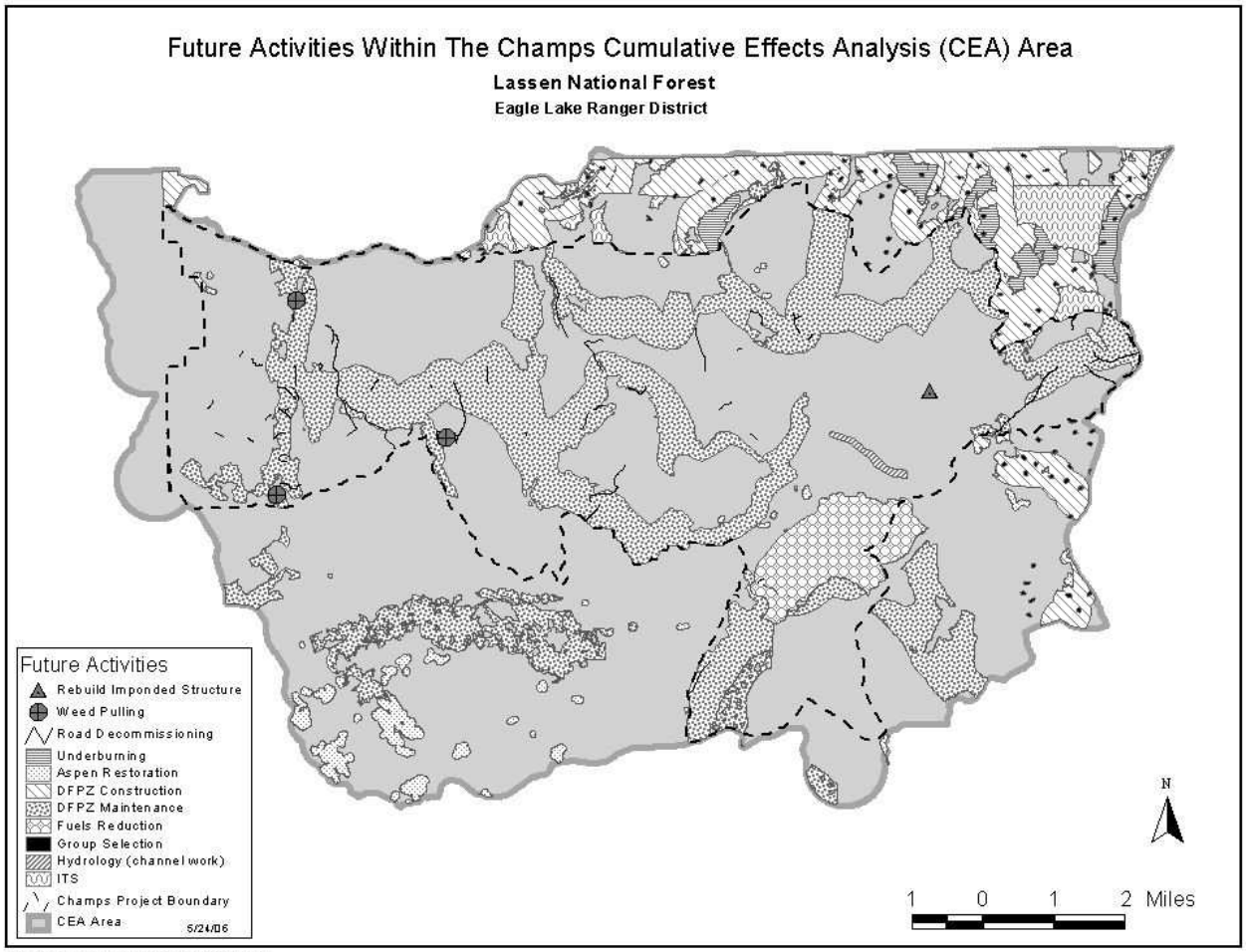
Source: Eagle Lake Ranger District GIS Shop

