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Shasta-Trinity
National Forest

Shasta McCloud
Management Unit

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Final Environmental Impact Statement

Pilgrim Vegetation Management Project

Elk Flat in the Pilgrim Vegetation Management Project Area

Pilgrim Vegetation Management Project
Final Environmental Impact Statement

Siskiyou County, California

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Abstract: The Environmental Impact Statement considers four alternatives in detail. Alternative 4 is the no action alternative. Alternative 1, the Preferred Alternative, would restore forest health and ecosystem functions by:

- commercial thinning and sanitation harvest on approximately 3,100 acres of overstocked coniferous stands
- sanitation and salvage harvest on approximately 10 acres of knobcone pine
- regenerate approximately 415 acres of diseased and insect infested stands; 15% green tree retention will not be met on approximately 255 of these acres because there are not enough disease-free trees to meet this standard. All regeneration units will be replanted with healthy conifer seedlings
- releasing approximately 20 acres of aspen by removing competing conifers,
- restoring approximately 275 acres of dry meadows by removal of encroaching conifer trees
- underburning approximately 200 acres of natural and activity fuels
- mechanically piling and burning approximately 700 acres of activity fuels
- closing approximately 10 miles of roads to reduce maintenance costs
- decommissioning approximately 2 miles of roads not needed for future management
- reconstructing one road-stream crossing
- construct approximately 0.3 miles of new road needed for present and future management.

Alternative 2 is the same as Alternative 1 except that on approximately 535 acres of proposed thinning/sanitation, canopy closure would be maintained at 60% on average. Alternative 3 is the same as Alternative 1 except that on approximately 415 acres of regeneration harvest, 15% of the area would be retained in trees that are generally the largest and/or oldest trees in the stands even though they are diseased.

Summary

The Shasta Trinity National Forest proposes to restore forest health and ecosystem functions by:

- commercial thinning and sanitation harvest on approximately 3,100 acres of overstocked coniferous stands
- sanitation and salvage harvest on approximately 10 acres of knobcone pine
- regenerate approximately 415 acres of diseased and insect infested stands; 15% green tree retention will not be met on approximately 255 of these acres because there are not enough disease-free trees to meet this standard. All regeneration units will be replanted with healthy conifer seedlings
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The area affected by the proposal includes a portion of the McCloud Flats approximately 6 miles northeast of the town of McCloud, California.

This action is needed because an interdisciplinary team identified several circumstances where the desired conditions described in the *Shasta Trinity National Forest Land and Resource Management Plan*[1] (Forest Plan) differ from the existing condition within the assessment area. Within the project area overstocked stands, insect killed and infested trees and root disease areas are preventing attainment of Forest Plan objectives for forest health, wildlife habitat, and timber growth/yield for matrix and riparian reserve lands. In some areas fuel ladders and surface fuel accumulations exceed Forest Plan standards. Aspen, oak, willow and dry meadow habitat are being lost due to competition with conifers and fire exclusion. There is a higher than desired open road density.

The Notice of Intent (NOI) to prepare this environmental impact statement was published in the Federal Register on February 14, 2005. The NOI asked for public comment on the proposal from February 14 to March 14, 2005. In addition, the agency published new releases in the *Redding Record Searchlight* on February 14, 2005 and the *Mount Shasta Herald* on February 16, 2005. Letters, including a copy of the Notice of Intent and a map of the proposed action, were sent to four environmental groups known to be interested in vegetation management projects on the unit and one private landowner with property adjacent to the project area. This project has also been listed in the *Shasta-Trinity Schedule of Proposed Actions* (SOPA) since January 2004.

[1] USDA Forest Service 1995. *Shasta Trinity National Forest Land and Resource Management Plan*.

The unit has met with both the Winnemem Wintu and Pit River Tribes and presented them each with a copy of the Pilgrim Proposed Action map. Additional public scoping was initiated with a public scoping notice in the *Mount Shasta Herald* and *Record Searchlight* newspapers, on September 21 and 22, 2005 respectively, to request public comment on a proposed non-significant Forest Plan amendment for the green tree retention standard; about 255 acres of the regeneration units would not meet the 15% green tree retention standard due to extensive root disease. In addition, letters requesting comments on the proposed non-significant Forest Plan amendment were mailed to those previously contacted about the action, those persons or groups that expressed interest in the project, and additional persons/groups that may be affected by the project (e.g. permittees, user groups).

The Forest invited the public on two field visits to the project area. Invitations for a field tour on June 25, 2005 were mailed to eight persons or groups that expressed interest in the project (letter dated June 16, 2005). No members of the public turned out for the June field tour. A notice was published in the *Mount Shasta Herald* newspaper on November 2, 2005, inviting the public on a field tour of the project area on November 15, 2005. Additionally, invitations were mailed to persons or groups that expressed interest in the project (letter dated November 1, 2005). Two interested citizens, a timber industry member, California Fish and Game, and the U.S. Fish and Wildlife Service participated in the November tour. Comments made during the tour were supportive of the proposed action. An email was received the day after the tour from a person who could not attend.

Comments received during scoping are found in Appendix B of this document.

As a result of scoping two significant issues were identified:

1. The proposed action could adversely impact critical habitat for the northern spotted owl, including dispersal habitat and forage habitat, by reducing crown closure and harvesting trees greater than 20 inches in diameter at breast height, and by removing and fragmenting habitat in stands to be regenerated. These actions would also reduce habitat for the northern goshawk and other old-growth dependent species, including the late-successional group of management indicator species.
2. The proposed action could adversely impact snag-dependent management indicator species by harvesting existing snags, diseased trees and potential future snags over 20 inches in diameter at breast height.

These issues led the agency to develop alternatives to the proposed action. Alternative 2 would maintain an average 60% canopy closure in all thinning areas where feasible (approximately 535 acres). Alternative 3 would retain 15% of the largest and oldest trees in the regeneration units (approximately 415 acres) even though some of the trees left to meet the 15% retention standard are diseased and would perpetuate root disease in these stands. All other actions for Alternatives 2 and 3 are the same as Alternative 1.

Distribution of the Draft Environmental Impact Statement:

The Notice of Availability of the Pilgrim Vegetation Management Project Draft Environmental Impacts Statement (DEIS) was published in the Federal Register on June 23, 2006. The Legal Notice for Comment was published in the Redding Record Searchlight on June 28, 2006. Copies of the DEIS were mailed to the Federal, State and Local agencies and the publics listed in Chapter 4 of the DEIS on June 19, 2006. The comment period for the DEIS ended on August 7, 2006. Timely comments were received from three environmental groups, one local government agency, one timber company, one tribal group and one individual. A summary of comments received and the Forest Service responses is found in Appendix K.

Major conclusions

Direct, indirect, and cumulative effects are addressed for each resource area potentially affected by the project. As a result of this analysis, the following conclusions were drawn.

Approximately 670 acres of low quality Northern Spotted Owl dispersal Habitat within Critical Habitat Unit CA-2 will be temporarily removed and about 840 acres of low quality dispersal habitat will be temporarily degraded. No nesting, roosting or foraging habitat for the Northern Spotted Owl would be affected. Northern Spotted Owl may be affected but is not likely to be adversely affected. The project area is considered poor habitat for Northern Spotted Owls and none have been found based on surveys and observations over the last fifteen years.

Twenty-one openings totaling approximately 415 acres and ranging in size from 5 to 40 acres would be created on the landscape. These openings would be the result of removing dead and dying trees suffering from insect infestation and root disease. Removal of these diseased trees will remove the disease vector and aid in breaking the disease cycle. Reforestation of these areas will be with a mix of conifer tree species.

Approximately 130 acres of commercial forestland will be dedicated to landings, main skid trails and permanent road construction.

Beneficial effects from the project to forest health include development of open pine stands stocked at sustainable densities that are more resistant to insects, disease and catastrophic wildland fire. Riparian plant species, aspen and oaks will be more abundant and sustainable. Riparian uplands will support healthier trees and contribute to meeting the Aquatic Conservation Strategy Objectives. Acres of open dry meadows will increase and be more representative of historic conditions.

The three action alternatives will provide timber products that will benefit the local and regional economy.

Based upon the effects of the alternatives and comment from the public on the DEIS, the responsible official (Forest Supervisor) will decide whether to approve the Proposed Action or an alternative design that would move the area toward desired conditions, or to not implement the project at this time.

Changes Made to the Final Environmental Impact Statement

The following changes were made to the Final Environmental Impact Statement, Based on comments received on the Draft Environmental Impact Statement and marking done to-date:

- Unit 208 has changed from 40 acres of thinning/sanitation to 40 acres of GTR meeting the 15 percent retention guideline. This increased the acres of regeneration harvest but did not change the effects, since these acres were already part of the 670 acres of Spotted Owl dispersal habitat considered removed.
- The effects to T&E Species were revised to show some minor effects to the Northern Spotted Owl.
- The MIS Section was revised to better meet the forest and regional standards.
- A Purposed and Need Section was added for Road Management.
- The definition of thinning was refined to include removing some dominant and co-dominant trees if needed to meet the desired stocking.
- Public Safety was added as a Design Criteria in the Alternative Section.
- The estimation of snags retained after harvest was increased based on marking to-date that showed none of the existing snags are suitable for harvest.
- Survey information for Goshawks and Pine Martens was included.
- Additional reasons are given in the Hydrology Section for not using the Equivalent Road Acres method for cumulative watershed impacts.
- The Best Management Practices Annual Monitoring results for the past three years were added to the Hydrology Section.
- Adverse effects of No Action were added to the section on Unavoidable Adverse Effects.
- Specific wording and an analysis of the proposed forest plan amendment was added to Chapter 3.
- An Alternative 7 was added to the section on Alternatives Considered but Eliminated from Detailed Study.

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Chapter 1: Purpose of and Need for Action

Document Structure

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

- **Chapter 1. Purpose and Need for Action**: This chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- **Chapter 2. Alternatives, including the Proposed Action**: This chapter provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- **Chapter 3. Affected Environment and Environmental Consequences**: This chapter describes the existing conditions of the project area and the environmental effects of implementing the proposed action and other alternatives.
- **Chapter 4. Consultation and Coordination**: This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement.
- **Appendices**: The appendices provide more detailed information to support the analyses presented in the environmental impact statement.
- **Index**: The index provides page numbers by document topic.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Mount Shasta District Office in Mount Shasta, California. Throughout the analysis, these documents are referred to and incorporated by reference in support of information described.

Footnotes are used throughout the analysis to cite referenced material as well as to provide further information, supporting information, or clarifications.

Introduction

Over the last decade the Forest Service has been monitoring the incidence of black stain and annosus root disease on the McCloud Flats through establishment of plots and field and aerial surveys. In the last three years the incidence of Western Pine Beetle has also been observed and tracked, resulting in a number of salvage sales to reduce long-term ground fuel accumulations and increased fire hazard. The Pilgrim project area has been a known root disease activity zone for several decades and the spread of the disease has become more prevalent in recent years.

As a result of this monitoring, the Shasta-Trinity National Forest proposes vegetation management on approximately 3,800 acres within an 8,500-acre assessment area with the Pilgrim Vegetation Management Project. Project activities were designed to address declining forest health in areas of root disease and overstocking; loss of aspens, willows, oaks, and dry meadows; and increasing fuel loads. The project is about 6 miles northeast of McCloud, California, on the Shasta-McCloud Management Unit (Township 40 North, Range 1 West, Sections 2-5, 7-10, 14-23, 26 and 27; Township 41 North, Range 1 West, Sections 26, 27, and 31-35; and Township 40 North, Range 2 West, Section 12 Mount Diablo Meridian). Please see the attached maps.

Purpose and Need

The need for action was determined by comparing existing conditions in the field with the desired future condition for Management Areas 2 and 3 as described in the *Shasta-Trinity National Forest Land and Resource Management Plan*[2] (Forest Plan) on pages 4-80 to 81 and 4-84 to 85. Existing conditions were identified from extensive field reviews of the project area, computer modeling of wildfire behavior/effects, and interdisciplinary planning.

The majority of the project (93%) is within the matrix land allocation as described in the Forest Plan[3]. The remainder is within the Riparian Reserve land allocation[4]. The project

Dynamics of the project area

This landscape was shaped by geologic processes (e.g. volcanic eruptions and mudflows) that sometimes occurred at intervals shorter than the maximum lifespan of the trees occupying the areas. Repeated volcanic activity prevented the long-term formation of a mature soil profile, favoring ponderosa pine, shrub, and herbaceous vegetation.

Wildfires were frequent (every 5-15 years), low intensity surface fires. These low intensity fires consumed small conifers and other material, maintaining an open forest stand. Recurrent fires stimulated the bunch grasses.

Early accounts of the area include descriptions of open pine stands. Early explorers describe a large expanse of "desert" or dry meadow in the central McCloud Flats.

Early logging (circa 1885) in the flats removed most of the trees, mainly large old pines. A study in 1907 showed that only 2% of the original vegetation remained in the area after railroad logging. Livestock grazing was unregulated during that time, reducing grasses.

Fire suppression and other practices since then have contributed to conditions departed from the natural disturbance regimes.

(Paraphrased from the *McCloud Flats Ecosystem Analysis* [USDA Forest Service 1995] and November 15, 2005 Field Tour)

[2] USDA Forest Service, 1995.
[3] Forest Plan, page 4- 61.
[4] Forest Plan, page 4-53.

area is also located within Designated Critical Habitat for the northern spotted owl.

The interdisciplinary team identified several resource conditions where the desired conditions described in the Forest Plan differ from the existing condition in the planning area. These conditions provide the basis for the proposed action.

These conditions are briefly discussed below. A detailed explanation of the existing and desired conditions relative to the purpose and need are described at the end of this section.

- Overstocked stands, insect infested trees and root disease areas prevent attainment of forest health, wildlife habitat, and timber growth/yield Forest Plan objectives in matrix lands.
- In areas where fuel ladders and surface fuel accumulations exceed Forest Plan standards, the potential for catastrophic fire[5] exists.
- Where trees are overstocked, suffering root disease, and/or fuel levels are increasing from tree mortality in Riparian Reserves, the loss of the forest overstory trees diminishes potential woody debris recruitment for in-stream habitat features needed to detain annual runoff.
- Aspen, oak, willows and dry meadow habitat are being lost due to competition with conifers and fire exclusion.
- High road density with some user created roads that are not needed for forest management.

As a result of the comparison of existing and desired conditions, the following main purposes were identified for the project:

- Improve forest health, growth, and sustainability in matrix and riparian reserves.
- Reduce surface and ladder fuels so that wildfires in forest stands burn mainly with low intensity, without significant watershed impacts or habitat loss.
- Reduce the potential for catastrophic loss of overstory trees from fire, root disease, or insects by improving forest health and reducing fuels to maintain a source of woody debris recruitment for in-stream habitat features within Riparian Reserves.
- Maintain and enhance aspen, oaks, and dry meadow/open pine savannah forest types/plant communities.
- Reduce road density by decommissioning and closing roads not needed for forest management on a regular basis. The next section describes more specifically desired and existing conditions for the area and the needed for action.

[5] Catastrophic and stand replacing are used interchangeably and as used in this analysis mean tree mortality at the stand level through flame contact or radiant heat to tree crowns killing more than 70% of the live crown or intense surface fire that kills the cambium or roots, killing the tree.

Improve Forest Health/Growth

Existing Condition

Each stand within the project area was field examined by a Certified Silviculturist to determine current stand attributes including age, site class, basal area, mortality levels, presence of root disease and stand density. The Northern Province Pathologist, Pete Angwin and Northern Province Entomologist, Dave Schultz were also involved in field examinations to determine the extent and type of root diseases present in the stands proposed for regeneration harvest. Their site specific recommendations were then incorporated into the silvicultural prescriptions[6].

Elevations in the project area range from about 3,800 to 4,000 feet elevation and slopes are generally flat. The project area contains primarily 75-110 year old ponderosa pine (*Pinus ponderosa*) stands and scattered pine plantations, but other conifer species are present including white fir (*Abies concolor*), incense-cedar (*Calocedrus decurrens*), a small stand of knobcone pine (*Pinus attenuata*), and occasionally Douglas-fir (*Pseudotsuga menziesii*) or sugar pine (*Pinus lambertiana*). The most common historical disturbance event was low intensity frequent fires, which maintained open stands of ponderosa pine.

The stands proposed for treatment have been experiencing ponderosa pine mortality from bark beetles in the last three years, as a consequence of root diseases, drought and, overdense growing conditions for the site (overstocking).

Blackstain root disease (*Leptographium wageneri*) infection centers have been recognized in densely stocked ponderosa pine stands in the project area since the early 1970s, and annosus root disease (*Heterobasidion annosum*) centers since 1980.[7] Recurrent drought or less than normal precipitation cycles have occurred in the McCloud Flats area about every 10 years since 1960[8]. During these periods of low precipitation, infected trees incur additional stress. Susceptibility to bark beetle attacks and mortality increases. The resultant mortality areas scattered throughout the project area range in size from approximately ¼ to 5 acres.

Approximately 785 acres of younger forest areas (25-45 year old pine plantations)[9] are overstocked with tree densities ranging from 300 to 400 stems (trees) per acre. Tree diameters in these stands range from approximately 4 - 16” at diameter breast height.

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[6] Stand Record Cards in Project File
[7] Freeman, Wilfred, *Biological Evaluation of Tree Mortality on McCloud Flats*, Forest Insect and Disease Management, May, 1977
[8] Dave Schultz, Northern Province Entomologist, Personal Correspondence, August 2005.
[9] Units: All or portions of 3, 4, 5, 23, 24, 25, 30, 67, 68 (C14), 68 (C15), 69,127, 128, 129, 240, 452, 2901, 2902, 3003. Identified as Biomass on the Alternative 1 map.

> **Root diseases in the Pilgrim Project area**
>
> Two types of root disease are affecting pines in the project area including annosus and blackstain. About 3,000 acres have scattered pockets of root disease are in the Pilgrim Creek Snowmobile Park vicinity alone, the majority in the project area. Annosus affects pine species and incense-cedar. A separate variety affects white and red fir. The strain of blackstain in the project area affects only pine species. A separate strain affects Douglas-fir.
>
> Root diseases are caused by pathogenic fungi that interfere with a tree's ability to take up water and nutrients. In addition to killing a tree, root disease can result in growth reduction and increased tree stress that allow insects, primarily bark beetles, to attack and kill trees.
>
> A healthy tree produces abundant resin that pitches out attacking beetles. When trees are moisture stressed, they cannot produce sufficient resin to resist insect attack. Conditions that results in excessive demand for moisture (such as tree crowding) or that reduces the ability of the roots to supply water to the tree (such as root disease) can cause moisture stress and increase susceptibility to bark beetle attack.
>
> Root diseases can spread when healthy pine roots come into contact with inoculum in infected roots or stumps. Mortality can continue as root-to-root contact is made with adjacent healthy trees, creating ever widening pockets of mortality. Infection centers enlarge on the margin at an average annual rate of 2 to 5 feet per year.
>
> Overland infection for annosum is through spores produced by the fungus, which occupy freshly cut stump surfaces. The disease colonizes the stump and major lateral roots where it may remain for 50 years depending on site conditions. Blackstain differs from annosum. Even though the fungus spreads rapidly through the root systems of living trees it does not survive in roots after the tree dies. It survives for a few years at the most in dead tissue.
>
> (Paraphrased from the *Silvicultural Report*, October 14, 2005)

Approximately 2,235 acres of 75-110 year old pine stands within the proposed thinning areas[10] range from approximately 180-260 square feet per acre of basal area in overstocked areas with corresponding stand density indices in the overstory ranging from 288-416. These stands exceed the maximum stocking levels of 150 square feet/acre of basal area and stand density indices of 230 recommended by research scientists for resistance to insect infestations[11]. These stands are not meeting the Forest Plan objectives regarding resistance to insects and disease or growth. These stands are also experiencing bark beetle mortality as a result of scattered root disease centers, overstocking, and periodic drought.

Approximately 40 acres are occupied with 150 year-old mature pine and white fir trees with an understory layer of 50-to-100-year-old white fir/ponderosa pine[12]. Stand densities in areas of overstocking range from 180 to 240 square feet/acre.

Approximately 10 acres are occupied with 70-to-80-year-old dead and dying knobcone pine[13,14], with scattered ponderosa pine and incense-cedar. A manzanita/chinquapin understory

[10] Units: All or portions of 1, 2, 4, 146, 213, 266, 324, 402, 403, 404, 405, 406, 409, 416, 417, 426, 427, 432, 433, 434, 435, 436, 441, 449, 450, 451, 454, 455, 457, 462. Identified as thinning on the Alternative 1 map. All or portions of 207, 208, 230, 231, 423, 424, 425, 443, 444, 447, 448, 463, 464, 467, 502. Identified as thinning/sanitation on the Alternative 1 map.
[11] Oliver and Uzho, 1997. *Maximum Stand densities for Ponderosa pine and red fir and white fir in Northern California*, pg 62-63.
[12] Units: 421, 422, 431.

(2-3 feet tall) occupies most of the stand. There is an increasing potential over time for high intensity wildfire as dead and down knobcone pine continues to accumulate in areas of dense manzanita/chinquapin understory vegetation.

Approximately 415 acres of primarily 95-110 year-old ponderosa pine[15] are experiencing substantial and accelerated tree mortality from disease and associated insect attack. Pockets of dead trees, up to 40 trees per acre in areas, range in size from 1 to 5 acres. Ponderosa pine trees in these stands are infected with blackstain and/or annosus root disease. Bark beetles (e.g. western pine beetle) are killing overstory pine trees weakened by these diseases. Field review in June 2005 showed that the stands are continuing to succumb to western pine beetle attacks, even in root-disease infected areas that were previously thinned (1990)[16] and recently (2005) salvaged. As a result, few healthy or live overstory ponderosa pine trees remain in several of the stands.

Most of the live overstory pine in these stands are exhibiting signs of root disease and are expected to die within 2 to 10 years[17]. Healthy white fir saplings and poles, as well as ponderosa pine saplings and poles (currently exhibiting gall rust disease and likely infected with root disease), comprise the tree understory. Ponderosa pine commonly regenerates in openings in this area. Existing root-disease infected trees will continue to infect these establishing pine trees[18]. Photos 1 and 2 in Appendix A illustrate the condition of these stands.

Desired Condition

Forest stands are healthy and vigorous, consistent with the ecosystem needs of other resources[19]. The natural role of fire, insects and disease, and other components that have a key role in the ecosystem are recognized[20]. Recognizing these ecological processes, the forest is dynamic but resilient to rapid changes in condition, and sustainable over time.

In stands within Management Prescription VIII, tree mortality is minimized within the context of the matrix standards and guidelines[21]. This means that conifer stands should ideally have scattered mortality adequate to meet snag guidelines of 2 snags[22] per acre, but should not have large-scale mortality. Younger stands should have minimal levels of mortality until the average diameter at breast height exceeds 15 inches, the minimum diameter favored by cavity

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[13] Knobcone pine is a short-lived tree species. *Botanical and Ecological Characteristics, Knobcone Pine* Pages 1-3.
[14] Unit 407. Identified as knobcone pine sanitation on the Alternative 1 map.
[15] Units: 308, 408, 419, 420, 438, 439, 440, 442, 445, 446. Identified as regeneration harvest on the Alternative 1 map.
[16] Past thinnings retained higher basal areas than are prescribed by research for maintaining healthy pine stands
[17] D. Shultz, Entomologist, Region 5 Forest Service.
[18] Blackstain and annosus root diseases are primary spread by root-to-root contact. Dead trees can continue to serve as vectors for disease spread to healthy trees in the case of annosus. The strains of blackstain and/or annosus that infect pine do not infect white fir.
[19] Forest Plan, p. 4-5
[20] Forest Plan, page 4-80
[21] Forest Plan, p. 4-67
[22] Forest Plan, p. 4-62 refers to an average of 1.5 snags/acre greater than 15 in diameter and 20 feet high. The IDT recommended an average of 2 snags/acre for this project, with the same size criteria minimum.

nesters. The stocking (tree density) of healthy conifer stands is at a level that will allow residual trees to receive full overhead sunlight, and partial sunlight lower in the canopy. A sustained yield of timber and other wood products is available to help support the economic structure of local communities and supply regional and national needs[23].

In stands within Management Prescription VI, maintenance and enhancement of habitat for early and mid-seral stage dependent species (big and small game, upland game birds, and non-game) is emphasized. This generally means that tree densities are relatively low, encouraging greater amounts of understory cover/forage ratios. The landscape within this is a mosaic of openings of early seral stage plants and trees and open mature stands often containing multiple understory layers of trees and shrubs.

Pine stands with basal area stocking of 150 square feet per acre or lower, and Stand Density Indices less than 230, are less susceptible to bark beetles[24], more resilient to natural disturbance processes, and more sustainable over the landscape. Pole size natural stands and plantations are open and average 70 to 110 stems per acre[25].

Actions Needed

- Reduce existing forest stand densities in Prescription VIII areas to levels appropriate for ponderosa pine stands (approximately 100-150 square feet of basal area in thinning/thinning-sanitation[26] areas and approximately 20-25 foot spacing in plantations and biomass areas). This will reduce competition for limited moisture and improve the ability of trees to withstand drought conditions and insect attack in the future. Reduced stocking will improve tree growth and vigor.
- Reduce existing forest stand densities in Prescription VI lands to achieve stocking levels that will allow for the growth of shrubs and forage for early and mid-seral stage dependent species (approximately 100-120 square feet of basal area in thinning/thinning sanitation areas and approximately 20-25 foot spacing in plantations and biomass areas).
- In mature pine/mixed conifer stands thin to maintain and enhance the large tree component in these stands (thin to approximately 140-160 square feet of basal area).
- Remove dead/dying knobcone pine and existing dead and down woody material to reduce current and future fuel accumulations and to reestablish healthy stands by replanting the area with a mix conifer species appropriate to the site.
- Reduce the spread of root disease centers by harvesting dead or dying trees weakened by root disease. Re-establish healthier stands by replanting with a mix of conifer species adapted to the site.

[23] Forest Plan, 4-5
[24] Oliver and Uzho, 1997. *Maximum Stand densities for Ponderosa pine and red fir and white fir in Northern California*, pg 62-63.
[25] Oliver, W. *Growth of Ponderosa Pine Thinned to Different Stocking Levels in Northern California*, USDA Forest Service Research Paper PSW-147, 1979
[26] Sanitation is removal of unhealthy trees that pose a risk to the health of the existing stand

Reduce Surface and Ladder Fuels

Existing Condition

The Hazard/Risk Analysis for McCloud Ranger District shows the Pilgrim project area in a moderate fire hazard rating[27] and a high fire risk category[28]. The current fire regime[29] is one of moderate to high intensity at infrequent intervals and generally characterizes fast spreading, high intensity fires under worst case scenarios[30], which substantially depart from the historical regime.

Understory tree conditions create a fuel ladder from the ground into the forest canopy in areas within pine plantations and pine stands, including the mature pine stands. Fuel ladders, combined with accumulations of surface fuels (in some areas 20-40 tons per acre) throughout the area, have increased the risk of stand-replacing wildfire, where this occurs. Concentrations of surface fuels have developed in areas that have western pine beetle- and root disease -related conifer mortality and the knobcone pine stand. Fuel loadings in areas of conifer mortality range from 45 to 50 tons per acre[31]. Units treated in the last 5-14 years not experiencing accelerated deterioration have fuel loadings ranging from 5-30 tons per acre.

If a fire were to occur under 90th percentile (severe) fire weather conditions, the majority of the project area would exhibit flame lengths of over 6 feet from surface fuels alone with rates of fire spread over 700 feet per hour (11 chains per hour)[32]. With flames lengths from 4 to 8 feet, fires are too intense for direct attack at the head of the fire by firefighters with hand-tools. Hand-line cannot be relied on to hold the fire[33]. Uncontrolled wild fire may lead to a stand-replacing event in many units[34].

Desired Condition

The combination of surface, ladder, and crown fuels result in predicted fire behavior that is not likely to destroy forest stands[35]. Stand understories are open with less ingrowth particularly in stands on sites where wildfire plays a key role in stand development[36]. Fuel loadings average approximately 5 to 10 tons per acre[37] so that fire flame lengths with 90th percentile fire weather conditions do not exceed 1.5 to 2 feet.

Crown fire initiation

The initiation of a crown fire is a function of surface fire intensity and paramaters of the tree crown (surface fuel loadings, tree densities, and the distance between surface fuels and the live tree crown). It is the combination of these elements that contribute to expected fire behavior and wildfire effects on a stand.

[27] Vegetation condition and the contribution to fire behavior.
[28] Potential for ignition based on historical records for area; 1.5 fires per thousand acres per decade.
[29] A fire regime is a generalized description of the role fire plays in an ecosystem (Skinner and Agee, Hans and Brunell et al).
[30] Based on District historical records dating back approximately 100 years.
[31] BehavePlus, Version 3.0, modeling.
[32] BehavePlus, Version 3.0, modeling.
[33]*NWCG Fireline handbook*.
[34] Behave Plus, Version 3.0, modeling.
[35] Forest Plan, pages 4-81 and 4-85.
[36] Forest Plan, pages 4-80 and 4-84.
[37] Forest Plan, page 4-67, Appendix G-12.

At this level of intensity, uncontrolled wildfire would likely not be a catastrophic stand-replacing event. Treatments would replicate the natural role of fire in the ecosystem[38] (mainly low intensity, frequent surface fires).

Actions Needed

Reduce fuel ladders and to reduce excess surface fuels to 5-10 tons/acre so that the likelihood of uncontrolled wildfire is reduced and does not become a catastrophic stand-replacing event.

Prevent Catastrophic Loss of Forest Overstory Trees in Riparian Reserves

Existing Condition

Within treatment units, some areas within riparian reserves are overstocked and/or suffering root disease, which is leading to tree mortality and loss of the overstory trees. Overstory trees are potential woody debris recruitment source within Riparian Reserves. In areas within reserves, fuel levels are increasing or will increase from tree mortality, threatening the loss of forest overstory and woody debris recruitment for in-stream habitat features needed to detain annual runoff. Approximately 230 acres of Riparian Reserve occur within treatment units[39].

Desired Condition

Forest conditions in riparian reserves are sustainable for the site, including resilience to natural ecological processes[40], such as wildfire, drought, insects, and disease. Basal area and fuel levels conditions would be the same as the uplands, described previously. Forest overstory trees are maintained to provide woody debris recruitment to streams[41]. Intermittent streams receive natural woody debris recruitment at a rate that maintains in-stream habitat features within Riparian Reserves that are needed to detain annual runoff.

Actions Needed

Reduce stand densities and the spread of root disease to improve forest health conditions and reduce potential fuels loads, to maintain persistence of overstory forested stands (basal area and fuel levels conditions would be the same as the uplands).

[38] Forest Plan p. 4-18.
[39] Units 23, 68, 128, 129, 230, 240, 305, 308, 401, 402, 406, 411, 412, 424,425, 426, 427, 431, 449, 450, 451, 454, 457, 463.
[40] Forest Plan, page 4-53 and 4-59.
[41] Forest Plan, page 4-53 and 4-59.

Maintain Hardwoods and Dry Meadows

Existing Condition

The unique forest types and plant communities in the project area are quaking aspen (*Populus tremuloides*), California black oak (*Quercus kelloggii*), Willows (*Salix* spp.) and historic dry meadows/open pine savannahs (Elk and Coonrod flats). Aspen occurs as scattered groups of cloned individuals from a common root. Oak occurs as very scattered individual trees. Willows occur occasionally along some stream channels. Aspen willow and oak occurrence has declined over time, mainly due to conifer encroachment and competition[42]. Approximately 20 acres of aspen stands[43] are identified within the assessment area that have suppressed growth and are at risk of being lost because of competition with adjacent conifer trees. Scattered pockets of black oak and willow throughout the project area are being overtopped by conifers and are being lost from competition with adjacent conifers.

Historic dry meadows are being encroached with dense thickets of conifer trees[44]. These dry meadows have been reduced to a small proportion of their historic occurrence. Aerial photo interpretation using photos from 1944 to 1998 show a reduction of the meadow areas of both Elk Flat and Coonrod Flat. In 1944, Elk Flat was about 900 acres and by 1998 the meadow had decreased to about 400 acres. Similarly, Coonrod Flat was about 1,300 acres in 1944, and by 1998 the meadow area had decreased to 200 acres[45].

Desired Condition

Unique hardwood and dry meadow/open pine savannah plant communities are progressing toward or occur similar to their historic niche and contribute to the biological diversity of the area[46]. Oaks are healthy and seedlings are evident. Aspens are healthy and vigorous and new clones are establishing. Dry meadows and pine savanna are open, similar to historic conditions, and provide habitat for early seral stage wildlife[47]. Fire is reintroduced. In addition this type is classified as fuel model 2, and has low anticipated fire intensity.

Actions Needed

Maintain and improve the vigor of any existing aspen groups, and any oak trees, by reducing conifer encroachment. Remove competing conifers from around identified aspen stands to allow for improved health and vigor of the aspen (measured by an increase in sprouting) and provide room for aspen stands to expand. The very limited aspen component of this area is valuable for

[42] *McCloud Flats Ecosystem Analysis*, page 25.
[43] Unit 902 and scattered small aspen areas. Identified as Aspen Release on the Alternative 1 map.
[44] Units 401, 458, 459, 460. Identified as Dry Meadow Restoration on the Alternative 1 map.
[45] Mangels, Francis; Wildlife Biologist, "*Elk Flat and Coonrod Flat, Analysis of Ecological Succession and Recommendations for Management Report*" January 2002
[46] Forest Plan page 4-4, 4-6, 4-66, L-8.
[47] Forest Plan, page 4-81.

wildlife forage and general diversity. There is a need to remove competing conifers from around black oaks to reestablish the vigor of the black oak.

Restore dry meadow and open pine savannah systems to more historic conditions. Remove dense conifers from historic dry meadows at Coonrod Flat and Elk Flat to reestablish and maintain their open dry meadow and pine savannah character.

Road Management

Existing Condition

Currently within the Pilgrim Project Assessment Area there are about 51 miles of classified road about 4 miles of unclassified low standard roads. Together, these roads equate to a relatively high road density of about 4.1 miles per square mile.

There are some roads that may affect a traditional cultural gathering site at Coonrod Flat.

There some areas identified for harvest that were beyond the normal maximum ¼ mile skid distance.

There are several road crossings that are contributing sediment to intermittent streams.

Desired Condition

Retain roads on the forest transportation system that are needed for future activities such as forest health, timber management, recreation, fire protection, recreation management, mining, wildlife and range.[48] Analyze non-inventoried (unclassified) roads to determine whether they should be added to the transportation system or obliterated as time and funding allows.

Actions Needed

A Roads Analysis completed as part of the planning process for this project recommended:

- Close approximately 10 miles of roads not needed on a regular basis for management activities to reduce maintenance costs.
- Decommission approximately 2 miles of roads not needed for future management.
- Construct approximately 0.3 miles of road to facilitate timber management.
- Reconstruct one stream crossing to reduce sediment delivery.

Proposed Action Summary

The actions listed below are proposed by the Shasta-Trinity National Forest to meet the purpose and need. Please refer to the Alternative 1 map for locations.

- commercial thinning and sanitation harvest on approximately 3,100 acres of overstocked coniferous stands (2235 acres of existing forests, 785 acres of plantations and 40 acres of mature pine stands)
- sanitation and salvage harvest on approximately 10 acres of knobcone pine

[48] Forest Plan, page 4-17

- regenerating approximately 415 acres of diseased and insect infested stands; 15% green tree retention will not be met on approximately 255 of these acres because there are not enough disease-free trees to meet this standard. All regeneration units will be replanted with healthy conifer seedlings
- releasing approximately 20 acres of aspen and oaks by removing competing conifers,
- restoring approximately 275 acres of dry meadows by removal of encroaching conifer trees
- underburning approximately 200 acres of natural and activity fuels
- mechanically piling and burning approximately 700 acres of activity fuels
- closing approximately 10 miles of roads to reduce maintenance,
- decommissioning approximately 2 miles of roads not needed for future management
- reconstructing one road-stream crossing and
- construct approximately 0.3 miles of new road needed for present and future management.

The proposed action is described in more detail in Chapter 2 under Alternative 1.

Decision Framework

The Forest Supervisor will decide whether to implement the proposed action as described, select an alternative action that meets the purpose and need, or take no action at this time. A non-significant Forest Plan amendment regarding the green-tree retention standard and guideline[49] is part of this decision to address deteriorating forest conditions in large areas of dead and dying trees in root disease centers.

Forest Plan Direction

The project is guided by management direction found in the *Shasta-Trinity Land and Resource Management Plan*, which incorporated the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (Northwest Forest Plan[50], as amended[51]). Management direction for the Forest includes four

[49] To retain patches and single trees of at least 15% of the largest, oldest live trees, decadent or leaning trees, and hard snags of each regeneration unit. These elements should be protected (retained) for multiple rotations to provide support for those organisms that require old forests. *Shasta-Trinity National Forest Land and Resource Management Plan*, page 4-61.
[50] USDI Bureau of Land Management and USDA Forest Service, 1994.
[51] Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standard and Guidelines on January 12, 2001 (USDA Forest Service and USDI Bureau of Land Management 2001), the *Record of Decision To Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines* on March 22, 2004 (USDA Forest Service and USDI Bureau of Land Management 2004), and the *Record of Decision Amending Resource Management Plans for Seven Bureau of Land Management Districts and Land and Resource Management Plans for Nineteen National Forests Within the Range of the Northern Spotted Owl* on March 22, 2004 (USDA Forest Service and USDI Bureau of Land Management 2004a). The latter two Record of Decisions became effective April 21, 2004.
[51] The *Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines* is under litigation filed on April 13, 2004 in the Western District of Washington.

integrated levels: 1) Forest-wide direction, 2) Land allocations and standards and guides from the Northwest Forest Plan, 3) Management Prescription direction, and 4) Management Area direction.

Ninty-three percent of the National Forest lands within the 8,500-acre Pilgrim assessment area are designated as Matrix in the Forest Plan[52]. Matrix lands are further defined by management prescriptions. Approximately 80% of the matrix lands are within prescription VIII, Commercial Wood Products Emphasis[53]. Approximately 13% is within prescription VI, Wildlife Habitat Management[54]. Both of these prescriptions provide for timber and road management. Prescription VIII lands emphasizes intensive timber management[55]. Prescription VI lands permit modified timber management in order to achieve wildlife habitat objectives primarily for species dependent on early and mid-seral stages[56]. The assessment area is within the McCloud Flats (Management Area 2) and Mount Shasta (Management Area 3) Management Areas.

Approximately 7% of the National Forest lands within the assessment area are within the Riparian Reserve designation[57]. Approximately 600 acres of Riparian Reserve are found along Ash Creek, Trout Creek, Swamp Creek, Pilgrim Creek and Dry Creek within the assessment area. The Forest Plan standards and guidelines for timber management in Riparian Reserves allow for the application of salvage and silvicultural practices in Riparian Reserves when they are needed to control catastrophic events, control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives[58].

The area was evaluated for management needs in the *McCloud Flats Ecosystem Analysis*[59]. This analysis recommended opportunities for management of timber and roads within the project assessment area. Pertinent recommendations include "maintaining a steady flow of wood products through commercial thinning and salvage to maintain forest health and biodiversity,"[60] and harvest and regeneration where stands are substantially damaged or endangered by root diseases or insect-caused mortality.[61] This analysis also recommended salvage and thinning activities in Riparian Reserves if conducted with consideration toward achieving the objectives of the Aquatic Conservation Strategy[62].

The assessment area is within a Critical Habitat Unit (CA-2) for the Northern Spotted Owl. The Northwest Forest Plan recognized that forest management would occur within Critical Habitat[63]. The U.S. Fish and Wildlife Service was consulted during project development[64].

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[52] Forest Plan, page 4- 61.
[53] Forest Plan, page 4-67
[54] Forest Plan, page 4-66
[55] Forest Plan, page L-6
[56] Forest Plan, page L-7
[57] Forest Plan, page 4-53.
[58] Forest Plan, page 4-54
[59] McCloud Flats Ecosystem Analysis, September 1995.
[60] McCloud Flats Ecosystem Analysis, September 1995, page 88
[61] McCloud Flats Ecosystem Analysis, September 1995, page 88
[62] (Flats Ecosystem Analysis, 1995; last amended February 2004)
[63] McCloud Flats Ecosystem Analysis, September 1995, p. 19. Northwest Forest Plan, p. A-3.
[64] *Biological Assessment*, November 2005.