Figure B-7, Ongoing Activities



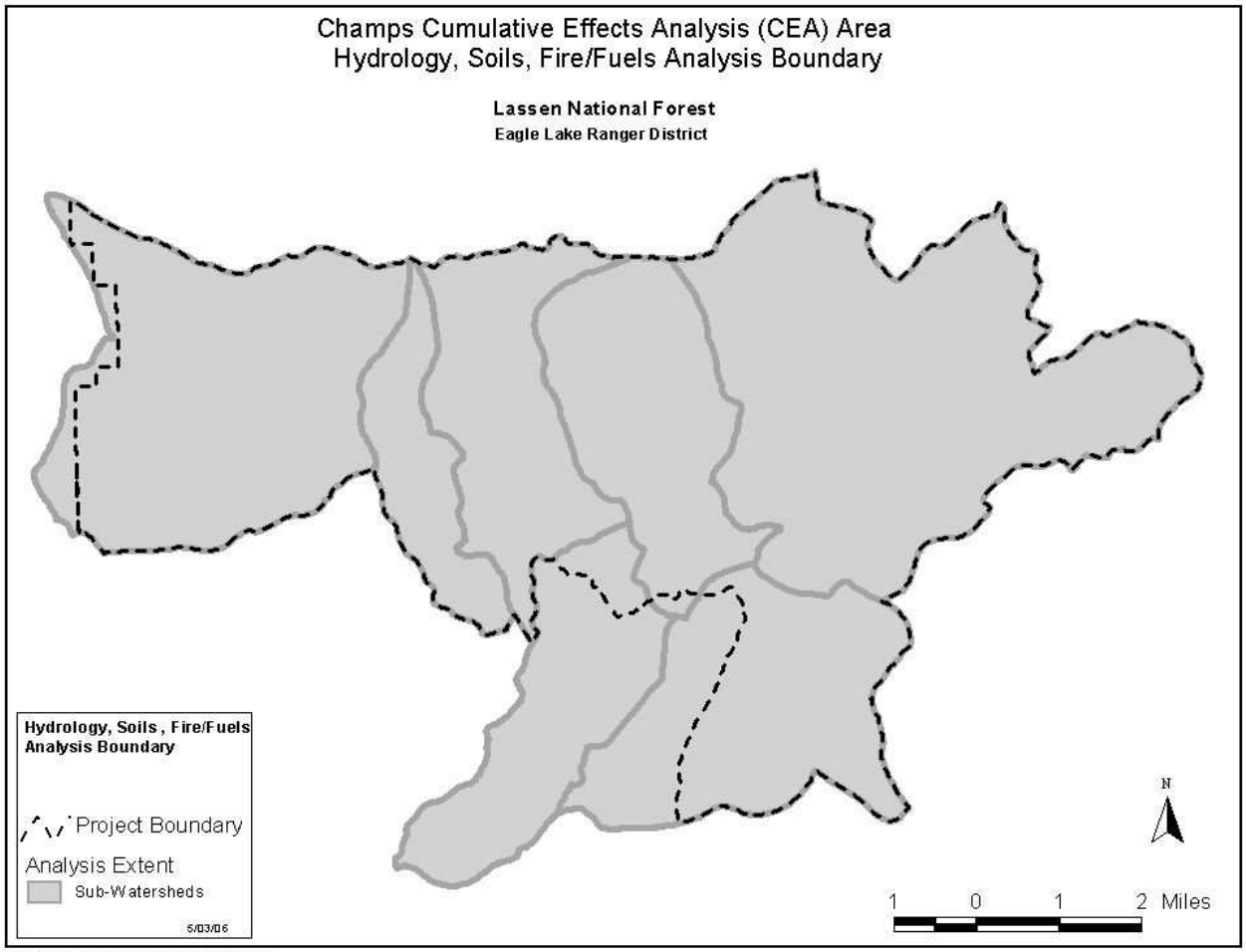
Source: Eagle Lake Ranger District GIS Shop