The *McCloud Flats Ecosystem Analysis* evaluated the Critical Habitat Unit, consistent with Northwest Forest Plan direction[65]. The value of critical habitat was described as low because of the high fragmentation and natural features (lava reefs, dry open flats and sinks) that limit dispersal[66]. It described the potential value of the Critical Habitat Unit as moderate to low because some land will not provide forest with the crown canopy needed for owl dispersal (coarse soils and lava reefs do not support 40% canopy forest, root disease centers near Mud Creek continually open up the canopy of trees through tree mortality).

Public Involvement/ Issue Identification

This project has been listed in the *Shasta-Trinity Schedule of Proposed Actions* (SOPA) since January 2004. The Notice of Intent (NOI) to prepare an environmental impact statement was published in the Federal Register on February 14, 2005. The NOI asked for public comment on the proposal from February 14 to March 14, 2005. In addition, as part of the public involvement process, the agency published new releases in the *Redding Record Searchlight* on February 14, 2005 and the *Mount Shasta Herald* on February 16, 2005. Letters, including a copy of the Notice of Intent and a map of the proposed action, were sent to four environmental groups known to be interested in vegetation management projects on the unit and one private landowner with property adjacent to the project area. Eleven written responses and two telephone responses were received. (See Appendix B for Response to Comments and Issue Identification).

The unit has met with both the Winnemem Wintu and Pit River Tribes and presented them each with a copy of the Pilgrim Proposed Action map. Some tribal members visited the project area in the spring and summer of 2005.

Biologists with the U.S. Fish and Wildlife Service (Red Bluff Field Office) visited the Project area twice in October 2004 and discussed the proposed actions with the team.

Additional public scoping was initiated with a public scoping notice in the *Mount Shasta Herald* and *Record Searchlight* newspapers, on September 21 and 22, 2005 respectively, to request public comment on a proposed non-significant Forest Plan amendment for the green tree retention standard[67] because many regeneration harvest stands would not meet the 15% green tree retention standard. Letters requesting comments on the proposed amendment were mailed to those previously contacted about the action, those persons or groups that expressed interest in the project, and additional persons/groups that may be affected by the project (e.g. permittees, user groups). Three letters and one telephone call were received as a result of this scoping.(See Appendix B for a summary of these comments)

The Forest invited the public on two field visits to the project area. Invitations for a field tour on June 25, 2005 were mailed to eight persons or groups that expressed interest in the project (letter dated June 16, 2005). No members of the public turned out for the June field tour. A notice was published in the *Mount Shasta Herald* newspaper on November 2, 2005, inviting the public

[65] USDI Bureau of Land Management and USDA Forest Service, 1994. p. A-3.
[66] McCloud Flats Ecosystem Analysis, September, 1995.
[67] Forest Plan pages 4-61 and 4-62.

on a field tour of the project area on November 15, 2005. Additionally, invitations were mailed to persons or groups that expressed interest in the project (letter dated November 1, 2005). Two interested citizens, a timber industry member, California Fish and Game, and the U.S. Fish and Wildlife Service participated in the November tour. Comments made during the tour were supportive of the proposed action. An email was received the day after the tour from a person who could not attend.

Public scoping is integral to the environmental analysis process. Comments in response to scoping are used to determine the range of actions, alternatives, and impacts to be considered in an analysis, as well as to identify significant issues related to a proposed action. Issues are points of discussion, dispute, or debate about the environmental effects of proposed actions. Using the comments from the public the interdisciplinary team and District Ranger identified two significant issues. A list of comments, issue determination, and response to comments can be found in Appendix B.

Significant Issues

1. The proposed action could adversely impact critical habitat for the northern spotted owl, including dispersal habitat and forage habitat, by reducing crown closure and harvesting trees greater than 20 inches in diameter at breast height, and by removing and fragmenting habitat in stands to be regenerated. These actions would also reduce habitat for the northern goshawk and other old-growth dependent species, including the late-successional group of management indicator species.

Unit of measure

Acres of dispersal and forage habitat degraded. Acres of habitat removed. Acres of forest resistant to insect attack over time.

2. The proposed action could adversely impact snag-dependent management indicator species by harvesting existing snags, diseased trees and potential future snags over 20 inches in diameter at breast height.

Unit of measure

Estimated snags/acre removed (compared to remaining snags) and estimated snag recruitment.

Distribution of the Draft Environmental Impact Statement

The Notice of Availability of the Pilgrim Vegetation Management Project Draft Environmental Impacts Statement was published in the Federal Register on June 23, 2006. The Legal Notice for Comment was published in the Redding Record Searchlight on June 28, 2006. Copies of the DEIS were mailed to the Federal, State and Local agencies and the publics listed in Chapter 4 of the DEIS on June 19, 2006. The comment period for the DEIS ended on August 7, 2006. Timely comments were received from three environmental groups, one local government agency, one timber company, one tribal group and one individual. A summary of comments received and the Forest Service responses is found in Appendix K.

Chapter 2: Alternatives

Introduction

This chapter describes and compares the alternatives considered for the Pilgrim Vegetation Management Project. It describes alternatives considered in detail and those eliminated from detailed study. Reasonable alternatives were explored and objectively evaluated as well as those alternatives eliminated from detailed study (40 CFR 1502.14). The end of this chapter presents the alternatives in tabular format so that the alternatives and their environmental impacts can be readily compared.

Alternatives Considered in Detail

Alternative 1: Preferred Alternative

Vegetation management is proposed on approximately 3,800 acres within an 8,500-acre assessment area. Forest Service crews, service contracts, and/or commercial timber sales may implement these actions.

All timber harvest would use feller/bunchers and and chainsaws to cut trees designated for removal and whole tree ground skidding to landings. At the landings, cut trees are either chipped and removed or cut to sawlog lengths and removed. Sporax will be applied to all stumps 14” and larger within four hours of being cut unless weather conditions delay application. Harvest operations will take from 2 to 3 years to complete, with possible contract extensions if deemed appropriate.

Following completion of all timber sale contract requirements and close of the contract, subsequent actions can take place. Regeneration harvest units will be evaluated for the need to pile and burn residual slash. After any necessary site preparation, conifer seedlings will be hand planted at about 300 trees per acre. Planted seedlings will consist of Ponderosa pine in open areas and a mix of species in more shaded areas. Areas that were thinned will be evaluated for meeting fuel loading standards and cleared of any excessive slash and woody debris if necessary. Underburning and proposed road closures and decommissioning would also occur from 1 to two years after the close of the timber sale contract.

This alternative is responsive to the Purpose and Need for Action. If approved, the actions are proposed to begin within one year of issuing the decision for this project.

All acreage figures are estimates that are generally plus or minus 10%. Acreages have been refined during the planning process and may again change slightly as field layout is completed. Please refer to the Alternative 1 maps for locations and treatments. Refer to Appendices C and D for a unit-by-unit and road-by-road summary of activities. Stand specific prescriptions are part of the project record.

Forest Health/Growth Management

Biomass Thinning

On approximately 785 acres of 25-45 year old pine stands, thin to a spacing of approximately 20-25 feet. About 90% of these stands are older plantations. The resulting product will be primarily wood chips. About 25 of the 785 acres are within Riparian Reserves.

Thinning

On approximately 1,200 acres of 75-95 year old pine stands, remove trees that are recently dead or dying from insects, root disease and/or drought. In remaining overstocked areas thin to a density of approximately 120-150 square feet per acre basal area. Regeneration needs due to past and present tree mortality will be evaluated post harvest and if necessary areas larger than 1 acre in size would be planted. Thinning will remove trees in all size and crown classes with emphasis on removal of suppressed and intermediate crown class trees. Some dominant and codominant crown class trees may be removed to attain the prescribed basal area.
About 55 of the 1,200 acres to be thinned are within Riparian Reserves.

Thinning/Sanitation

On approximately 1,035 acres of 75-110 year old pine stands which are currently experiencing more mortality than the “thinning” stands, remove trees that are recently dead or dying from insects, root disease and/or drought and then thin any remaining overstocked areas to a density of approximately 100-120 square feet per acre basal area. Regeneration needs due to past and present tree mortality will be evaluated post harvest and if necessary areas larger than 1 acre in size would be planted.

The thinning/sanitation prescriptions include the removal of predominantly suppressed and intermediate crown class trees and diseased or damaged trees to concentrate growth on the residual trees and decrease competition for resources. The objective is to concentrate growth on the residual trees in the stand with the best ability to respond to less competition. These trees have larger crowns and a greater capacity to photosynthesize and increase crown size as more light reaches the full crown. Some dominant and codominant crown class trees may be removed to attain the prescribed basal area.

About 65 of the 1,035 acres are within Riparian Reserves.

Mature Stand Thin

On approximately 40 acres, thin two-storied stands (50 to 100 year old fir/pine and 150 year old pine/white fir) to reduce understory ladder fuels , inter-tree competition, and maintain older trees, especially pines. About 6 acres of the 40 acres are within Riparian Reserves. See Residual Fuels/reintroduction of fire below for underburning in these stands.

Knobcone Sanitation

Remove dead and dying knobcone pine on approximately 10 acres. Tractor pile and burn residual slash and brush and re-plant with ponderosa pine and incense-cedar.

Regeneration Harvest

Harvest and re-plant approximately 415 acres of 95-110 year old Ponderosa pine stands suffering from root disease and bark beetle mortality. Diseased trees that have chlorotic foliage, ragged and fading crowns, poor needle retention and/or evidence of successful insect attacks will be removed. If available, retain 15 percent of healthy and full crowned overstory trees. All species other than pine will be favored as leave trees as their long term viability will be greater. Retention areas should include the largest, oldest (where available) and healthiest live trees, decadent or leaning trees and hard snags occurring in the unit. Leave all healthy white fir, incense-cedar, sugar pine, Douglas-fir and black oak. Tractor pile (brush rake) and burn residual slash. Re-plant with mixed species in shaded areas, ponderosa pine in open areas.

In pine stands where there are few healthy or live overstory pine trees, the Forest Service is not able to meet the Forest Plan green-tree retention standard and guideline to retain patches and single trees of at least 15% of the largest, oldest live trees, decadent or leaning trees, and hard snags within each regeneration unit if all of the diseased trees are removed[68,69]. Currently, this condition exists on about 255 acres. In these stands, a site-specific (this project), non-significant Forest Plan amendment is proposed. This amendment would allow the Forest Service to deviate from the 15% green tree retention minimum where there are not enough healthy pine trees to meet that standard.

For Pilgrim Vegetation Management Project regeneration harvest treatment units 14-408,419,420,438,439,440 & ,442, 15-208, 16-461 & 466, 8-411,412,413,41 & ,415 the largest healthiest ponderosa pine trees and all other conifer species will be retained. To adequately control the annosus and black stain root infection, less than15 percent of the area associated with these cutting units can be retained. These stands will retain between 5 and 10 percent of the healthiest commercial size trees for the green tree retention standard.

Specific measures for green tree retention and snag retention follow. These measures are to be applied to the treatment units listed above for implementation of this project, only. Upon completing the Project the 1995 Forest Plan standard and guide will apply to these treatment units.

1. Retain healthy green trees up to 15 percent of the area associated with each cutting unit (stand). It is estimated the less than 15 percent of the area will be retained due to existing mortality and treatment needs to control the root disease.

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[68] Forest Plan, page 4-61.

[69] These elements should be protected (retained) for multiple rotations to provide support for those organisms that require old forests (*Shasta-Trinity National Forest Land and Resource Management Plan*, page 4-61). Root diseased pine trees are not expected to persist more than about 2-10 years as living trees, and about 5-10 years as standing snags (D. Schultz, Entomologist, Region 5, Forest Service).

2. Trees will be retained as individuals and patches where feasible to meet project objectives.
3. As a minimum, snags will be retained within these harvest units at 2.0 per acre or more greater than 15 inches in diameter and 20 feet in height.

About 55 of the 415 acres are within Riparian Reserves. About 6 acres of these 55 acres will not meet the 15 percent retention standard.

Forest Fuels Management

Activity Fuels

Up to 700 acres of slash resulting from timber sale activity will be treated post harvest by piling and burning or burning slash concentrations ("jackpot" burning).

Reintroduction of fire

Underburning is proposed on approximately 200 acres in areas of units, 421, 422 (mature thinning stands) and 401,458, 459, and 460 (dry meadow restoration stands).

Fuel Ladders

All thinning prescriptions are designed to remove the ladder of continuous fuels by thinning smaller trees.

Hardwood Management

Release aspen from conifer competition on approximately 20 acres by removing conifers within 100-150 feet of aspen. Remove competing conifers from within 30 to 50 feet of black oaks where they are found in harvest units.

Dry Meadow Restoration

On approximately 275 acres of historic dry meadow areas, remove small diameter (4-14[70] inch in diameter at breast height) conifers and thin the remaining overstory trees to 80 square feet/acre of basal area to restore the openness of these dry meadow areas. About 22 acres of the 275 acres are within Riparian Reserves. See also Residual fuels/reintroduction of fire above for underburning in the dry meadow units.

Road Management[71]

Following harvest and fuels treatments approximately 10 miles of existing roads will be closed with either guardrail barricades or earth berms[72]. An additional 2 miles of existing roads will be

[70] 1-4" material will be left in place and either lopped and scattered or burned for incorporation into the soil.
[71] As recommended in the Pilgrim Project Roads Analysis of April, 2005
[72] About 6.8 miles of classified (roads part of the inventoried forest road system that have road maintenance and traffic service levels assigned to them) roads and 3.3 miles of unclassified roads (low standard roads, often built by forest users, not part of the official forest road system).

decommissioned and removed from the forest road system[73]. Approximately 0.3 miles of new road construction will be needed to reduce skidding distance in one harvest unit (15-443). Short lengths of temporary spur road may be constructed to minimize skidding distances (See Proposed Road Activities Map and Appendix D).

Alternative 2: Proposed Action modified to retain an average 60% canopy cover

This alternative is responsive to significant issue 1 by retaining greater canopy closure (average 60%), where possible, for retention of dispersal habitat for the Northern Spotted Owl and other species needing higher canopy closure. Sixty percent canopy closure for this issue is defined as 200 square feet per acre basal area.

This alternative proposes the same actions as Alternative 1, with the following exceptions:

On approximately 535 acres[74], thin to retain a density of 200 square feet per acre basal area, which approximates 60% canopy cover. Removal of trees that are dead or dying from insects, root disease and/or drought is still proposed, as long as an average 60% canopy closure is retained.

Please refer to the Alternative 2 map for treatment locations.

Alternative 3: Proposed Action modified to maintain 15% green tree retention in regeneration harvest units

This alternative is responsive to Forest Plan direction to retain patches and single trees of at least 15% of area with, to the extent possible, the largest, oldest live trees, decadent or leaning trees, and hard snags of each regeneration unit[75, 76]. It is also responsive to an alternative suggested by the public that requested the Forest Service meet the 15% green tree retention standard and guideline. This alternative proposes the same actions as Alternative 1, with the following exceptions:

Instead of harvesting and re-planting 415 acres of 95-110 year old ponderosa pine stands suffering from root disease and bark beetle mortality and removing all diseased trees that have chlorotic foliage, ragged and fading crowns, poor needle retention and/or evidence of successful insect attacks (stands that were proposed for regeneration harvest in Alternative 1), the following is proposed:

Regeneration Harvest with 15% green tree retention

Harvest and re-plant approximately 415 acres of 95-110 year old Ponderosa pine stands suffering from root disease and bark beetle mortality. Retain at least 15% of the area associated with each cutting unit (stand) in patches and single trees of the largest, oldest live trees, decadent or leaning

[73] About 0.8 miles of classified and 1.3 miles of unclassified road.
[74] Areas above 60% canopy closure now.
[75] Forest Plan, page 4-61.
[76] These elements should be protected (retained) for multiple rotations to provide support for those organisms that require old forests (Forest Plan, page 4-61).

trees, and hard snags(to the extent possible). Removal of diseased trees that have chlorotic foliage, ragged and fading crowns, poor needle retention and/or evidence of successful insect attacks is still proposed, as long as at least 15% of the largest, oldest live trees, decadent or leaning trees, and hard snags are retained to the extent possible. Leave all healthy white fir, incense-cedar, sugar pine, Douglas-fir and black oak. Tractor pile (brush rake) and burn residual slash. Re-plant with mixed species in shaded areas, and ponderosa pine in open areas.

Please refer to the Alternative 3 map for treatment locations.

Alternative 4: No Action

This alternative would result in none of the proposed management activities being implemented within the project area at this time. Conditions would remain as described in the affected environment section of this document. The analysis of the no action alternative provides reviewers a baseline to compare the magnitude of environmental effects of the action alternatives.

This alternative is responsive to the 20-inch diameter limit on tree removal and canopy cover retention as discussed in significant issues 1 and 2.

Table 1. Summarizes actions and acres or miles listed for each alternative

Activity	Alternative			
	1 (approx. units)	**2 (approx. units)**	**3 (approx. units)**	**4 (approx. units)**
Biomass Thinning Acres	785	785	785	0
Standard Thinning Acres	1200	700	1200	0
Thinning/Sanitation Acres	1035	1000	1035	0
Thinning to retain average 60% canopy closure Acres	0	535	0	0
Mature Stand Thinning Acres	40	40	40	0
Knobcone Sanitation Acres	10	10	10	0
Regeneration harvest Acres	415	415	415	0
Meet 15% GTR Standard	160	160	415	0
Fuels Treatment Acres - underburn	200	200	200	0
Fuel Treatment Acres – tractor pile and burn/burn slash concentrations	700	700	700	0
Aspen Release Acres	20	20	20	0
Dry Meadow Restoration Acres	275	275	275	0
Road Closure Miles	10	10	10	0
Road Decommissioning Miles	2.0	2.0	2.0	0
New Road Construction Miles	0.3	0.3	0.3	0
Temporary Road Construction Miles	0.5	0.5	0.5	0

* (See Appendix C for Treatment Acres by Unit and Type)

Design Criteria Common to All Action Alternatives

The interdisciplinary team identified the following design criteria to minimize or eliminate potential environmental effects. Standard operating procedures, like protection of land survey monuments, are not listed here, as they are routine administrative practices. The following design criteria are common to all action alternatives:

1. Wildlife and wildlife habitat

- Retain, where feasible[77], an average of 2 to 3 snags per acre meeting the minimum requirements of 15 inches in diameter at breast height and at least 20 feet in height.
- Maintain, where feasible, an average 5 tons per acres of coarse woody debris, a portion of which is in the form of 4 to 6 logs per acre meeting minimum requirements of over 10 feet long at the largest available diameter.

[77] Where snags or logs of this size exist and except for instances where snags must be felled for safety.

2. Soils resources

- Where compaction exceeds threshold, described in the soils report, landings and skid trails (within approximately 200 feet of landings) will be treated with a tractor and winged subsoiling device to increase soil porosity.

3. Protection of water quality

- Implement all Best Management Practices (Appendix E).
- Exclude skidding equipment for 20 feet extending outward from the stream bank or inner gorge in all Riparian Reserves. Minimize soil disturbance in Riparian Reserves by requiring directional felling and minimizing turning of harvest equipment.
- When watering roads for dust abatement, adhere to the following rules:[78] Allow drafting from creeks provided that sufficient water quantity and quality is maintained to support associated wildlife species and riparian values. Never allow drafting to remove more than 50 percent of any stream discharge at the time of drafting. Establish alternative water sources when drafting needs would remove more than 50 percent of any stream discharge.

4. Visual Quality Objectives

- New landings will be located out of sight of Pilgrim Creek road where ever possible.
- All tree stumps within 150 feet of Pilgrim Creek Road and the Snowmobile Park will be cut to leave a tree stump height no greater than 6 inches. If a landscape feature obstructs the view between the road and the 150-foot boundary, treat the stumps only to the feature. Remove slash within 150 feet of the Snowmobile Park.

5. Noxious Weeds

- The Standard B Provision, Equipment Cleaning, will be included in all contracts.
- Heavily disturbed soils (e.g. landings, main skid trails) will be seeded with native grass and forb seeds to discourage occupation by noxious weeds.
- Old landings that will be used for this project and are known to have populations of bull thistle will be cleared prior to flowering, generally July, to reduce the spread of seed by equipment.
- Annual weed monitoring of the project area will be conducted for three seasons after project completion. Monitoring and hand pulling will be done concurrently.

6. Insects and Disease

- All cut stumps over 14 inches in diameter and larger will be treated with Sporax within four hours of stump creation to prevent the spread of root disease. Application of Sporax will follow all State and Federal rules and regulations as they apply to pesticides (See Appendix J, Borax Report for the Pilgrim Project). Sporax will be not be applied within 20 feet of running water.

[78] Forest Plan, page 4-25.

7. Recreation Facilities in Unit 421

- Do not allow skidding across paved surfaces to prevent damage to the edge of the asphalt surface unless no other route is available.
- Do not allow landings within 250 feet of any improvement on the north side of the parking area for visual purposes. Existing landings on the north side of the parking lot from previous sales can be utilized.
- Designate a landing on the south side of the parking lot to minimize skidding across paved surfaces. An opening on the southwest corner of the storage/utility building is recommended. Access to this landing can be by utilizing the paved drive on the west end of the building. Minimize the size of this landing to retain as much of the existing stand/trees.
- Close the Snowmobile Park to public access for safety during operations in this unit[79].
- Utilize a "cut tree designation" in this unit to further minimize visual effects of the harvesting component of this project.
- Have the unit recreation staff review the designation of trees to be removed with the unit silviculturist to ensure that all trees that are hazardous to the public will be removed and that adequate spacing for snow removal operations is achieved.
- Protected improvements that need to be noted in the contract are all obvious pre-existing facilities associated with the snowmobile park facility including asphalt surface. Three other improvements that need protection are: 1) the drain line for the utility/storage shed at the snowmobile park, 2) traffic counter lines and box at the exit of the snowmobile park and 3) traffic counter lines and box in Unit 226. The unit recreation staff needs to be consulted for locating these improvements.

8. Winter recreation

- Winter snow plowing will not occur on FA-19 or FA-13 north of the intersection of FA-19 and FA-13 to minimize impacts to winter recreation opportunities.

9. Air quality

- All burning will be consistent with the provisions of the Siskiyou County Air Pollution Control District rules and regulations through the permit process[80].
- Dust abatement will be required where necessary to prevent the loss of road and landing surface material.

[79] Coordinate with the unit recreation staff for notification of the public. Do not allow camping by contractor personnel or equipment storage at the snowpark unless the park is closed for activity to this unit.
[80] A smoke management plan will be submitted to Siskiyou County Air Pollution Control District with the project burn plan. Upon approval of the smoke management plan, the County would issue a burn permit

10. Botanical diversity

- Where tractor piling for site preparation or slash piling, a brush rake method would be used to minimize disturbance by allowing soil fines to remain on site and to minimize disturbance to understory plants.
- Conifer seedlings would be hand scalped of grass and brush at years 2 and 3 and rototilled only if necessary for gopher control to minimize disturbance to the understory vegetation. Seedling stocking and survival surveys would indicate if gopher damage was a direct cause of seedling mortality.
- Trees (or segments of trees) would be taken to landings with limbs and tops attached then delimbed in the landings (sometimes called “whole tree logging” or “limbing after skidding”) as much as possible to minimize the need for additional slash treatment and disturbance to understory vegetation[81]. See also Fuels, below.
- Units will be monitored post-harvest by the unit fuels officer to determine fuels treatment needs, to minimize the need for tractor piling and disturbance to understory vegetation.

11. Fuels

- Trees (or segments of trees) would be taken to landings with limbs and tops attached and then delimbed in the landings to minimize activity-generated slash and the need for additional slash treatment (piling, burning)[82]. This project would utilize materials (e.g. biomass) as much as possible that is traditionally lopped, scattered, and burned, to reduce the need for fuel treatments.

12. Range

- Protect the Bartle Cattle Allotment buried waterline.

13. Heritage Resources

- Known sites will be flagged by the unit archaeologist and protected during harvest operations.

14. Public Safety

- Warning signs will be placed along the Pilgrim Creek Road to make the public aware of logging trucks entering the roadway.
- Signs will be placed in and around the Pilgrim Creek Snowmobile Park alerting the public to the presence of Sporax on cut stumps immediately after its application.
- Signs will be placed along the Pilgrim Creek Road during all prescribed burning to alert the public of possible smoke and fire in the area.

[81] Note that dead trees create more slash than green trees due to breakage, even with whole tree yarding.
[82] Note that dead trees create more slash than green trees due to breakage, even with whole tree yarding.

Monitoring

Implementation Monitoring

- During timber marking the unit silviculturist and/or project planner will review tree marking to ensure the guidelines in the stand specific silvicultural prescriptions are met and that unit boundaries are correctly located with the specified stream buffers.
- Following timber marking the unit archaeologist will inspect all archaeological sites to ensure they have been adequately protected.
- Following marking of Unit 421 the unit recreation specialist will review the marking to ensure all facilities will be protected and hazard trees have been designated.
- The assigned timber sale administrator will visit the project area as needed during harvest operations to ensure compliance with the terms of the timber sale contract.
- During site clearing for planting and fuels treatment the unit soil scientist and assigned contracting officer's representative will visit the operation to ensure soil quality standards are being met with regard to retention of organic matter and large woody debris.
- During tree planting the assigned contracting officer's representative will daily inspect a sample of the trees planted to ensure contract standards are being met.
- Following tree planting the area will have survival exams at year 1, 3 and 5 to ensure adequate stocking of the areas.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods of action. Some of these alternatives may have been outside the scope of the purpose and need, duplicate other alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Alternative 5 was developed in response to the 20-inch diameter limit described in significant issues 1 and 2. Alternative 6 combined two alternatives suggested by the public (a shaded fuel break alternative and restoration alternative), which had similar themes of action. Alternative 7 was suggested by a local resource agency to insure the existing root disease would not spread to adjoining stands. These alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

Alternative 5

- **No harvest of trees over 20 inches in diameter (Significant Issue 1)**

This alternative was not considered in detail because it would not meet the purpose and need. Retaining all trees 20 inches in diameter and larger would leave many stands or areas of stands overstocked at levels above the recommended 150 square foot/acre basal area needed to decrease susceptibility to bark beetle infestations. Leaving these areas at these levels would continue the high susceptibility to further density and insect related mortality, therefore not meeting the purpose and need for forest health/growth objectives. It would also prevent the removal of dead/dying and infected/infested trees that are greater than 20 inches in diameter, most of which are the larger and older pine trees in regeneration harvest areas, and pockets in thinning stands. These trees are continuing the spread of root disease[83] to other pine trees of all ages and sizes. Tree mortality has accelerated within the project area over the last several years[84], contributing to large areas of dead trees.

Alternative 6

- **Retain an average 60% canopy closure, maintain all old and large trees, 20 inch diameter limit on tree removal, reduce fire hazard, retain all large logs, snags, and trees with wildlife characteristics, no thinning in riparian areas or meadows, no new road construction (Significant Issues 1 &2)**

This alternative was not considered in detail for several reasons. Many requested actions are already a part of proposed actions. (e.g. reduce fire hazard and thinning while, retaining the healthiest and mostly the largest trees). Retaining an average 60% canopy closure is part of Alternative 2. A diameter limit was not considered in detail for the same reasons as Alternative 5.

Refraining from thinning in riparian reserves does not meet the purpose and need of preventing catastrophic loss of forest overstory (from stand replacing fire or epidemic levels of insect and disease infestations that are killing stands), to maintain a source of woody debris recruitment for in-stream habitat features within Riparian Reserves. The Forest Plan Standards and Guidelines for timber management in Riparian Reserves allow for the application of salvage and silvicultural practices in Riparian Reserves when they are needed to control catastrophic events, control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives[85]. A field review of the unit by the project hydrologist indicated that the unit could be harvested without impacts to water quality or riparian and aquatic resources. Maintaining the current overstocking and fuel accumulations in riparian reserves would continue the susceptibility of the reserve areas to overstory tree loss from fire, insects and disease.

Refraining from thinning in dry meadows does not meet the purpose and need of restoring the dry meadow/pine savannah systems, which have decreased in size over the last century from the lack of wildfire and subsequent encroachment by conifers[86]. Functioning dry meadow/pine savannah systems provide diverse and important habitat for wildlife as well as a natural fuel break.

[83] Blackstain and annosus root diseases are primarily spread by root-to-root contact. Dead trees can continue to serve as vectors for disease spread to healthy trees in the case of annosus.
[84] 2004 and 2005 Insect Mortality Flight.
[85] Forest Plan, page 4-54
[86] Pers. comm. D. Fleming, Silviculturist and F. Mangels, Wildlife and Range Biologist.

Refraining from constructing new logging roads was not considered in detail because of the concern that there would be resource damage to soils from excessive skidding distances with numerous repeated trips, without 0.3 miles of new road and temporary spur access. Placing landings where the skidding distance can be minimized, and temporary spurs to these landings will reduce detrimental soil compaction and displacement that results from the high volume of repeated skidding that would occur with this alternative.

Grazing, drought, and climate change actions are outside the scope of the purpose and need. Where appropriate, the cumulative effects are described in chapter 3.

Alternative 7

- **This alternative was suggested by a commenting resource agency and would remove all ponderosa pine from the regeneration units to insure the existing root disease does not spread to adjoining stands.**

This proposal arose from a concern that trees that are retained may be infected with black stain but are not exhibiting any signs of the disease. If the trees were infected, they would cause the disease vector to persist in the newly established stand.

This proposal was not considered as a viable option because:

- There is a high probability that the existing prescription in the Proposed Action will be sufficient to control the root disease in these stands.
- Replanting with a mix of species will insure that the stands remain forested even if the blackstain persists.
- It would be difficult to defend cutting a tree that appeared to be perfectly healthy and free of disease when that tree could be contributing to meeting the 15% green tree retention standard.

Alternatives to Borax

See Appendix J, Borax Report for the Pilgrim Project, for consideration of alternatives to borax and its effectiveness.

Comparison of Alternatives

Table 2 provides a brief summary of the environmental impacts of the alternatives in comparative format. In this table, alternatives are compared by significant issue, responsiveness to the purpose and need, consistency with Forest Plan standards and guidelines, and resource effects. Chapter 3 forms the scientific and analytical basis for this comparison of effects and describes effects in detail.

Table 2. Comparison of alternatives.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Improve forest health	Approximately 3500 acres meets objectives for healthy growing conditions, lower incidence/risk of insect attacks and disease.	Approximately 3000 acres meets objectives for healthy growing conditions, lower incidence/risk of insect attacks and disease.	Approximately 3200 acres meets objectives for healthy growing conditions, lower incidence/risk of insect attacks and disease.	0 acres meets objectives for healthy growing conditions, lower incidence/risk of insect attacks and disease.
Reduce fuels (% fuel models, FM, and flame lengths, in feet, in treatment areas)	FM 2 - 18 % FM 8 - 82 % FM 10 - 0 % Percent Treated acres & flame length: 18% < 8.5’ 82% < 1.4’	FM 2 -18 % FM 8 - 68 % FM 10 - 14 % Percent Treated acres and flame length: 18% < 8.5’ 68% < 1.4’ 14% > 6.2’	FM 2 - 18 % FM 8 - 75 % FM 10 - 7 % Percent Treated acres and flame length: 18% < 8.5’ 75% < 1.4’ 7% > 6.2’	FM 2 - 5 % FM 8 - 3 % FM 10 - 92 % Some acres transition to FM 12. Percent Untreated and flame length: 5% < 8.5’ 3% < 1.4’ 92% > 6.2’
Acres of reduced chance of crown fire	Approximately 3500 acres	Approximately 2900 acres	Approximatley 3100 acres	0 acres
Fuel Loading and annual accumulations	5-10 tons/ac on all treated acres .6 to 3 tons/ac/yr	5-10 tons/ac on all treated acres .6 to 3 tons/ac/yr	5-10 tons/ac on all treated acres .6 to 3 tons/ac/yr	45-50 tons per acre on about 400 acres within 5 years and up to 70 tons per acre in 10 years. 5-30 tons per acre on about 3400 acres 3 to 5 tons/ac/yr on about 3100 acres
Reduce catastrophic loss of overstory trees (woody recruitment) in Riparian Reserves	Risk of catastrophic tree loss reduced on approximately 230 acres in riparian reserves.	Risk of catastrophic tree loss reduced on approximately 135 acres in riparian reserves.	Risk of catastrophic tree loss reduced on approximately 175 acres in riparian reserves.	Risk reduced on 0 acres
Maintain/enhance hardwoods and dry meadows	20 acres of aspen, all oaks, 275 acres of dry meadow enhanced	20 acres of aspen, all oaks, 275 acres of dry meadow enhanced	20 acres of aspen, all oaks, 275 acres of dry meadow enhanced	Eventual loss of aspen and further reduction of dry meadow acres

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impacts to northern spotted owl critical habitat (CH), including dispersal and foraging habitat **(Significant Issue 1)**	Temporary loss of Approximately 670 acres of low quality dispersal habitat. Approximattely 840 acres of low quality dispersal habitat degraded. 1,250 acres of capable (potential) habitat improved in the long term. not likely to destroy or adversely modify designated critical habitat for the Northern Spotted Owl. Increased resilience to insect infestation on approximately 3500 acres of treated habitat	Temporary loss of Approximately 640 acres of low quality dispersal habitat. Approximattely 275 acres of low quality dispersal habitat degraded. 1,250 acres of capable (potential) habitat improved in the long term. not likely to destroy or adversely modify designated critical habitat for the Northern Spotted Owl. Increased resilience to insect infestation on approximately 3,000 acres of treated habitat	Temporary loss of Approximately 670 acres of low quality dispersal habitat. Approximattely 840 acres of low quality dispersal habitat degraded. 1,250 acres of capable (potential) habitat improved in the long term. not likely to destroy or adversely modify designated critical habitat for the Northern Spotted Owl. Increased resilience to insect infestation on approximately 3200 acres of treated habitat.	Continued fragmentation of low quality NSO dispersal habitat from root disease and insect infestations. Continued spread of root disease centers and insect infestation areas and loss of habitat.
Impacts to the Northern Spotted Owl **(Significant Issue 1)**	May affect, but is not likely to adversely affect the Northern Spotted Owl.	May affect, but is not likely to adversely affect the Northern Spotted Owl.	May affect, but is not likely to adversely affect the Northern Spotted Owl.	May affect, but is not likely to adversely affect the Northern Spotted Owl.
Impacts to old-growth dependant species, including late-successional associated MIS (Significant Issue 1)	Old growth trees will be retained[87]. Increased resilience to insect infestation and fire on approx. 40 old-growth acres. No effect to population trend of Red-Breasted Nuthatch a late-successional MIS species	Old growth trees will be retained. Increased resilience to insect infestation and fire on approx. 40 old-growth acres. No effect to population trend of Red-Breasted Nuthatch, a late-successional MIS species	Old growth trees will be retained. Increased resilience to insect infestation and fire on approx. 40 old-growth acres. No effect to population trend of Red-Breasted Nuthatch, a late-successional MIS species	Approximately 40 old-growth acres with greater hazard of loss from insect infestation and/or wildland fire. No effect to population trend of Red-Breasted Nuthatch, a late-successional MIS species
Impacts to snag-associated MIS **(Significant Issue 2)**	maintains an average of 2-3 snags per acre. Meets/exceeds Forest Plan guides.	maintains an average of 2-3 snags per acre. Meets/exceeds Forest Plan guides.	maintains an average of 2-3 snags per acre. Meets/exceeds Forest Plan guides.	Retains all snags at a density of about 3 to 4 per acre. Increase in fuel loading at above normal rates.

[87] These trees will generally be greater than 150 years and display old growth characteristics such as large limbs, deeply furrowed bark, flattened tops and/or decadence. These trees generally stand well above the general conifer canopy and usually are > 36” in diameter at breast height.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impacts to snag recruitment (Significant Issue 2)	snag recruitment at about 1-3 trees per acre over 10 years on 3100 thinned acres. Accelerates development of larger size trees and snags. Snag recruitment limited on about 415 acres for 50-80 years (retention trees may provide some recruitment).	snag recruitment at 1-3 trees per acre over 10 years on 2,565 acres. Accelerates development of larger size trees and snags. Snag recruitment estimated to approximate 20 trees per acre over the next 10 years on 535 acres. Snag recruitment limited on about 415 acres for 50-80 years (retention trees may provide some recruitment).	snag recruitment at about 1-3 trees per acre over 10 years on 3100 acres. Accelerates development of larger size trees and snags. Snag recruitment limited in regenerated areas similar to Alternative 1 except more retention trees (which are diseased and likely to die and create snags) with this alternative.	Maintains snag recruitment at about 10 to 20 trees per acre per decade. Increase in fuel loading to above desired conditions.
Open road density	About 3.4 mi rd/sq mi	About 3.4 mi rd/sq mi	About 3.4 mi rd/sq mi	About 4.1 mi rd/sqmi
Estimated Volume	50-54 CCF	44-48 CCF	50-54 CCF	0 CCF
Present Net Value	Approximately $4.3 million	Approximately $3.3 million	Approximately $4.3 million	$0
Est. Jobs Created, direct and indirect	750-810	660-720	750-810	Some indirect jobs from recreation uses

Chapter 3 - Affected Environment and Environmental Consequences

This chapter describes aspects of the environment likely to be affected by the proposed action and alternatives. Also described are the environmental effects (direct, indirect, and cumulative) that would result from undertaking the proposed action or alternatives. Together, these descriptions form the scientific and analytical basis for the comparison of effects displayed at the end of Chapter 2.

This chapter is organized into several sections: available information, information related to cumulative effects - past, present, and reasonably foreseeable future actions, aspects of the environment likely to be affected by the alternatives and expected effects (including significant-issue related effects and achievement of purpose and need), short-term uses and long-term productivity of the human environment, unavoidable adverse effects, irreversible and irretrievable commitments of resources, energy/natural depletable resources, urban quality/historic and cultural resources/built environment, and legal and regulatory compliance.

The planning record for the Pilgrim Vegetation Management Project Draft Environmental Impact Statement includes project-specific information, including resource reports and results of other field investigations. Individual reports, input, and analysis from the record are summarized and referenced in this chapter. Some reports are included in the appendices. These reports are incorporated by reference. The planning record is located at the Mount Shasta Ranger District office.

Available Information

Much of the Forest resource data resides in an electronic database formatted for a geographic information system (GIS). The Forest uses GIS software to assist in the analyses of these data. GIS data is available in tabular (numerical) format, and as plots displaying data in map format. Knowledge about many of the relationships and conditions of wildlife, fish, forests, jobs, and communities is evolving as research continues. The ecology, inventory, and management of a large forest area is a complex and ever-developing science. However, the basic data and central relationships are sufficiently well established in the respective sciences for the deciding official to make a reasoned choice among the alternatives, and to adequately assess and disclose the possible adverse environmental consequences.

Past, present, and reasonably foreseeable future actions

According to the Council on Environmental Quality (CEQ) NEPA regulations, “cumulative impact” is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (4 CFR 1508.7). In determining cumulative effects, the effects of the past and present and future actions listed in

Appendix F were added to the direct and indirect effects of the proposed action and alternatives. Relevant boundaries and projects assessed for cumulative effects vary by resource and by overlap of effects in time and space.

Most resources used the 8th order watershed as described in Appendix F. This cumulative effects area was used because it encompasses an area of the McCloud Flats that has very similar topography, soils, hydrology and vegetation types.

The larger fifth order watersheds were consider but discounted as the cumulative effects bounded area because they encompass are much larger area (about 260,000 acres) that included mountainous terrain with very different soil types, vegetation and hydrologic function. These larger watersheds also include about half the Mt. Shasta Wilderness, which would dilute some effects.

The temporal scale for cumulative effects to all resource is from 1996 to two years into the future (2009) when out year projects have been well enough defined to generally assess their impacts. Planted areas are established and well stocked within five years.[88] Plantations on the McCloud Flats usually have reached a height of 4-5 feet within 10 years, allowing regeneration of adjoining stands, if they have reached maturity.