Figure B-8, Reasonably Foreseeable Future Activities



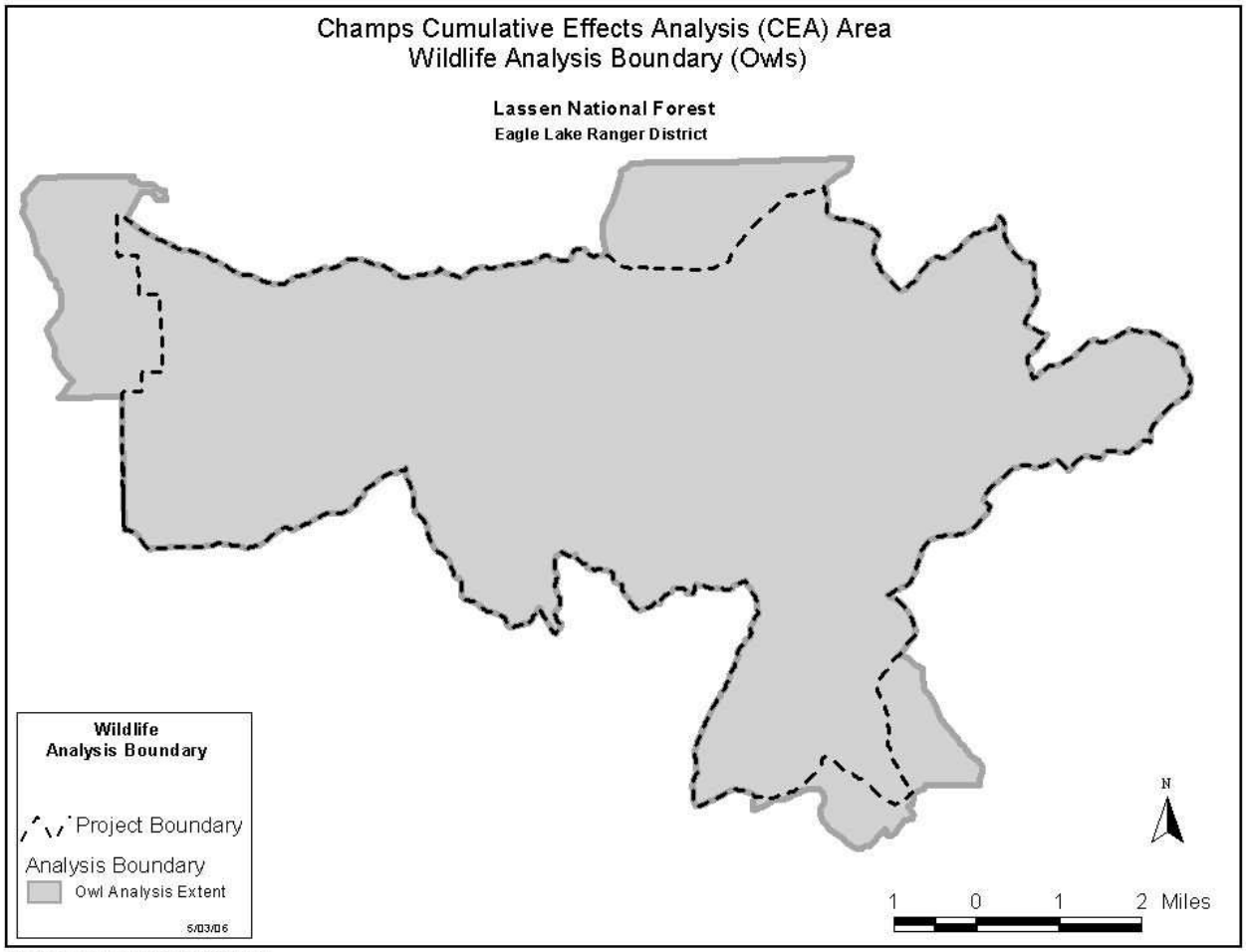
Source: Eagle Lake Ranger District GIS Shop

Figure B-9, Hydrology, Soils, Fire/Fuels CEA area



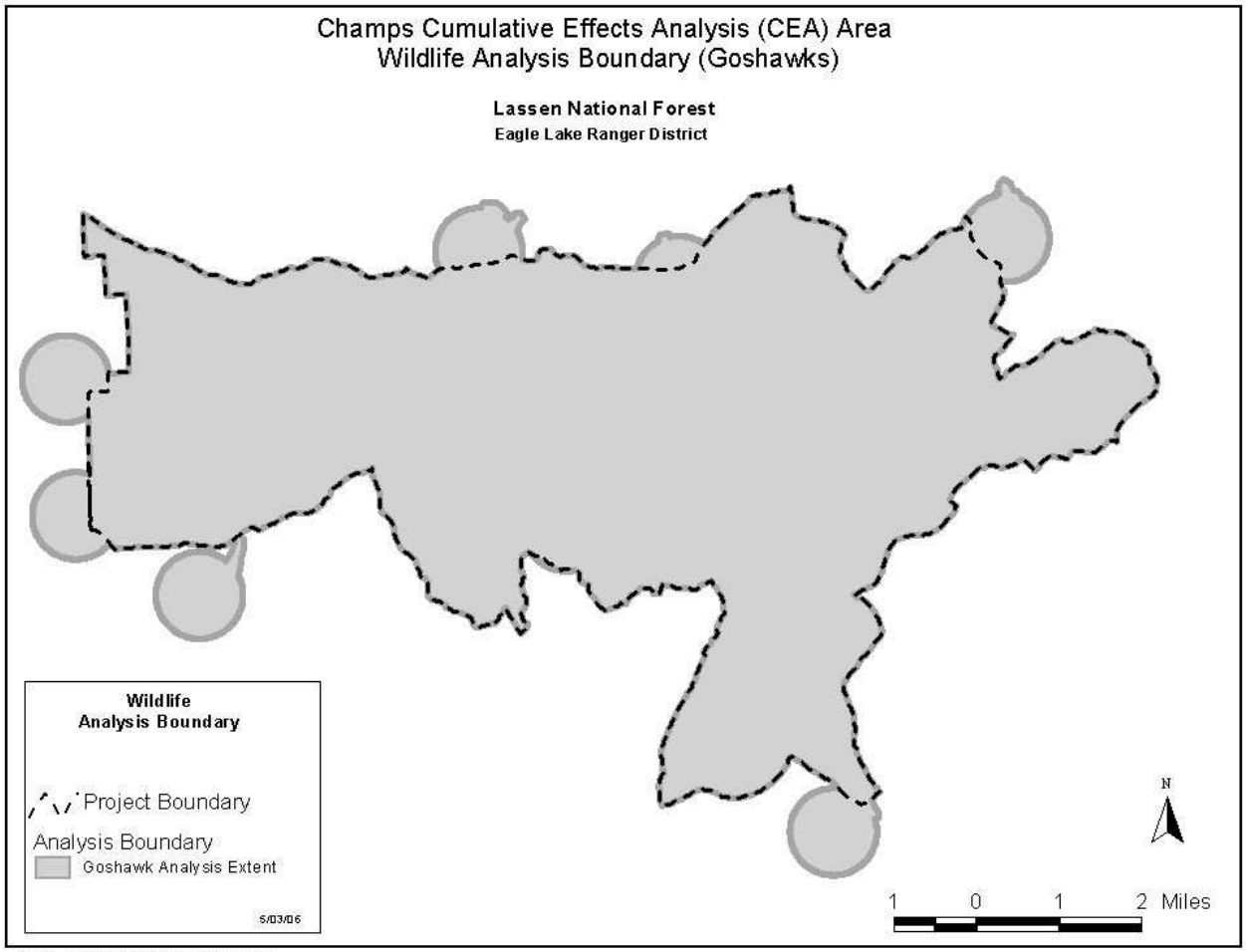
Source: Eagle Lake Ranger District GIS Shop