Aspects of the environment likely to be affected by the alternatives & expected effects

Alternative 4 is presented first in each topic to describe the trend associated with continuation of the present condition (no action).

Forest Health[89]

Affected Environment

Please refer back to the purpose and need in chapter 1 for affected environment specific to the stands proposed for treatment. Over the last 3 years, the McCloud Flats has experienced numerous areas of insect outbreak (e.g. Edson Creek, Elk Flat, Ash Sink). The outbreaks were aggravated by the presence of root disease that weaken a tree’s ability to take up water and nutrients, periodic droughts and over dense growing conditions in pine stands (that cause tree stress as the trees compete for nutrients, sunlight, and water). Areas of infestation, and subsequent tree mortality, increased in size from 5 to 125 acres within a few years for one area in the absence of any treatments.

[88] Based on 5th year survival surveys of plantations on the McCloud Flats
[89] Paraphrased from the *Final Silvicultural Report for DEIS Pilgrim Vegetation Management Project*, October 14, 2005, as updated by discussion with the author, and from information shared at the November 15, 2005 field tour of the area.

Western pine beetle outbreaks

These beetles usually breed in and kill scattered, overmature, slow-growing, decadent, or diseased or weakened trees. This is a normal, ecological process – the way a forest matures and replaces itself.

Several conditions affect outbreaks. The availability of phloem and inner bark is key to influencing outbreaks. Most trees are too healthy or too weak to provide the material for beetle numbers to increase. Healthy trees can withstand many attacks before the beetles successfully attack, establish a brood, and new adult beetles emerge; weak are easily killed, but provide food sources for relatively few beetles. However, when trees undergo sudden and severe moisture stress, they cannot produce sufficient resin flow to resist attack. In these trees, almost all attacking beetles can succeed and reproduce many times their number of offspring, increasing the beetle population to outbreak levels. Any condition that results in excessive demand for moisture (e.g. tree crowding or competing vegetation) or any condition that reduces the ability of the roots to supply water to the tree (e.g. root disease, drought, mechanical root damage) can cause moisture stress and increase susceptibility to successful attack by western pine beetle.

Thinning dense stands is an effective silvicultural prevention method. Substantially reducing stocking densities relieves competition and stress among the remaining trees, decreasing susceptibility to successful bark beetle attack.

Pine-beetle induced tree mortality

Attacking adult beetles carry spores of blue-staining fungus. As the beetles chew their way through the bark, the spores of this fungus become dislodged. In trees attacked early or midsummer, it takes only a few weeks for the fungus to invade and block the vessels of the inner bark and sapwood. Once blocked, the foliage begins to fade and generally within a year, dies and turns red. In trees attacked later in the summer or fall, the fungus develops more slowly and and the canopy does not fade until the next spring.

(Summarized/excerpted from DeMars, C.J. and BH Roettgering, 1982. *Western Pine Beetle.* Forest Insect and Disease Leaflet 1. USDA Forest Service.)

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect Effects (Forest Health)

Numerous areas within each stand would continue to exceed recommended stocking levels for the site (with stocking levels ranging from 180-260 square feet of basal area per acre in overstocked areas and corresponding SDI[90] levels from 288 to 416). These are included in the 3,100 acres identified with overstocked stands (biomass thinning, thinning, thinning/sanitation, mature stand

[90] Stand Density Index (SDI). Measure of stocking for even aged stands which compares the number of trees per acre of a certain average diameter with the average number of trees present in fully stocked stands of the same diameter. It is relatively independent of site quality and age.

thinning areas on the Alternative 1 map). These levels are 20% to 73% above the recommended level of 150 square feet per acre and are above the 230 recommended SDI level. Without treatment, stocking densities in these stands will continue to increase over time resulting in loss of diameter growth and increased competition between individual trees for moisture and nutrients. As both basal area/acre and associated SDI indices continue to rise above the recommended levels for resistance to insects, more mortality will occur at potential rates of approximately 6 to 20 times compared to thinned stands (tree mortality of 20 trees per acre over 10 years for the unthinned control plot versus 1-3 trees per acre over 10 years for stands thinned to 100-140 square feet per acre basal area)[91].

In areas affected with root disease (regeneration harvest areas, but also root disease areas in thinning and thinning/sanitation stands) all live, diseased trees will be left in the stands. Leaving these trees would continue the root disease cycle within these stands and to adjacent stands as root diseases can spread underground when healthy pine roots come into contact with inoculum in infected roots or stumps. A wave or pulse of mortality would be expected after every period of below-normal precipitation. Tree mortality would continue as root-to-root contact is made with adjacent healthy trees, creating ever widening dead tree pockets at a rate of 2-5 feet/year.

Tree mortality will slow in areas infected with black stain root disease if sunlight begins to reach the soil. If standing and snapped dead trees remain on the site, the dead material may cast enough shade to allow the black stain pathogen to remain active. Tree densities in stands with black stain root disease may drop far below the density that would result from thinning. Tree mortality from annosus root disease in pine will continue as this fungus spreading from root-to-root in the living trees, and remains active as a saprophyte in the stumps of dead trees. The disease centers will slowly spread until they hit barriers such as creeks, or rock outcrops, or non-hosts. Naturally regenerated pine seedlings in sites with either active black stain root disease or annosus root disease are likely to become infected and perpetuate the disease cycle on the site. There will be regular tree mortality and an accumulation of fuel on the sites for the foreseeable future[92].

In addition, low vigor ponderosa pine trees suffering from root disease will continue to deteriorate and be susceptible to bark beetle attacks, resulting in additional mortality and subsequent openings. Retaining these sources of insect infestation and disease increases the risk of spread to other stands within the assessment area.

Trees in the knobcone stand are dying rapidly and there is an increasing potential over time for high intensity wildfire to occur as dead and down knobcone pine continue to accumulate in areas of dense manzanita/chinquapin.

[91] Fiddler, G.O., D.R. Hart, T.A. Fiddler, P.M. McDonald. 1989. *Thinning decreases mortality and increases growth of ponderosa pine in northeastern California*. USDA For. Serv. Res. Paper PSW-194. page 5. This research showed tree mortality of 20 trees per acre/10 years for the unthinned control plot versus 1-3 trees per acre/10 years for stands thinned to 100-140 square feet/acre.
[92] D. Shultz, Entomologist, Region 5 Forest Service, Personal Correspondence, August 2005.

With no action, conifers would continue to encroach on aspens and oaks, continuing the trend of hardwood loss. The aspen stands located in California are on the periphery of its distribution, which makes them important to maintain[93].

Aerial photo interpretation, using photos from 1944 to 1998, shows a reduction of 500 acres of meadow in Elk Flat and 1,100 acres of meadow in Coonrod Flat due to Ponderosa pine in-growth[94]. This trend of meadow loss is expected to continue.

Alternative 4 would forego opportunities for improvements to timber stand health and growth; in addition, no timber volume (yield) would be provided toward sustained yield objectives. With no action, no acres would be moved to a stand density condition allowing for lower insect, disease, and mortality levels. The desired future condition of the timber resource as identified in the Forest Plan for the project area is to minimize mortality within the context of the matrix standards and guidelines…[95] and also to develop forest stands that are resistant to epidemic insect or disease attack[96]. Therefore, Alternative 4 would not achieve these management goals as described in the Forest Plan.

Cumulative Effects (Forest Health)

For forest health cumulative effects the bounded area is the Pilgrim Assessment Area. This is an appropriate area since effects outside this area do not notably influence the presence of disease and insect infestations within the area. The time frame for forest health cumulative effects is approximately 10 years, since most stands in the McCloud Flats are entered for some type of timber harvest at 10 to 15 year intervals.

Past harvest within and adjacent to the project area over the last decade focused on thinning from below, with an objective of retaining higher canopy closures (45%-60%) in pine stands for wildlife habitat objectives. Salvaging in areas of heavy pine mortality also occurred along with some regeneration harvest located primarily in dead and dying lodgepole/knobcone stands. Regeneration cutting in areas of known ponderosa pine root disease centers was avoided.

Past thinning to retain 45%-60% canopy closure has little to no effect on reducing the spread of blackstain and/or annosus root disease. Consequently, root disease centers that existed 10 years ago are still in existence today and have expanded 2-5 feet a year for a total of approximately 40 feet.

In the absence of fire and any other management in openings that were created by black stain root disease, natural tree regeneration becomes infected and the disease spreads outwards like ripples caused by throwing a stone into a pool of water. This has resulted in additional trees being affected by root disease and a subsequent increase in susceptibility to drought and insect related mortality. Both the black stain and the annosus root disease centers act as refugia for bark beetles

[93] In the last 100-150 years aspen in the western United States has declined 50-96%. Bartos, Dale, Aspen Ecology and Management Field Meeting Notes, Modoc National Forest, August 6, 1998.
[94] Mangels, Francis; Wildlife Biologist, "*Elk Flat and Coonrod Flat, Analysis of Ecological Succession and Recommendations for Management Report*" January 2002
[95] Forest Plan, p. 4-67
[96] Forest Plan, p. 4-5, p. 4-82

during periods of favorable precipitation. A ready source of bark beetles is maintained on site, and they are able to take advantage of weakened trees when soil moisture is less available. During extended droughts, western pine beetle, mountain pine beetle and red turpentine beetle will build up enough to cause extensive ponderosa pine mortality in the vicinity of the root disease centers. Mortality commonly continues for a year or two after precipitation returns to normal and the final stocking of live trees is lower than what would result from thinning. This scenario was repeated after the 1975-77 drought, 1987-91 drought and most recently from 2001-2005 on the Flats[97].

Alternative 1 - Preferred Alternative

Direct and Indirect Effects (Forest Health)

Thinning prescriptions in Alternative 1 would reduce the tree densities on about 3,100 acres of overstocked ponderosa pine stands. Removing recently dead and dying pine trees in pockets associated with root diseases in these stands will reduce disease vectors by removing the disease host. Sanitation would remove most of the mortality of the next 5 years while still maintaining existing mature stands.

Thinning would retain basal area at levels recommended for ponderosa pine stands, about 100-150 square feet of basal area in older stands, with an average of about 120 square feet per acre, and approximately 20 to 25 foot spacing in the younger stands[98]. Corresponding stand density indices[99] would range from approximately 171 to 192. These stand density index values are below the 230 stand density index value recommended for resistance to bark beetle attacks. Stocking levels are expected to remain at or below the recommended levels for bark beetle resiliency for 20 years after treatment[100].

After treatment, these stands would meet the project purpose and need for healthier growing conditions by reducing inter-tree competition for resources. Research demonstrates that thinning helps reduce the incidence of pest damage to a stand[101]. Less competition increases the health and vigor of the remaining trees resulting in a reduction of risk to bark beetle attack. The growth rates

[97] D. Shultz, Entomologist, Region 5 Forest Service, Personal Correspondence, October 2005.
[98] Biomass thinning in plantations.
[99] Based on an average leave basal area of 120 square feet/acre and overstory layer average stand diameters.
[100] Based on expected growth rates for this project area which included Forest Vegetation Simulation modeling runs based on inventory plot data from the project area, Region 5 Growth Studies within the project area and appropriate yield tables (Dunning, D., and L.H. Reineke. 1933. *Preliminary Yield Tables for Second-Growth Stands in the California Pine Region.* USDA, Washington D.C. Technical Bulletin 354 23 p.)
[101] Cochran, P.H. and James W. Barrett. 1995. *Growth and mortality of ponderosa pine poles thinned to various densities in the Blue Mountains of Oregon*. Res.Pap. PNW-RP-483. Portland OR:U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 27 p.
Oliver, William W. 1995. *Is Self-Thinning in Ponderosa Pine Ruled by Dendroctonus Bark Beetles?* Pages 213-218 in Lane G. Eskew, ed. Forest Health Through Silviculture-Proceedings of the 1995 National Silviculture Workshop. USDA For. Serv. Gen. Tech. Rpt.RM-GTR-267.
Sartwell, Charles and R.E. Stevens. 1975. *Mountain Pine Beetle in Ponderosa Pine- Prospects for silvicultural control in second growth stands.* J. of Forestry

would be greater for the residual trees[102] and less mortality would lead to lower dead fuel levels[103]. The thinned stands will be more open, similar to historic conditions, at densities shown to be sustainable with increased resilience to bark beetle attacks for approximately 20 years.

Studies indicate that thinning to 100-140 square feet per acre of basal area reduced tree mortality 86 to 95% as compared to unthinned stands and growth increased 338 to 638%[104]. At this level of thinning, tree mortality is expected to be about 1-3 trees per acre over 10 years[105]. Thinning directly reduces the host resource base (excess trees) that support beetle populations and reduces competition among leave trees for water and nutrients, which improves their resilience to future bark beetle attacks[106].

Removing dying trees and all diseased overstory pine trees in regeneration areas will remove the disease vectors (blackstain and/or annosus infected trees), aiding in breaking the disease cycle[107]. Removing all diseased overstory trees to break the disease cycle is based on research recommendations[108] and observations of plantations originating in the 1980's and early 1990's in the Pilgrim and Edson Creek vicinity which were established in areas with a history or root disease. In these plantations, that have had all of the diseased overstory pine removed and were then reforested, these actions have resulted in plantations stocked at the Region's recommended densities of 125 to 150 trees/acre well distributed over the stand area with only spotty mortality (< 2 acres in size) resulting from older annosus disease centers.

Re-planting with a species mix of healthy, rapidly growing seedlings, will enhance species diversity. Ponderosa pine will be planted in open areas and mixed species in shaded areas. It is expected that the larger stumps infected with annosus will decompose before the planted pine trees get big enough to have large root systems that would perpetuate the disease on the site. Reducing the spread of root disease and establishing healthy stands in regeneration harvest areas would meet the purpose and need as well as Forest Plan direction for healthy forest stands[109].

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[102] Fiddler, G.O., D.R. Hart, T.A. Fiddler, P.M. McDonald. 1989. *Thinning decreases mortality and increases growth of ponderosa pine in northeastern California*. USDA Forest Service Research Paper PSW-194, p. 5.
[103] *Fuels Specialist Report*, November 25, 2005.
[104] Fiddler, G.O., D.R. Hart, T.A. Fiddler, P.M. McDonald. 1989. *Thinning decreases mortality and increases growth of ponderosa pine in northeastern California*. USDA Forest Service Research Paper PSW-194, p. 5.
[105] Dead trees will be a variety of sizes and may not be greater than 15 inches in diameter.
[106] Goyer, R., Wagner, S 1997. Current and proposed technologies for bark beetle management. Journal of Forestry, p. 29-32.
[107] Based on research recommendations (Schmitt, Parmeter and Kliejunas, Annosus Root Disease of Western Conifers, Forest Insect and Disease Leaflet 172, Revised 2000) and observations of plantations established in areas with a history of root disease originating in the 1980's and 1990s in the Pilgrim and Edson Creek vicinity (Dave Schultz, Forest Entomologist, Personal Correspondence, September 2005).
[108] Hessburg, Goheen and Bega, Black Stain Root Disease of Conifers, Forest Insect and Disease Leaflet 145, 1995
[108] Freeman, Wilfred , *Biological Evaluation of Tree Mortality on McCloud Flats*, Forest Insect and Disease Management, May, 1977
[108] Freeman, Wilfred, *Biological Evaluation in the Pilgrim Creek Area*, Forest Insect and Disease Management, January 1980
[108] Dave Schultz, Forest Entomologist, Input for Edson Sale (Report No. 04-02) page 6, March 2004
[109] Forest Plan 4-5, 4-67, and 4-80.

About 160 acres[110] of 415 acres are expected to meet or exceed the 15% green tree retention guideline with a combination of disease-free overstory ponderosa pine and other mixed conifer species. The remaining 255 acres will retain healthy, sustainable trees (e.g. white fir, incense cedar), but may not meet the 15% guideline because these trees are generally smaller than the trees being removed and there are not enough healthy disease-free overstory ponderosa pine in the affected stands to meet the minimum 15% retention guideline. The healthy, sustainable trees are the most likely to persist and contribute to forested habitat, which is consistent with the intent of the guideline (to provide older forest habitat elements in a new stand indefinitely)[111]. Therefore this alternative will achieve the overall forest health objective but not always meet the 15% green tree retention guideline in these particular stands.

Sanitation of knobcone on 10 acres would achieve Forest Plan goals for forest health by removing the dead and dying knobcone pine and re-planting with ponderosa pine and incense cedar as these species are more sustainable for the site, will live longer, and have a higher value for wildlife habitat[112].

Releasing aspen and black oaks, by removing encroaching conifers in 20 acres of aspen patches and around isolated willows and black oaks, would achieve the Forest Plan goal of emphasizing management of hardwoods including aspen where they exist[113, 114] by reducing competition for resources, primarily sunlight[115]. Monitoring of mechanical treatments on the Lassen National Forest indicate there is a significant increase in total number of aspen stems in treated stands compared to controls[116].

Removing small diameter conifers (which are a result of pine in growth) and thinning to a wide spacing in the overstory trees in historically dry meadow areas will restore the open dry meadow conditions that previously existed in this area. It will also achieve the Forest Plan goal of maintaining and enhancing dry meadow (early seral stage)/open pine savannah forest types/plant communities[117]. Underburning in the dry meadows/pine savannah type areas will help to restore and maintain the historical open conditions that are described in the purpose and need by reducing the current amount of pine seedling and sapling encroachment. Underburning in the mature stand areas will benefit the stimulation of understory vegetation and will have no effect on residual tree/stand health as long as the fire intensity is kept at a low level.

Sporax ($Na_2 B_4 O_7 10H_2O$, Sodium tetraborate decahydrate) is used as a registered pesticide (fungicide) for forestry to prevent the spread of annosus root disease[118]. As such, Sporax is

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[110] Unit 305, 308,445, 446, 453, and 456.
[111] Forest Plan, page 4-61.
[112] *Silvics of North America*, Volume 1 Conifers Ag Handbook 654, Dec. 1990. p. 413-424.
[113] Forest Plan, page 4-14 & 4-82
[114] Effectiveness monitoring results for treated and non-treated aspen stands from 1999 to 2003 was conducted on the Eagle Lake Ranger District, Lassen National Forest. Jones, Bobette et al, "*Aspen Restoration through Mechanical Removal of Conifers in Northeast California*" (Abstract, 2003)
[115] Sheppard, W.D. 2003. Factors to Consider to Enhance and Expand Aspen.
[116] Jones, Bobette et al "*Aspen Restoration through Mechanical Removal of Conifers in Northeast California*" (Abstract, 2003).
[117] Forest Plan, pages 4-14 & 4-81
[118] Wilber-Ellis Sporax, EPA registration number 2935-501.

applied to freshly-cut stump surfaces at a rate of approximately one pound per 50 square feet of stump surface. For this project, it is estimated that about 1 pound of Sporax per acre would be applied in thinning prescription stands and about 1-2 pounds of Sporax in regeneration harvest stands[119]. Sporax will be applied to cut stumps fourteen inches in diameter and greater on approximately 3800 acres of harvest units.[120]

Potential toxicity of Sporax and boron to mammals, birds, fish, amphibians, and terrestrial and aquatic invertebrates and fungi is discussed in Dost and others as well as several other publications[121]. The literature indicates that there are potential risks to humans and the environment from borax application. Sporax is highly toxic to the eye and is readily absorbed through abraded skin[122]. The Forest Service discusses any pesticide use, including cautions about proper handling of Sporax for personal and environmental protection (e.g. wear protective equipment when applying borax, keep away from water sources) with purchasers/operators prior to application in accordance with regulations to minimize the potential for this risk.

Sporax is considered practically nontoxic to fish, aquatic invertebrate animals, and birds, as well as relatively nontoxic to bees[123]. At high concentrations, Sporax is toxic to plants[124]. Measurements of soil, plants and litter at distances up to 5 meters from stumps at various times after application do not indicate treatment-related increases in boron content[125]. Existing data indicate that adverse effects of forest uses of Sporax on wildlife or livestock are improbable and borax should be expected to have no effect on surrounding plants, invertebrates, or microorganisms[126].

Because of formulations, and methods and location of treatment, as well as observance of laws and safety procedures required to protect humans, non-target species, and resources, exposure levels to the public would be low and the probability of human health and environmental problems from Sorax use would be highly unlikely.

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[119] D. Fleming (District Silviculturist) and G. Steel (Sale Administrator).

[120] Schmitt, Craig L., John R. Parmeter, and John T. Kliejunas. 2000. Annosus Root Disease of Western Conifers. Forest Insect and Disease Leaflet 172. US Department of Agriculture, Forest Service, page 8.

[121] Dost, F.N., Norris, L. and C. Glassman, 1996. *Assessment of human health and environmental risks associated with the use of borax for cut stump treatment.* Unpublished, prepared for USDA Forest Service Regions 5 and 6. National Pesticide Telecommunications Network (National Pesticide Information Center), 2001. Boric Acid (Technical Fact Sheet). http://npic.orst.edu/factsheets/borictech.pdf. U.S. Environmental Protection Agency, Prevention, Pesticides, and Toxic Substances. 1993. *Reregistration Eligibility Decision Document: Boric Acid*; EPA 738-F-93-006. *Human Health and Risk Assessment for Borax (Sporax),* USDA Forest Service, February 24, 2006.

[122] U.S. Environmental Protection Agency, Prevention, Pesticides, and Toxic Substances. 1993. *Reregistration Eligibility Decision Document: Boric Acid*; EPA 738-F-93-006.

[123] U.S. Environmental Protection Agency, Prevention, Pesticides, and Toxic Substances. 1993. *Reregistration Eligibility Decision Document: Boric Acid*; EPA 738-F-93-006.

[124] National Pesticide Telecommunications Network (National Pesticide Information Center), 2001. Boric Acid (Technical Fact Sheet).

[125] Dost, F.N., Norris, L. and C. Glassman, 1996. *Assessment of human health and environmental risks associated with the use of borax for cut stump treatment.* Unpublished, prepared for USDA Forest Service Regions 5 and 6.

[126] Dost, F.N., Norris, L. and C. Glassman, 1996. *Assessment of human health and environmental risks associated with the use of borax for cut stump treatment.* Unpublished, prepared for USDA Forest Service Regions 5 and 6.

Cumulative Effects (Forest Health)

Timber harvest in the last 10 years within the cumulative effects bounded area has been about 220 acres of salvage of dead trees for western pine beetle infestations, about 1,400 acres of commercial thinning of natural stands and plantations.

Past thinning to retain 45%-60% canopy closure (180 to 220 square feet of basal area) has had little to no effect on reducing the spread of blackstain and/or annosus root disease. Consequently, root disease centers that existed 10 years ago are still in existence today and have expanded 2-5 feet a year for a total of approximately 40 feet.

Past salvage and the Alternative 1 will/have treated about 600 acres of trees that are dead and dying from root disease and Western Pine Beetle infestation. These areas will be reforested with a mix of conifer tree species and will be within forest standards for coarse woody debris and fuel loadings.

Past regeneration harvest has converted approximately 200 acres of knobcone and lodgepole pine stands to Ponderosa pine plantations. This alternative will convert approximately 10 acres of Knobcone pine to a Ponderosa pine plantation.

The cumulative effects for commercial thinning and biomass thinning are the same as described in direct and indirect effects as past thinning has not appreciably improved forest health due to the continued effects of root disease from higher stand densities that were retained.

Alternative 2 - Proposed Action modified to retain 60% canopy cover

Direct and Indirect Effects (Forest Health)

The effects of Alternative 2 are the same as Alternative 1 except that all thinning units (where possible) would be kept at 60% crown closure which is defined as a leave basal area of 200 square feet/acre. Approximately 535 acres of the 3100 total thinning acres would be thinned to the 200 square feet/acre density under this alternative. A stand density of 200 square feet per acre is 33% above the recommended level of 150 square feet/acre. Tree mortality at this basal area is expected to be about the same as no action, or about 20 trees per acre over 10 years.

Oliver’s research using stand density index has shown that stands with stand density indices greater than 230 are in the zone of imminent mortality from bark beetles[127]. Corresponding stand density indices[128] for the proposed thinning to 200 sqft/acre range from 285 to 320. These stand density index values are well above the 230 stand density index value recommended for resistance to bark beetle attacks.

Thinning to 60% crown closure is not a sustainable density for pine stands when the stated purpose and need for the project is forest health. Maintaining this level of stocking would continue the trend of stressed trees, decreased tree vigor, slow or stagnating tree growth and risk to epidemic bark beetle infestation.

[127] Oliver, William W. 1995. *Is Self-Thinning in Ponderosa Pine Ruled by Dendroctonus Bark Beetles?*
[128] Based on an average leave basal area of 200 square feet/acre and average overstory stand diameters.

There would be somewhat less Sporax applied on these 535 as a greater number of trees would be retained at 200 square feet of basal area per acre as compared to 100-150 square feet per acre.

Cumulative Effects, Alternative 2 (Forest Health)

The cumulative effects would be the same as Alternative 1 except that this alternative would contribute approximately 535 acres less toward improving forest health with regards to stand susceptibility to insects, disease, and other ecological processes.

Alternative 3 - Proposed Action modified to maintain 15% green tree retention in regeneration harvest units

Direct and Indirect Effects (Forest Health)

The effects of Alternative 3 are the same as Alternative 1 except for approximately 255 acres of regeneration harvest stands where some live, root-diseased trees are retained to meet the Forest Plan 15% green tree retention guideline.

Leaving up to 15% live, root diseased pine trees on approximately 255 acres of the regeneration harvest stands would continue the root disease cycle within these stands and to adjacent stands as root diseases can spread underground when healthy pine roots come into contact with inoculum in infected roots or stumps. Mortality can continue as root-to-root contact is made with adjacent healthy trees, creating ever widening pockets of mortality at a rate of 2 to 5 feet per year.

Approximately 6 to12 diseased pine trees per acre would be left to achieve the 15% retention requirement[129]. If the area has black stain root disease in pine, the treatment will slow the progression of the disease, but it will still be present. Ponderosa pine that seeds in naturally could also be affected[130]. If the area is infected with annosus root disease, then leaving living pine trees will perpetuate the disease on the site. The infected pine trees will live for varying amounts of time, and any seedling roots that touch the roots of the overstory trees will become infected. The stumps will also remain infected, although they tend to rot out on the Flats within about 15 years. Previous experience has shown that leaving pine trees in an annosus root disease center has resulted in mortality that lingered for at least 30 years in the Pilgrim area[131]. The new plantations would be 20-40 percent unstocked as a result of continued root disease[132].

Alternative 3 would be consistent with the 1995 Forest Plan 15% green tree retention guidelines on all 415 regeneration harvest acres, but would not meet the purpose and need or Forest Plan direction for healthy forest stands[133] on those acres because diseased trees would be

[129] Forest Plan Final Environmental Impact Statement, pVIII-10.
[130] D. Shultz, Entomologist, Region 5 Forest Service, Personal Correspondence, September, 2005.
[131] D. Shultz, Entomologist, Region 5 Forest Service, Personal Correspondence, September, 2005.
[132] If each of 6-12 overstory trees results in a hole in the plantation of 0.05 acres, then 12-25% of the new plantation would be unstocked. Leaving Douglas-fir or white fir overstory trees should have no effect on either annosus root disease, or black stain root disease. D. Shultz, Entomologist, Region 5 Forest Service, Personal Correspondence, September 2005.
[133] Forest Plan 4-5, 4-67, and 4-80.

retained, providing a disease vector to newly planted seedlings. In addition, the retained (diseased) overstory trees would not meet the intent of the 15% green tree retention guideline (to be retained indefinitely) because most of the live overstory pines showing signs of root disease are expected to die within 2 to 10 years and fall over within about 5-10 years[134].

There would be slightly less Sporax applied on 255 acres of regeneration harvest stands due to the 15% green tree retention standard being met with this alternative.

Cumulative Effects, Alternative 3 (Forest Health)

The cumulative effects would be the same as Alternative 1 except that this alternative would contribute approximately 255 acres less toward improving forest health with regards to root disease and tree mortality. Leaving these diseased overstory trees will increase the risk of root disease spread to other stands within the assessment area.

Vegetation Diversity

Affected Environment

The project area is located within two 5th order watersheds[135], Ash Creek and Upper McCloud River. Most of the project (about 75%) is within the Ash Creek watershed. Vegetation typing data combined with calculations to account for growth and harvest[136] in these watersheds was used to determine seral stage and vegetation diversity and the percent late successional forest in each watershed.

Vegetation types in the project area are typical of the southern Cascades and the McCloud Flats Area. Conifers species are typically, in order of abundance, Ponderosa pine, White fir and Incense cedar, with minor amounts of Douglas fir and Sugar pine. Within the larger 5th order watersheds Red fir occurs on the upper slopes of Mt. Shasta, generally above 6000 feet elevation. Brush species (greenleaf manzanita, whitethorn ceanothus, bitterbrush) and Knobcone pine are scattered throughout the watersheds and often are the result of past wildland fires. Barren areas are present on the slopes of Mt. Shasta above timberline, generally above 7500 feet elevation.

Commercial forest land for this analysis is defined as timber stands capable of growing at a minimum 20 cubic feet per acre per year and capable of developing late seral characteristics.

Definitions for Late-successional stages found on page 4-15 or the Forest Plan. Late successional forests are forest in its mature and/or old growth stages. Mature stands are those which the annual growth rate has peaked[137].

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[134] Dave Schultz, Region 5 Entomologist. Keen, F.P. 1955. The rate of natural falling of beetle-killed ponderosa pine snags. Journal of Forestry 53 (10): 720-723. Dahms, W. 1949. How long do ponderosa pine snags stand? RN-57. Pacific Northwest Research and Experiment Station.
[135] Forest Plan page 4-63 describes assessment of late-successional forest at the 5th field watershed scale.
[136] Forest Plan (1975/1980) data with 1990 and 1995 updates for plantations. Not grown. Calculations were made to account for growth. Timber harvest since 1996 included in calculations. See the vegetation diversity calculations in the project file.
[137] *Report of the Forest Ecosystem Management Assessment Team, July, 1993*, Glossary

The desired condition is to have a diversity of plants at all ecosystem scales[138] and a minimum of 5 percent of each successional stage, including both suitable and unsuitable timber lands[139]. Also, there should be a minimum of 15 percent late successional forest within each fifth field watershed[140]. Currently the Ash Creek Watershed has approximately 29% late successional forest and the Upper McCloud Watershed has approximately 23 % late successional forest. Both watersheds are below the minimum requirements for the successional stages 1 (grass, forbes and seedlings), 4a (large trees with open canopy of 10-39 percent) and 4c-older (multilayer large trees generally over 180 years of age and 70 percent or greater canopy closure).

Table 3. Vegetation Type Diversity, Ash Creek Watershed

Vegetation Type	Acres	Percent of National Forest Lands (NFSL) or Commercial Forest Lands (CFL)
Ponderosa Pine	22,200	40%NFSL, 53%CFL
Red Fir	12,000	21%NFSL, 28%CFL
White Fir	7,200	13%NFSL, 17%CFL
Mixed Conifer	1,000	2%NFSL, 2%CFL
Brush, Knobcone, lodgepole & whitebark pine	9,000	16%NFSL
Barren and early seral plants	4,600	8%NFSL
Totals	56,000NFSL 42,400CFL	100% 100% NFSL CFL

Table 4. Seral Stage Diversity, Ash Creek Watershed

Seral Stages	Acres	Percent of CFL
1	800	Not CFL, 1% of NFSL
2	12,600 (7400 CFL)	18
3a	8400	20
3b-c	13,900	33
4a**	1,000	2
4b-c**	10,500	25
4c older**	800	2
Total	42,800 CFL	100

** Late Successional Forest

[138] Forest Plan, page 4-4
[139] Forest Plan page 4-14
[140] Forest Plan, page 4-63

Table 5. Vegetation Type Diversity, Upper McCloud Watershed

Vegetation Type	Acres	Percent of National Forest Lands (NFSL) or Commercial Forest Lands (CFL)
Ponderosa Pine	30,800	50%NFSL, 56%CFL
Red Fir	2,400	4%NFSL, 5%CFL
White Fir	13,100	21%NFSL, 24%CFL
Mixed Conifer	8,400	14%NFSL, 15%CFL
Brush & Knobcone	3,600	6%NFSL
Barren and early seral plants	3,000	5%NFSL
Totals	61,300NFSL 54,700CFL	100% 100%

Table 6. Seral Stage Diversity, Upper McCloud Watershed

Seral Stages	Acres	Percent of CFL
1	200	Not CFL, .3% of NFSL
2	10,100 (8400 CFL)	15
3a	16,600	30
3b-c	17,100	31
4a**	600	1
4b-c**	11,800	22
4c older**	200	.3
Total	54,700 CFL	~100

** Late Successional Forest

Vegetation Trends

Railroad logging in the early 1900's removed almost all the old-growth forests within the McCloud Flats Area. Subsequent wildland fires at 10 year intervals resulted in brushfields, Knobcone pine stands and open Ponderosa pine stands. Timber harvest in the 1970's and 80's focused on regeneration of understocked and mature stands and conversion of some brushfields and Knobcone pine stands to Ponderosa Pine. Timber harvest in the 1990's to the present time has focused on thinning of overstocked stands and conversion of some Knobcone and Lodgepole pine stands to Ponderosa Pine. Comparing aerial photos from 1944, 1975 and 2003 (see Photo Gallery), there is a trend of increasing stocking of natural conifer stands and dry meadow areas and increasing acres of late seral forest. Seral stage diversity (outside of root disease and insect mortality areas) is moving toward more closed canopy, mature forests influenced by the exclusion of large scale wildland fires and the emphasis on stand thinning in the last decade. Vegetation type has shifted somewhat toward more Ponderosa pine as reforestation of brushfields and harvested stands emphasize this species, which historically has been the dominant species on the McCloud Flats and in the project area.

Alternative 4 - No Action

Direct and Indirect Effects (Vegetation Diversity)

Successional stage diversity will change with the potential loss of about 415 acres of late successional stands (approximately 305 acres in the Upper McCloud Watershed and 110 acres in the Ash Creek Watershed) due to existing insect and disease infestations. This loss would be significant if it caused the percent of late successional forest to fall below 15 percent of the capable land in each of the two fifth field watersheds affected. The actual acres lost would depend on future weather conditions and rate of spread for root disease centers and insect infestations. This potential loss would be a reduction of about 0.5 percent of the late-successional forest in the Upper McCloud Watershed and about 0.2 percent of the Ash Creek Watershed. There would be a corresponding increase in the acres of early successional forest in these watersheds.

Cumulative Effects (Vegetation Diversity)

Cumulative effects for vegetation diversity are bounded by the two fifth field watershed as described in the Affected Environment Section above. This bounding is based on Forest Plan direction for assessing the existing percent of late successional forests and effects of the proposed actions on those successional stages.

Within the last decade approximately 1,000 acres of regeneration harvest and salvage have occurred in the two fifth field watersheds on National Forest lands. A majority of this harvest (670 acres) was salvage of dead and dying Ponderosa pine from Western Pine Beetle infestations. The other 330 acres was regeneration of lodgepole pine and knobcone pine. This has reduced the amount of late successional forests within the Ash Creek Watershed by approximately 1.0 percent and in the Upper McCloud Watershed by approximately 0.9 percent[141]. These stands have some residual mid and late-successional stage trees and groups of trees with a much lower canopy closure.

There has also been approximately 11,400 acres of commercial thinning in the two fifth field watersheds that has not changed the amount of late successional forest in the short term (10 years and less), but will increase the percent of late successional forest in the long term (15 and longer) as mid-successional (3b and c) stands that were thinned grow into the late-successional (4b and c) stage. Development of these stands assumes no catastrophic loss from fire, insects or disease.

There are also two future projects within the fifth field watersheds. The Mudflow Project (Upper McCloud Watershed) will commercially thin approximately 2,100 acres of natural stands and plantations and treat root disease centers ranging from small group selection area (2-4 acres) to regeneration with reserve trees in areas of more extensive root disease on approximately 500 acres and remove encroaching conifers from approximately 200 acres of wet meadows. The Algoma Project will commercially thin approximately 4,000 acres of natural stands and

[141] Vegetation diversity calculations in project file.

plantations, partly in the Upper McCloud Watershed and partly within the Ash Creek Watershed. This project is in a late successional reserve and may treat root disease centers or insect infestations. These projects are predominantly thinning of mid and late successional stands to improve growth and resistance to insect, disease and wildland fires. Regeneration and sanitation harvest on approximately 700 acre of the Mudflow Project will reduce the amount of late-successional forest in the Upper McCloud Watershed by 1.3 percent.

There is a large percent of both watersheds currently in this mid-successional dense stage, 3b-c (33 percent of the Ash Creek and 31 percent of the Upper McCloud Watershed) that should develop into the late-successional stage in the next 10 to 40 years.

Past and proposed future regeneration harvest will reduce the amount of late-successional forest in the Upper McCloud Watershed by about 2.2 percent and in the Ash Creek Watershed by about 0.9 percent. Past and proposed future projects will or have thinned approximately 2,700 acres of mid-successional plantations that will increase the acres of late-successional forest in 30 to 50 years in both watershed.

Overall there will be a short-term reduction in the percent of late-successional forest in both watersheds, but they will remain above the 15 percent threshold. The percent of late-successional forests will increase over the next 10 to 40 years as mid-successional stands, especially those that have been or will be thinned, grow into the late-successional stage.

Alternatives 1, 2 & 3

Direct and Indirect Effects (Vegetation Diversity)

Thinning should not change successional stage diversity in the short term as the majority of dominant and co-dominate trees will be retained and average tree diameter will increase with the removal of smaller diameter trees from the understory. Increased diameter growth will advance the treated mid-successional stands to late-successional forests more rapidly. Approximately 2300 acre of thinning will remain late-successional forest. Approximately 785 of biomass thinning will develop into late-successional forest in 40 to 60 years.

Regeneration harvest, aspen release and meadow restoration will result in the change of about 535 acres late successional forest to early-successional forest. Much of this change would occur even if no action is taken, as described in the effects of no action. This change will reduce the amount of late-successional forest by .2 percent (100 acres) for the Ash Creek Watershed and by .8 percent in the Upper McCloud Watersheds. Both watersheds would remain above the 15 percent threshold for late successional forests

About 175 acres of early to mid-successional forest will be changed to early successional/open as pole and sapling size conifers are removed to expand dry meadows to their more historic size. These are predominately Ponderosa pine type and will remove about 1 percent of the Ponderosa pine type in the Ash Creek 5th Field Watershed. There will be a corresponding increase in the early-successional stage grass and forbes as dry meadow areas expand.

Vegetation type diversity will be increased for the 415 acres of regeneration harvest, as they are they are predominantly Ponderosa pine and will be planted with a mixture of conifer species.

Cumulative Effects (Vegetation Diversity)

Alternatives 1, 2 & 3 (approximately 535 acres of regeneration harvest) combined with the past actions (approximately 1,000 acres or regeneration harvest) and future actions (approximately 700 acres of regeneration harvest on the Mudflow Project) will result in reducing the amount of the late successional forests in the Ash Creek fifth field watershed by approximately 1.0 percent and in the Upper McCloud fifth field watershed by about 2.8 percent. The Ash Creek Watershed will then have about 28 percent late-successional forest and the Upper McCloud Watershed will have about 20 percent late-successional forest.

Commercial thinning in the last decade and proposed commercial thinning will have treated approximately 20% (8,700 acres) of the commercial forest lands in the Ash Creek Watershed and approximately 20% (11,100 acres) in the Upper McCloud Watershed. In the long term (15 years and longer), these watersheds will have a greater percent of the landscape in late successional and old-growth forests as thinning treatments accelerate tree growth and stands mature into late-successional and old-growth forest, absent any catastrophic event from fire, insects or disease.

Fuels and Wildfire[142]

Affected Environment

Refer also to the purpose and need in chapter 1 for affected environment specific to fuels. Generally the landscape is typical of Fire Behavior Fuel Models 2, 8, and 10[143], with about 92% of the areas proposed for treatment in Fuel Model 10. Fires in Fuel Model 10 burn in the surface and ground fuels with greater fire intensity than in other timber litter models. Crowning, spotting and torching of individual trees are more frequent in this fuel situation, leading to potential difficulties in controlling fire[144]. With Fuel Model 8, slow-burning ground fires with low flame lengths are generally the case, although the fire may encounter occasional heavy fuel concentrations that can flare up[145]. Fires in Fuel Model 2 spread primarily through fine herbaceous fuels, either curing or dead. These are surface fires where the herbaceous material, in addition to litter and dead downed wood from the open shrub or timber overstory, contribute to fire intensity[146].