Figure B-10, California spotted owl CEA area



Source: Eagle Lake Ranger District GIS Shop

Figure B-11, Northern goshawk CEA area

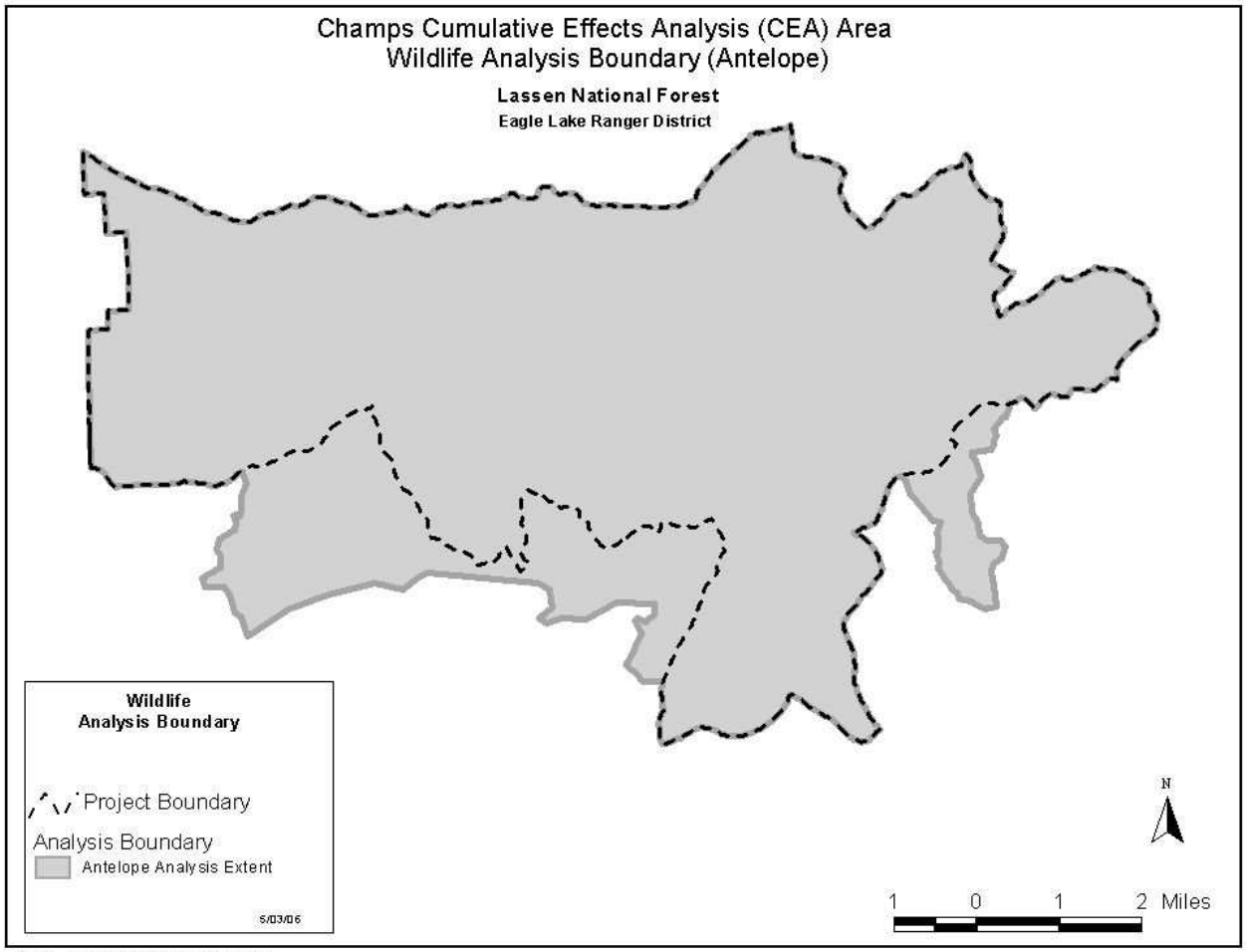


Source: Eagle Lake Ranger District GIS Shop

Figure B-12, Sandhill crane CEA area

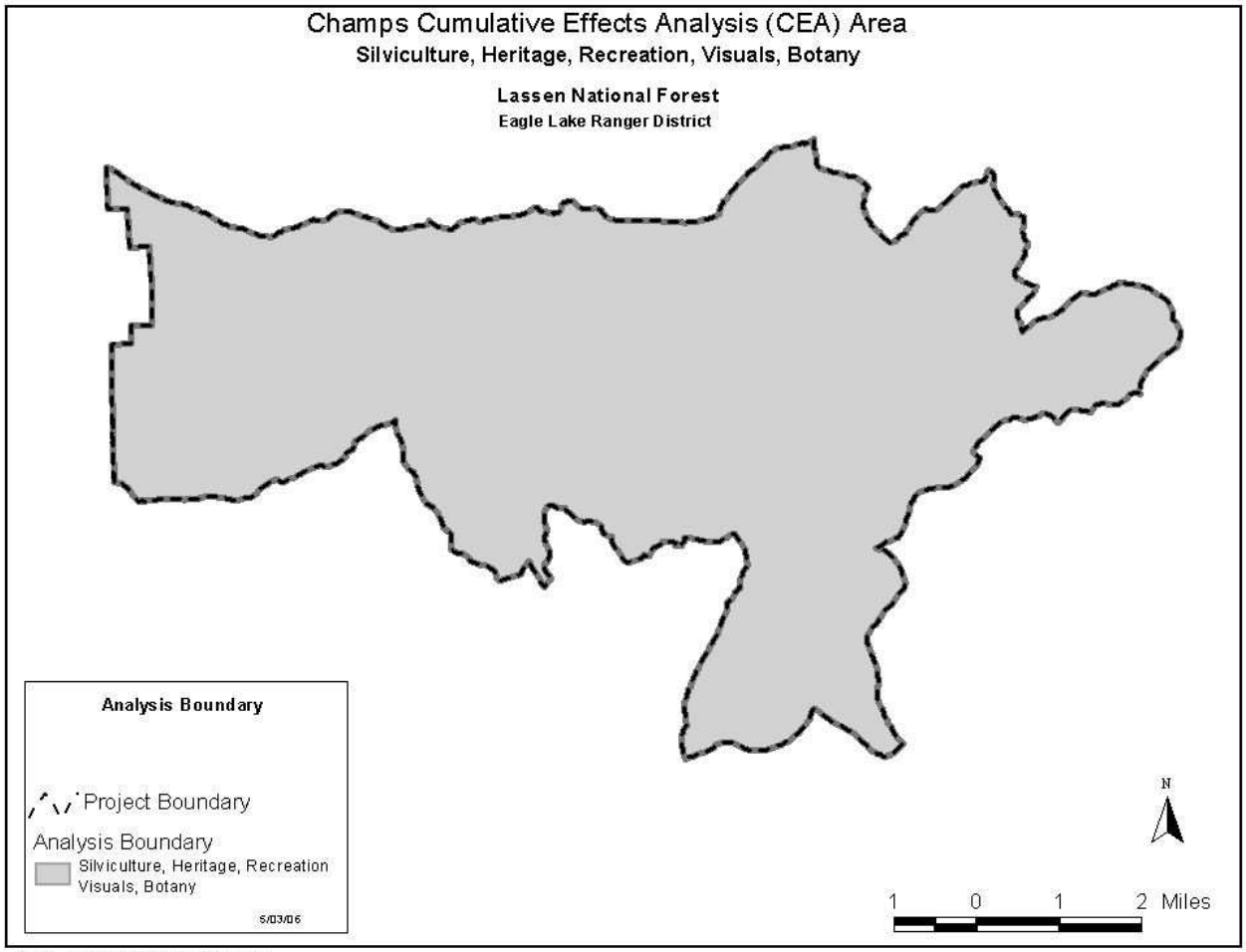
Source: Eagle Lake Ranger District GIS Shop