The Pilgrim project area has a moderate hazard rating (i.e., to what degree does the condition of the vegetation and topography contribute to the increase in fire behavior), and a high risk rating (i.e., what is the chance of a fire starting in this area?)[147]. Between 1994 and 2004 there have been 21 lightning caused fires and 17 human caused fires within the 8th field watershed.

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[142] Paraphrased from the *Fuels Specialist Report*, November 25, 2005.
[143] Anderson 1982. Aids to Determining Fuel Models for Estimating Fire Behavior. USDA Gen. Tech. Rep. INT-122, p. 13.
[144] Anderson 1982. *Aids to Determining Fuel Models for Estimating Fire Behavior*. USDA Gen. Tech. Rep. INT-122
[145] Anderson 1982. *Aids to Determining Fuel Models for Estimating Fire Behavior*. USDA Gen. Tech. Rep. INT-122, p. 11.
[146] Anderson 1982. *Aids to Determining Fuel Models for Estimating Fire Behavior*. USDA Gen. Tech. Rep. INT-122, p. 5.
[147] (potential for ignition based on; 1.5 fires per thousand acres per decade)

Under current conditions, with the increase of disease and insect infestation, severe weather blow down, and overcrowding, the existing fuel loading is 45-50 tons per acre (t/a) in the infected areas. Areas not experiencing accelerated deterioration have fuel loadings ranging from 5-30 t/a[148].

The current fire regime is one of moderate to high intensity fires at infrequent intervals and generally characterizes fast spreading, high intensity fires under worst case scenarios.

Desired fuel conditions are 5-10 tons/acre, retaining approximately 4-6 logs over 10' in length and of the largest available diameter[149], the Forest Service would need fire behavior conditions that mimic those of a Fuel Model 2, 8 or 9. This would allow suppression by ground resources and would create favorable conditions to apply prescribed fire where needed. Annual natural fuels accumulation should be in the range of .6 - 3 ton/acre per year[150].

Environmental Consequences

The criteria used to compare the alternatives are change in fuel model, flame lengths, and rates of spread. Direct, indirect and cumulative effects are also discussed as they relate to these criteria. Table 7 shows the changes to criteria.

Table 7. Fuel model, flame lengths, rates of spread and canopy cover by alternative in Harvest Units

	Alternative 4 no action (current condition)	Alternative 1	Alternative 2	Alternative 3
Change in Fuel Model (% acres)	FM 2 - 5 % FM 8 - 3 % FM 10 - 92 %	FM 2 - 18 % FM 8 - 82 % FM 10 - 0 %	FM 2 - 18 % FM 8 - 68 % FM 10 - 14 %	FM 2 - 18 % FM 8 - 75 % FM 10 - 7 %
Flame Length: **FM 2** **FM 8** **FM 10**	Untreated: 5%<8.5' 3% < 1.4' 92% > 6.2'	Treated acres: 18%< 8.5' 82% < 1.4'	Treated acres: 18% < 8.5' 68% < 1.4' 14% > 6.2'	Treated acres: 18% < 8.5' 75% < 1.4' 7% > 6.2'
Rate of Spread: **FM 2** **FM 8** **FM 10**	Untreated: 5% - 55 ch/hr 3% - 3 ch/hr 92% -11 ch/hr	Treated acres: 18% - 55 ch/hr 82% - 3 ch/hr	Treated acres: 18% - 55 ch/hr 68% - 3 ch/hr 14% - 11 ch/hr	Treated acres: 18% -55 ch/hr 75% - 3 ch/hr 7% - 11 ch/hr

Legend: FM=fuel model, ch/hr=chains per hour.

Alternative 4 - No Action

Direct and Indirect Effects (see Table 7 above) (Fuels and Wildfire)

With this alternative, current fire conditions would persist. Most of the project area would continue in the short term in Fuel Model 10 with flame lengths over 6 feet and rates of spread of about 11 chains per hour. Canopy base heights, surface fuel loads, dead crowns, crown density,

[148] 5 t/a in the meadow restoration units
[149] Forest Plan G-12 & 4-67
[150] Skaggs, B. Technical Fire Management Report Sequoia National Forest 1996, Agee. Fire Ecology of the Pacific North West Forests 1993 p336

and conifer encroachment would continue. Over time, portions of the project would transition to Fuel Model 12[151]. The primary carrier of fire in fuel model 12 is dead and downed slash like material. The rate of spread would be 17 ch/hr, with a flame length of about 9.7 feet[152] (fuel model 12)[153]. There will be a greater probability of surface fire transitioning to a crown fire as well as higher intensity surface fires. Greater crown density promotes transition of passive to active crown fires (passive fire is dependent on surface fuels and intermittently torches in the crowns; an active crown fire is independent of surface fuels and burn primarily in the crown[154]). Flame heights exceed direct attack capabilities. The fire regime will remain out of sync with historical conditions. Greater fire severity effects are expected, including the chance for stand replacing fire.

In areas of root disease and insect infestation, the expected fuel loading will significantly increase in the .1-9" class over the next 5 years, adding roughly 15-25 tons per acre[155]. Within 10 years, about 70 percent of the trees that are now dead or dying will have fallen,[156] adding approx. 30-50 total tons per acre (this includes >9" material). This would exceed 70+ tons per acre and significantly increase the amount of surface fuels that are the primary carrier of fire. These high fuel loadings will cause higher intensity fires and make fires harder to control.

Currently about 10 percent of the project area has fuel loadings in excess of 15 to 25 tons per acre. Over the next 10 years, areas of conifer mortality from disease and insects will add approximately another 500 acres of excessive fuel loading or about 12 percent of the project area. This additive effect does not consider possible salvage of dead and dying trees in the future.

Cumulative Effects (Fuels and Wildfire)

Effects were bounded by assessing the estimated maximum potential spotting range of a wildfire originating within the project boundary or from an outside source which could spot into the project area. This boundary is .5 miles or less from unit perimeters. This area is approximately 8500 acres, of which about 10 percent is private lands.

Timber harvest in the last 10 years within the cumulative effects bounded area has been about 220 acres of salvage of dead trees for western pine beetle infestations, about 1,400 acres of commercial thinning of natural stands and plantations, about 400 acres of underburning and about 250 acres of slash pile burning. Underburning and slash pile burning were done on the same acres as timber harvest. The effects of these actions have been a change from generally Fuel Model 10

[151] Fuel Model 12 is characteristic of rapidly spreading fires with high intensities that are capable of generating firebrands. When fire starts, it is generally sustained until a fuel break or change in fuels is encountered. Anderson 1982. *Aids to Determining Fuel Models for Estimating Fire Behavior*. USDA Gen. Tech. Rep. INT-122, p.13.
[152] Maxwell W.G. & Ward F.R. "Photo-Series for Quantifying Forest Residues" PNW-95 Oct. 1979 & "Behave 2.0.2 " fire modeling program
[153] Behave 2.0.2 fire modeling program
[154] Donna Sager, Assistant Fuels Officer.
[155] These figures are based on observation of infected stands on the McCloud Flats over a 3 year period.
[156] Keen. F.P. "*How Soon Do Yellow Pine Snags Fall?*" Jour-Forestry 27:735-737 oct.1929

to Fuel Model 8 on the acres that were thinned (18% of the cumulative effects area) and to Fuel Model 2 on the acres that were salvaged (2% of the cumulative effects area).

Alternative 1 - Preferred Alternative

Direct and Indirect Effects (see Table 7 above) (Fuels and Wildfire)

Thinning and sanitation/regeneration prescriptions and prescribed burning will remove fuel ladders, increasing the canopy base height. These prescriptions will also remove the majority of dead crowns, reduce crown density, and remove encroaching trees from historically natural openings. Prescribed burning and tractor piling treatments will reduce surface fuel loadings. Together, the activities would reduce ladder fuels and surface fuels that in turn would reduce the chance of a stand replacement passive crown fire in the treated units. This reduction of fuels changes the NFFL fire behavior fuel models changing the fire behavior characteristics. This change is in reduced flame lengths, rate of spread, scorch heights, and reduced mortality rate primarily by converting the existing fuel model 10 areas to fuel models 8 and 2. The chance of crown fire moving through the canopy or intense surface fire is reduced on 100% of the treated acres. Suppression resources are able to use direct attack methods in these areas with the reduced flame lengths/surface fuel intensities.

Fuel model 2 will have a flame length exceeding 4’. This is due to the nature of fine flashy vegetation but results in less overall resource damage.

Fuel loading will be in the desired range of about 5 to 10 tons per acre with annual accumulations of about .6 to 3 tons per acre.

Cumulative Effects (Fuels and Wildfire)

Past timber harvest along with slash pile burning and underburning (approximately 1600 acres) and the proposed action will reduce the chance of a crown fire on approximately 5300 acres of National Forest lands within the cumulative effects area. This is about 62 percent of the cumulative effects area.

Fuel loading will be within the desired range of 5 to 10 tons per acre on the approximately 5100 acres treated.

Alternative 2 - Proposed Action modified to retain 60% canopy cover

Direct and Indirect Effects (see Table 7 above) (Fuels and Wildfire)

The effects of this alternative are similar to Alternative 1 except where 60 percent canopy closure is maintained on approximately 535 acres. In areas with 60% canopy cover there will be more potential for passive crown fire. To quantify the specific change, the percentage of dead canopy would need to be calculated. Observation of infected stands shows that the progression of mortality can increase dramatically in a short period of time. Also the future surface fuel loading from the dead and dying trees will contribute to the fire behavior. When all treatments and effects of this alternative are looked at together, the chance of crown fire moving through the canopy or intense surface fire is reduced in about 86% (3200 acres) of the treated acres.

Cumulative Effects (Fuels and Wildfire)

Past timber harvest along with slash pile burning and underburning (approximately 1600 acres) and Alternative 2 will reduce the chance of a crown fire on approximately 4800 acres of National Forest lands within the cumulative effects area. This is about 56 percent of the cumulative effects area.

Alternative 3 - Proposed Action modified to maintain 15% green tree retention in regeneration harvest units

Direct and Indirect Effects (see Table 7 above) (Fuels and Wildfire)

Fire modeling results in very similar fire behavior outputs as Alternative 1. Alternative 3 would have greater potential for future increased surface fuel loading on 415 acres due to the possible dying and falling of the trees that were left to maintain the 15% retention. When all treatments and effects of this alternative are looked at together, the chance of crown fire moving through the canopy or intense surface fire for this alternative is reduced on about 93% (3500 acres) of the treated acres.

Cumulative Effects (Fuels and Wildfire)

Past timber harvest along with slash pile burning and underburning (approximately 1600 acres) and Alternative 3 will reduce the chance of a crown fire on approximately 5100 acres of National Forest lands within the cumulative effects area. This is about 60 % of the cumulative effects area.

Threatened and Endangered Species – Wildlife and Fish[157]

In addition to threatened and endangered wildlife and fish species, this section addresses significant issue 1, with regards to the northern spotted owl.

Affected Environment

Of the threatened and endangered wildlife and fish species considered in the *Biological Assessment*, (Appendix H) the project is within the range and contains potential habitat for only the northern spotted owl[158]. The project area is located entirely within designated Critical Habitat Unit CHU- CA-2 for the northern spotted owl and Forest Plan matrix and riparian reserve land allocations[159].

Matrix is designed to provide for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees. The matrix will also

[157] Paraphrased from the Biological Assessment (November 2005), *Specialist Report – Wildlife* (November 30, 2005), *Pilgrim Vegetation Management Project Forest Plan-Vegetation Size and Density* map (as adjusted by ground verification, October 23, 2005) and *Acres of Proposed Treatment with Vegsize and Vegdensity within the Pilgrim Vegetation Management Project* (frequency file).
[158] Biological Assessment, November 2005, p. 3 and 4.
[159] Biological Assessment, November 2005, p. 7 and 10. Forest Plan pages 4-53 and 4-61.

add ecological diversity by providing early-successional habitat[160]. Production of timber and other commodities is an important objective for matrix lands[161].

The proposed treatment areas occupy about 4% of CHU CA-2 acres[162]. CHU CA-2 was designated[163] to provide easterly distribution of the subspecies and to provide an opportunity to designate an area that may eventually support contiguous nesting habitat for northern spotted owl pairs[164]. Since then, it has been recognized that the area has limited capability to provide optimum dispersal habitat[165]. Critical habitat helps focus conservation activities by identifying areas that contain essential habitat features (primary constituent elements)[166].

Recent (2004, 2005 & 2006) and historic surveys (past 15 years) show no spotted owls within 1.3 miles of the project area[167]. A radius of 1.3 miles is used in this province to approximate a northern spotted owl home range territory. Black Fox Mountain and Elk Flat activity centers (based on detections of non-breeding pairs or single individuals) are well over 1.3 miles outside the net Project area[168]. These centers are irregularly and seldom occupied and contain low to moderate capability habitat (the best in the watershed). Unoccupied moderate to low capability activity centers are very unlikely to generate owl activity in even lower capability or unsuitable habitat in the project area outside of normal foraging radius from the nest. The probability of owls in the more marginal, unsuitable, and very low-capability habitat (the worst in the watershed) of the Project area is very low[169,170].

The Project is on the central flats in historically unsuitable or marginal dispersal habitat. The tree distribution is clumpy and non-uniform, often with patches of dense pine trees interspersed with more open areas. Limited riparian vegetation, flat ground, dry open meadows, and fragmentation also contribute to unsuitability. The Forest Service assumes that owls occasionally disperse through the north area (including private land), but are unlikely to stay, even for a short time. The route further north through private land with more slope and at least limited water is more probable, but also low capability and heavily logged.

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[160] Northwest Forest Plan. Basis for Standards and Guidelines, page B-2.
[161] Northwest Forest Plan. Basis for Standards and Guidelines, page B-1.
[162] Formal Consultation for the Pilgrim timber Sale (1-12-2005-F-24), Biological Opinion, page 16.
[163] Northern spotted owl Critical Habitat was designated based on the identification of large block of suitable habitat that are well distributed across the range of the spotted owl. Most CHUS were expected to provide suitable habitat for population support, some were designated primarily for connectivity, and other were designated for both (Formal Consultation for the Pilgrim timber sale (1-12-2005-F-24), Biological Opinion, page 9.)
[164] Formal Consultation for the Pilgrim timber Sale (1-12-2005-F-24), Biological Opinion, page 16.
[165] Lava rims and soils with low water holding capacity occur throughout the McCloud Flats. These areas are often not capable of supporting stands with high crown canopies (Managing Dispersal and Connectivity on Matrix Land, April 22, 1997).
[166] Federal Register Vol. 57, No. 10, January 15, 1992. pp. 1796.
[167] Biological Assessment, November 2005, p. 17.
[168] Biological Assessment, November 2005, p. 17.
[169] Forest Plan, Appendix G, p. G-12 table, USGS Maps, Air Photos 1995.
[170] Biological Assessment, November 2005, p. 17 and 18.

The spotted owl is associated with late-successional and old growth forest. From a forest vegetation type or structural standpoint[171], approximately 1,722 acres of treatment stands are classified as 3N, 3G, 4N, and 4G[172]. These vegetation types are usually considered nesting, roosting, and foraging habitat based on vegetation type. Although they have been classified in this way, they are not habitat nor are they comparable to similarly classified stands found in more moist areas of the forest. About 150 acres of regeneration harvest areas have extensive tree mortality, but are still reflected as 3N.

Under the habitat capability model[173], 1,517 acres of treatment stands are classified as 3N, 3G, 4N, or 4G (subtracting the high mortality 3N stands). Approximately 1,502 acres of low quality 3N timber type stands would be considered foraging habitat in other areas and about 14 acres of 4N/4G timber types would be considered nesting and roosting, however they are so limited by the conditions on the flats (slope, aspect, water, and prey base are limited), that they are not considered suitable northern spotted owl nesting, roosting, or foraging habitat. Field reconnaissance confirms that the project assessment area is low quality dispersal habitat at best[174]. Based on vegetation typing, habitat capability models, and ground verification, the actual project contains no suitable nesting, roosting, or foraging habitat. The owl analysis in the *Biological Assessment* considered 1,517 acres of low capability dispersal habitat in treatment areas and about 1,251 acres of capable (potentially suitable) dispersal habitat[175].

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect Effects (T&E Wildlife)

The direct effect of no action would be continuance of the present situation. Fragmented, low quality dispersal habitat would persist. The indirect effect of no action would be continuous further insect and disease induced tree mortality in the project area and vicinity (see also the Forest Vegetation section) and the potential for loss of habitat due to fire (see also the Fuels and Wildfire section). The highly probable continued effect of pathogens known to be present and/or wildfire would most likely remove some marginally suitable dispersal habitat. Approximately 150 acres of dispersal habitat has been lost from insect killed trees in the proposed regeneration harvest units. The remainder of these units, approximately 265 acres, could be lost over the next several years as pathogens continue to kill trees. An unestimated number of acres of dispersal habitat will continue to be lost in stands with root disease centers (within the approximately 1035 acres of proposed thinning/sanitation units) as the disease spreads to trees adjoining infection centers.

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171 Forest Plan (1975/1980) data with 1990 and 1994 updates for plantations.
172 Size 3 = 12 to 24 inches in diameter; size 4 (and above) = > 25 inches in diameter. Vegetation density N= 40-69% canopy closure; density G = >70% canopy (Debbie Fleming, silviculturist).
173 Habitat capability models, Appendix G of the Forest Plan.
174 Francis Mangels, Wildlife and Range Biologist.
175 Biological Assessment, November 2005, p. 22 and 23.

Juvenile owl may still disperse across the area, as owls are known to move across large areas of marginal or even unsuitable habitat[176].

Cumulative Effects (T&E Wildlife)

Cumulative effects for the Northern Spotted Owl are bounded by the Critical Habitat Unit, CHU-CA-2 which is approximately 89,000 acres of National Forest and private lands. The CHU contains all of the Algoma Late Successional Reserve (RC-357) and Bartle Managed Late Successional Area (DD-79) totaling approximately 26,891 acres and the Elk Flat Late Successional Reserve (RC-360) totaling approximately 3,056 acres. This cumulative effects area was used because there are two other vegetation management projects currently being planned within the CHU and will overlap in time with this project.

Since 1996 the U.S. Fish and Wildlife Service has consulted on thirteen projects within the CA-2 Critical Habitat Unit (CHU) [177]. Five minor projects have had no effect on suitable Northern Spotted Owl Habitat. The Pilgrim Creek Snowmobile Park Project included grooming of snowmobile trails and some hazard tree removal along these trails. The Intake Springs Water System Project removed 17 hazard trees. The Sugar Roadside Hazard Tree Project removed approximately 100 road hazard trees and the Cattle Camp Vegetation Management Project thinned 48 acres of a mixed conifer stand within the Cattle Camp Campground. The Coonrod Visual Enhancement Project removed about 70 trees in a historic meadow area that is part of a Native American cultural site.