Figure B-13, Antelope CEA area



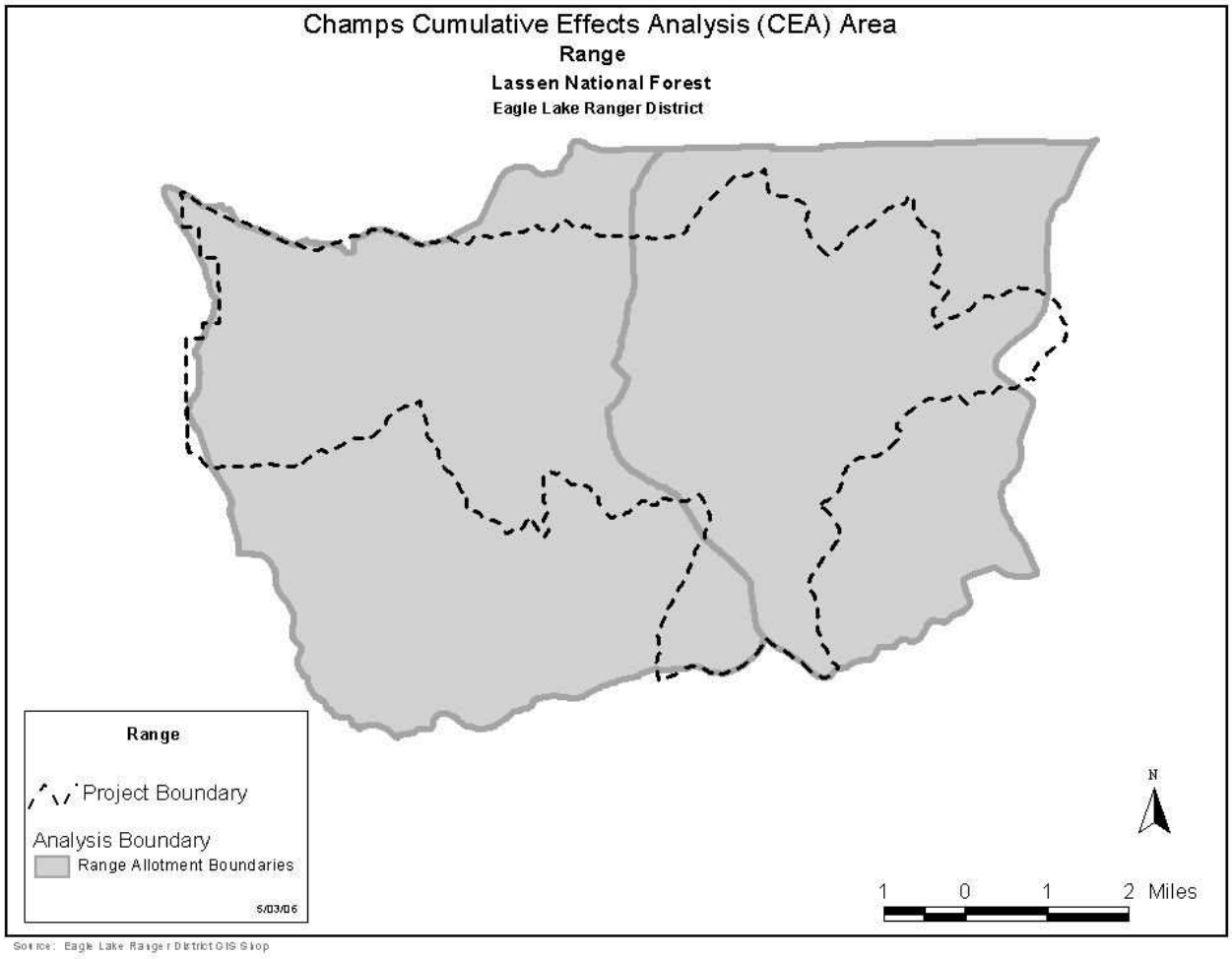
Source: Eagle Lake Ranger District GIS Shop

Figure B-14, Silviculture, Heritage, Recreation, Visuals, and Botany CEA area



Source: Eagle Lake Ranger District GIS Shop

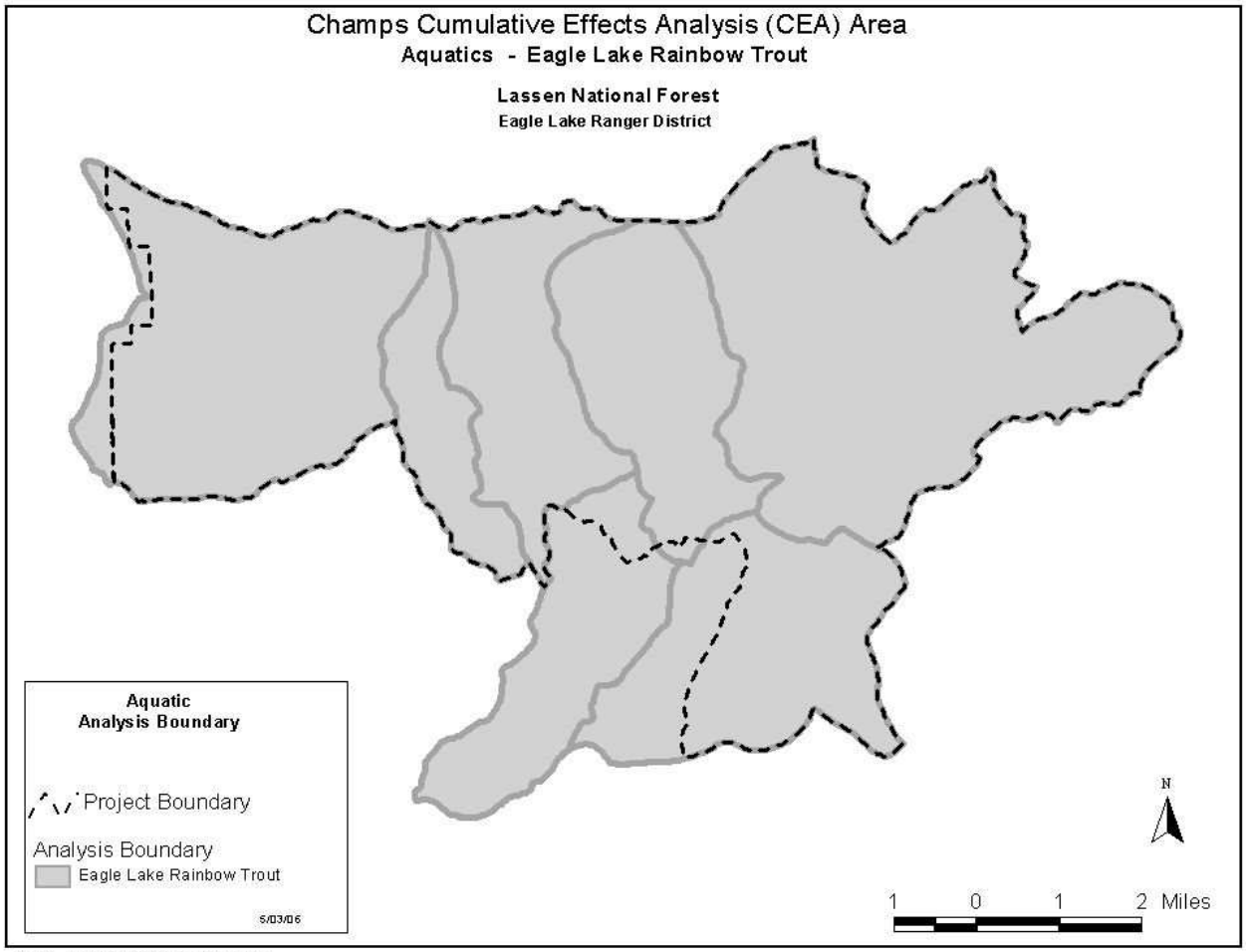
Figure B-15, Range CEA area



Source: Eagle Lake Ranger District GIS Shop

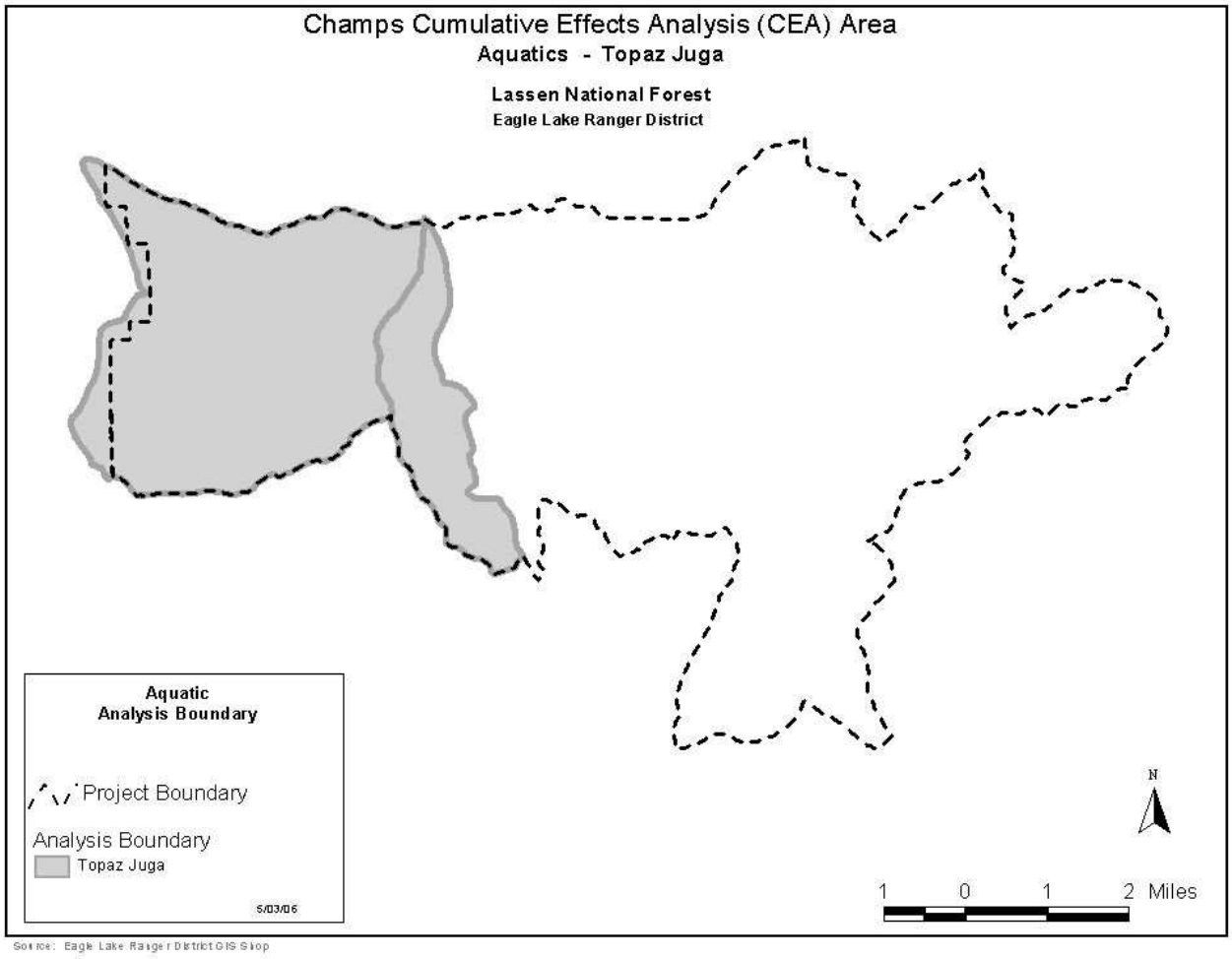
Note: The cumulative effects analysis area (CEA) for range includes the Harvey Valley and Champs Flat Allotments. The Champs project area also slightly overlaps a third allotment on the east (North Eagle Lake Allotment); however, this allotment was not included in the CEA for range because: 1) the same permittee uses the Champs Flat and North Eagle Lake Allotments, 2) the same herd of cattle are used in both allotments on a rotational basis, and 3) the overlap area is heavily timbered and essentially not used by the cattle. Past, ongoing, and reasonably foreseeable future activities within the overlap area are considered for cumulative effects for all resources.

Figure B-16, Eagle Lake rainbow trout CEA area



Source: Eagle Lake Ranger District GIS Shop

Figure B-17, Topaz juga CEA area



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Connaughton, James L. 2005. Guidance on the Consideration of Past Actions in Cumulative Effects Analysis. Council on Environmental Quality. Memorandum to Heads of Federal Agencies.