Five green timber sale Projects have been consulted on. The Mt. Thin and Fuels Project temporarily degraded approximately 24 acres of foraging habitat, but this did not have an adverse effect to critical habitat[178]. The Edson Vegetation Management Project thinned approximately 1700 acres of natural stands and plantations and regenerated about 20 acres of root diseased infested trees. This project temporarily degraded approximately 1,300 acres of forage habitat, but this did not have an adverse effect on critical habitat[179]. The Davis Vegetation and Road Management Project temporarily degraded approximately 100 acres of foraging habitat by commercial thinning. The McCloud Flats Phase 1 Forest Health Project (North Flats, East Flats, Corral, North Flats Biomass and Ash Biomass sales were implemented under the Flats Phase 1 Environmental Assessment) thinned approximately 2,900 acres of natural stands and plantation and regenerated approximately 90 acres of root diseased infested trees. This project temporarily degraded approximately 200 acres of marginal dispersal habitat, but this did not have an adverse effect on critical habitat[180]. The Mud Forest Health Project (Pilgrim Biomass Sale) thinned approximately 2,200 acres of natural stands and plantations. This project temporarily degraded approximately 200 acres of dispersal habitat, but this did not have an adverse effect on critical

[176] Personal Comm. with Francis Mangels, Wildlife and Range Biologist
[177] Formal Consultation for the Pilgrim Timber Sale (1-12-2005-F-24R) page 17
[178] Biological Assessment for Mountain Thin and Fuels Mgt. Project, pages 9 & 11
[179] Biological Assessment for Edson Vegetation Management Project, page 23
[180] Biological Assessment for McCloud Flats Phase 1 Project, pages 29 & 31

habitat[181]. The South Flats Multiproduct Project (South Flats and the Flow Multiproduct Sales) thinned approximately 3,800 acres of natural stands and plantations and regenerated approximately 110 acres of Knobcone pine. This project also resulted in the clearing of approximately 800 acres of shrubfields that were planted to a mix if conifer species, mainly ponderosa pine. This project degraded approximately 1,500 acres of marginal dispersal habitat[182].

All of the green sales, except Mountain Thin, had been surveyed to protocol for Northern Spotted Owls for at lease two years prior to project implementation and no owl were detected in areas proposed for harvest.

Three salvage sales have been consulted on. The Elk Flat Salvage removed approximately 80 acres of dead trees that was dispersal habitat. The Kinyon Vegetation Management Project removed approximately 130 acres of dead trees that were formerly considered foraging habitat. The Old Station Salvage removed approximately 213 acres of dead trees that were formerly considered dispersal habitat.

The Ash Sink Salvage and Elk II Salvage were determined to have no effect to the Northern Spotted Owl but did remove approximately 225 acres of dead trees that was formerly considered dispersal habitat.

Past projects within the CHU have degraded approximately 3,400 acres of forage/dispersal habitat (about 12 percent of the forage/dispersal acres in the CHU). Degraded habitat is a temporary loss in the quality of habitat, but not habitat function. Approximately 10,700 acres of Thinning (about 41 percent of the forage/dispersal habitat in the CHU) has improve habitat quality in the long term as stands have improved growth rates and trees grow larger and are less susceptible to insects and disease. Regeneration of approximately 220 acres of knobcone pine and root disease centers and planting of shrubfields will improve habitat in the long-term as these areas were planted to a mixed of conifer species, primarily ponderosa pine, that will grow into suitable dispersal habitat in thirty to forty years.

There are two future projects within CHU CA-2. The Mudflow Project that will commercially thin approximately 2,100 acres of natural stands and plantations, treat root disease centers ranging from small group selection area (2-4 acres) to regeneration with reserve trees in areas of more extensive root disease on approximately 500 acres and remove trees from 200 acres of meadow areas. The Algoma Project (in the Algoma Late Successional Reserve) will commercially thin approximately 4,000 acres of natural stands and plantations. These projects are in the early planning stage and the total acres and locations of treatments could change when a final proposed action is approved. As currently planned The Algoma Project would thin approximately 3,500 acres of foraging/dispersal habitat (the other 500 acres of thinning is in young plantations not currently considered suitable owl habitat) and the Mudflow Project would thin approximately 2,100 of foraging/dispersal habitat. Thinning of these stands would be with emphasis on removing smaller trees in the understory and some dominant and co-dominant size trees to attain the desired stocking. The Mudflow project will also remove approximately 500

[181] Biological Assessment for the Mud Forest Health Project, pages 8 & 9
[182] Biological Assessment for the South Flats Project, page 5

acres of diseased trees that are now considered dispersal habitat and 200 acres of trees from meadow areas now considered dispersal habitat. At this time it has not been determined how many acres of thinning may be degraded as a result of these proposed actions.

Cumulatively, the combined past and future vegetation management projects in CHU CA-2 have or will commercially thin approximately 16,800, acres of Northern Spotted Owl foraging/dispersal habitat (about 64 percent of the forage/dispersal habitat in the CHU). These thinning treatments degrade some of this habitat in the short term (5-10 years) but improve the quality of habitat in the long term as the stands develop more rapidly into a larger tree size and better quality dispersal/forage habitat. Due to site conditions, many of these stands on the McCloud Flats are naturally very low capability dispersal habitat[183].

The greatest cumulative impact to the Northern Spotted Owl and its critical habitat in CHU CA-2 is the continued loss of habitat from insect infestations and root disease centers. Not considering small pockets of dead trees that are scattered throughout the CHU, approximately 800 acres of foraging/dispersal habitat(about 3 percent of the forage/dispersal habitat in the CHU) have been lost to insects and disease in the last five years and this trend could continue into the near term future. Approximately 220 of these acres are in late successional reserves within the Critical Habitat Unit. All of this loss has been in pine stands that either had not been thinned or were thinned to densities that were too high to sustain healthy trees (See Forest Health Section).

Continued loss of dispersal and foraging habitat could result in fewer juvenile owls dispersing across the landscape and finding suitable habitat for nesting and roosting that currently exists in the Algoma Late Succession Reserve.

Alternative 1 - Preferred Alternative

Direct and Indirect Effects (T&E Wildlife)

The proposed regeneration harvest prescriptions have almost no effect on owl habitat because disease and insects have killed many of the trees in these areas, rendering the stands essentially unsuitable[184].

The thinning prescriptions are designed to sustain a forest canopy, but leave the stands open enough so that they may survive the endemic pathogens in the area. Treated stands would be more resistant to stand replacing crown fires or pathogens and would include more large-diameter conifers with fuller crowns and larger lateral branches than untreated stands[185]. Treatment in these stands is likely to reduce the risk of total stand loss, thereby helping to maintain some low capability dispersal habitat for the northern spotted owl[186].

In the short term, vertical structure will be somewhat simplified by removing smaller diameter conifers by thinning and underburning. Release of willows, oaks and aspens will

[183] Biological Assessment, November 2005, p. 11
[184] Biological Assessment, November 2005, p. 19
[185] Biological Assessment, November 2005, p. 19
[186] Biological Assessment, November 2005, p. 19

improve cover diversity and prey habitat diversity[187]. Larger conifers will be removed on about 20 acres of aspen treatment; these trees are not old growth. Removal of these conifers is regarded as a beneficial trade-off for the value of saving the few remaining aspen. Deciduous trees contribute to forest diversity and a diverse prey base, benefiting raptors using the area, but on a very limited acreage[188].

Maintaining prescribed snag and logs densities will provide for prey cover and promote species diversity within the limitations of the site[189].

Prescribed burning would help protect nearby owl habitat from catastrophic fire losses and stimulate prey diversity on the forest floor, providing a more reliable food supply. Increasing vegetative diversity increases the prey base and thus helps raptors, but the effect is slight in the Project.

The proposed thinning actions would affect about 1,517 acres of low capability dispersal habitat. Approximately 670 acres of low capability dispersal habitat will be removed (functional loss of primary constituent elements, thus no longer considered suitable habitat) and 844 acres degraded (reduction of habitat quality but not function) [190]. Degraded habitat will be regained in 5 to 15 years as thinned stands, mainly the 785 acres of plantations, grow into suitable dispersal habitat.

Approximately 1251 acres of capable/potential habitat will be modified (benefited) by removal of dying trees and replanting, plantation biomass thinning, thinning to remove fuel ladders and conversion of Knobcone pine to mixed conifer trees. Plantation thinning will accelerate the development of dispersal habitat. Thinning of natural stands will also accelerate the development of future dispersal habitat and improve the stands resistance to insect, disease and stand replacing wildland fire. Removal of dying trees and replanting will benefit the critical habitat unit by reducing the spread of insects and disease pathogens and reducing future ground fuels to within a range of desired conditions.

The effects of the proposed project constitute an adverse effect to critical habitat because the function of primary constituent elements[191] has been adversely affected. However, due to the limited amount of dispersal habitat to be removed (approximately 670 acres) the U. S Fish and Wildlife Service does not expect this adverse effect will impede the ability of the project area to provide for the intended conservation needs of the Northern Spotted Owl[192]. The U. S Fish and Wildlife Service's determination is that *the proposed action is not likely to destroy or adversely modify designated critical habitat for the Northern Spotted Owl.* Overall the removal of the

[187] Biological Assessment, November 2005, p. 20
[188] Biological Assessment, November 2005, p. 20
[189] Biological Assessment, November 2005, p. 21
[190] Formal Consultation for the Pilgrim timber Sale (1-12-2005-F-24), Biological Opinion, page 20 & 21
[191] Primary constituent elements are an integration of habitat components such as tree and stand structure, prey base, cover, slope, aspect, availability of water, etc. that are essential to a species conservation.
[192] Formal Consultation for the Pilgrim timber Sale (1-12-2005-F-24), Biological Opinion, page 21

majority of the trees in the project area is beneficial to the CHU due to the currently severe pathogenic conditions[193].

Because the project area is unsuitable for nesting, roosting and foraging, owls are not likely to occupy the area for those purposes during proposed activities. Because the proposed project will not modify the limiting factors making the area unsuitable (availability of open water, slope, etc.), it is still highly unlikely that owls would occupy the area post-project. Although the operation modifies forest structure in the thinning and sanitation harvest, slope, water and soil limitations maintain unsuitable nesting, roosting and foraging habitat conditions throughout the Project Area. Juvenile owl could still disperse over the project area but may seek better habitat to the south of the project area along the McCloud River[194]. Owls normally disperse at night, so noise should not be a factor. Also, since owls have been known to disperse over large areas of marginal and unsuitable habitat[195], the proposed actions may discourage owl movement, but not prevent it. Openings created by regeneration harvest areas are scattered across the landscape and should not be a barrier to owl dispersal.

Future stand conditions will increase and improve dispersal habitat in 5 to 15 years, as thinned plantations grow into suitable owl dispersal habitat and thinned natural stands recover canopy closure and trees increase in size.

Based on the lack of owl occupancy within the project area and the low probably of owl presence in the future, the U. S Fish and Wildlife Service has concurred with the finding that this project *may affect, but is not likely to adversely affect the Northern Spotted Owl.*

Alternative 1 - Preferred Alternative

Cumulative Effects (T&E Wildlife)

Effects of past and future actions within CHU CA-2 are described under the cumulative effects section for the No Action Alternative. The combined effects of the proposed action with these effects would/has result in the removal of approximately 2,000 acres of foraging/dispersal habitat (600 acres of previous salvage, 700 acres of proposed regeneration harvest/meadow restoration in the Mudflow Project and 670 acres of the proposed Pilgrim Project) and the temporary degrading of approximately 4,200 acres of foraging/dispersal habitat. Most of the removed habitat (about 1,800 acres) is the result of root disease and Western Pine Beetle infestations killing large areas of trees. The removed foraging/dispersal habitat is about 8.0 percent of the total foraging/dispersal habitat in the CA-2 Critical Habitat Unit.

Degraded foraging/dispersal habitat retains its intended function, but at a lower quality. As this habitat grows into taller and larger trees, habitat quality will increase and in the long term (20 years and longer) and should develop into nesting/roosting habitat, especially within the late successional reserves in the CHU CA-2. Some of this habitat, in the project area and the

[193] Formal Consultation for the Pilgrim timber Sale, page 20
[194] Biological Assessment, November 2005, p. 22
[195] Personal Comm. Francis Mangels, Range and Wildlife Biologist

surrounding McCloud Flats especially, may never develop the factors[196] necessary for suitable nesting/roosting or foraging habitat for Northern Spotted Owls[197].

A range-wide evaluation of critical habitat indicated that the effects (consulted on and fire effects) to date have impaired, to varying degrees, the ability of individual CHU's to fulfill their intended function. However, these effects have not precluded the CHU network from providing for Northern Spotted Owl conservation across the species range[198]. Consulted upon effects and natural disturbances have had a minor impact to CHU-2 since its designation in 1992[199]. Vegetation management projects in the last ten years have benefited the critical habitat unit by removing infected and diseased trees and thinning overstocked stands to improve growth and resistance to pathogens.

Past and future actions, including the proposed action, will discourage, but not prevent, owl dispersal across the critical habitat unit for about 5 to 10 years, after which thinned plantations and natural stands will have grown into more suitable dispersal and foraging habitat. None of the past actions has impacted suitable nesting/roosting habitat and none of the future projects will affect nesting/roosting habitat if owls are found to be present. There is a long-term benefit to the northern spotted owl from managed habitat that is more resistant to stand replacing events, such as the recent western pine beetle outbreak in the critical habitat unit and on the general area of the McCloud Flats.

Alternative 2 - Proposed Action modified to retain 60% canopy cover

Direct and Indirect Effects (T&E Wildlife)

The effects are the same as Alternative one except that approximately 535 acres, in 20 stands, of marginal dispersal habitat will remain at 60 percent or greater canopy closure, making these acres more suitable for owl dispersal in the short-term. However, these stand densities cannot be sustained in the long-term as discussed in the effects of Alternative 2 under forest health. This could result in a stand replacing event, such as has recently occurred in the project area from a western pine beetle infestation. Owls would be less likely to disperse over the area if there are additional large blocks (100 to 200 acres or greater) of the forest canopy removed either from continued insect activity or from wildland fire.

Cumulative Effects (T&E Wildlife)

The cumulative effects of Alternative 2 are the same as Alternative 1 except that approximately 535 acres of denser canopy cover will be maintained on some stands. The denser canopy cover will be a short-term benefit to dispersing owls. The long-term effect could be detrimental to owl dispersal as insect and disease mortality would be greater (see effects of Alternative 2 to Forest Health).

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[196] Biological Assessment, November 2005, p. 14
[197] Biological Assessment, November 2005, p. 19
[198] Formal Consultation for the Pilgrim timber Sale (1-12-2005-F-24), Biological Opinion, page 15
[199] Formal Consultation, page 17

Alternative 3 - Proposed Action modified to maintain 15% green tree retention in regeneration harvest units

Direct and Indirect Effects (T&E Wildlife)

The effects of Alternative 3 are the same as Alternative 1 with the exception of the regeneration harvest areas where 15% green tree retention would be maintained on all 415 acres instead of only 160 acres. Most of these areas are not considered dispersal habitat now due to mortality and the low canopy closure. The 15% green tree retention areas will provide remnant forest structure within regeneration harvest areas in the short term (2 to 10 years[200]) while still alive and for another 10-30 years as snags and eventual downed logs. Due to the low capability habitat of the project area and fragmentation, even in the absence of action, these areas are not likely to be used and therefore these 15% patches have no benefit to spotted owls.

Cumulative Effects (T&E Wildlife)

The cumulative effects of Alternative 3 are the same as Alternative 1.

Sensitive Species - Wildlife and Fish[201]

Affected Environment

Of the sensitive wildlife and fish species considered in the Biological Evaluation, the project is within the range and contains marginal habitat for only the northern goshawk (*Accipter gentiles*), Pallid Bat (*Antrozous pallidus*) and American marten (*Martes americana*)[202].

The project area is within a portion of the Upper McCloud River Redband Trout Refugium, a boundary that has been managed to be consistent with the Redband Conservation Agreement since 1998[203, 204]. The perennial fish-bearing reaches of Edson, Swamp and Trout Creek are well upstream of the creeks in the project area[205]. Also, a portion of Trout and Dry Creeks between the Pilgrim Creek Road and Road 40N12 has been recommended by the California Department of Fish and Game as intermittent Redband Trout refugium habitat. No Redband Trout have as yet been observed in this section of Trout and Dry Creeks.

Acceptable dispersal habitat surrounds the McCloud Flats, but the project area is marginal at best for goshawks, pallid bats and martens and has no resident foraging individuals. Intermittent streams exist within the project area, but riparian vegetation is very limited and dissimilar to typical riparian foraging areas. Since martens, goshawks and pallid bats have an affinity for riparian habitat, and the project area has almost none, the area has little attraction for these

[200] D. Shultz, Entomologist, Region 5 Forest Service.
[201] Paraphrased from the *Biological Evaluation*, November 10, 2005 and discussions with the author.
[202] Biological Evaluation November, 2005, p. 1-3.
[203] California Dept. of Fish and Game, "*Redband Trout Conservation Agreement Shasta-Trinity National Forest*," Fig. 1. Upper McCloud River Area Redband Trout Streams, May 2004 draft.
[204] California Dept. of Fish and Game, "*Redband Trout Conservation Agreement Shasta-Trinity National Forest 1998*.
[205] *McCloud Flats Ecosystem Analysis*, McCloud Ranger District, Shasta-Trinity National Forest, Siskiyou County, California, September, 1995, p. 42.

species. The Pilgrim project is in the poorest habitat surrounded by fair/poor habitat over three miles away on all sides.

Based upon habitat mapping, aerial photograph interpretation, and recent field surveys, crown canopy connectivity through the project is discontinuous and extremely limited. Very large natural openings of hundreds of acres, open pine forests, or old harvested areas limit dispersal. This is due to naturally occurring dry sparsely forested or shrub/grass dominated areas. Timber harvesting has had little effect on this naturally poor habitat for marten, pallid bats or goshawks.

American Martens have not been sighted in the project area since 1982. Habitat associations for marten on the Forest are found in higher elevation (>4,500 feet) true fir[206] stands[207] which are not found on the Flats (< 4200'). Protocol surveys (using baited trip cameras) for martens in 2002 and 2003 in and around the assessment area detected no martens in the project area and confirm the above habitat association. The watershed includes very little high or moderate capability habitat[208], and contains extensive low or marginal capability habitat, including all of the project area. Current dry habitat conditions and the absence of riparian areas suggest that marten do not likely occur in the watershed below 5000' except as transients. The total lack of any reasonable corridor in the flats suggests non-occupancy, even on a seasonal basis.

Goshawks nest outside of the project area in the Elk Flat LSR and on Black Fox. They may be foraging on the limited prey base along Ash Creek[209], but the creek has almost no riparian vegetation. The extinct Ash Creek Sink territory in NW section 22 was last active in 1991 before root disease became extensive. A goshawk was heard in the area in 2003 when extensive beetle and pathogen kill was beginning near the sink[210]. Due to extensive mortality of dense trees from pathogens in 2003-04, the entire territory was lost. Goshawks are locally common in Management Area 2, but are typically associated with late-successional dense old growth conifer habitat with some surface water supply into July. Habitat surveys suggest that nesting may occur outside the project area, but none within the project area[211]. Protocol surveys for Goshawks done in 2004, 2005 and 2006 within the project area did not detect any nesting pairs.

A single Pallid Bat was located at Trout Creek Meadows in October of 2005. This meadow is five miles north of the Pilgrim Project area. Prior to this sighting, Pallid Bats had never been found on the McCloud Flats. Pallid Bats are a very sedentary species and seldom venture far from its winter hibernation colonies and travel less than three miles from day roosts[212]. Due to this very sedentary habit, it is highly unlikely this bat came from the Pilgrim Project area.

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[206] Criss and Kerns 1990 p. 17,18,25
[207] Buskirk, et al. 1994
[208] LRMP appendix G
[209] Simons 1997 Chapter 1
[210] Mangels, district goshawk database
[211] Biological Evaluation, November 2005, p. 8.
[212] BE. p. 8

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect Effects (Sensitive Wildlife Species and Habitat)

The direct effect of no action would be continuance of the present situation. Poor quality foraging/dispersal habitat would persist. The indirect effect of no action would be continuous further insect and disease induced tree mortality in the project area and vicinity (see also the Forest Vegetation section) and the potential for loss of habitat due to fire (see also the Fuels and Wildfire section). The highly probable continued effect of pathogens known to be present and/or wildfire would most likely eliminate some marginal dispersal habitat for goshawks and martens.

Direct and Indirect Effects, Redband Trout

There would be no direct or indirect effects to Redband Trout from no action as there is currently no confirmed presence of the species within the project area or downstream of the project area.

Cumulative Effects (Sensitive Wildlife Species and Habitat)

Cumulative effects for sensitive wildlife and fish species are bounded by the 8th order watershed as described in Appendix F. This watershed was used because it best represents the habitat conditions for sensitive wildlife and fish species found on the McCloud Flats.

Timber harvest in the past 10 years has included approximately 8,300 acres of commercial thinning (approximately 2,800 acres on private lands), 550 acres of regeneration harvest (350 acres on private lands) and 1,500 acres of salvage (1000 acres on private lands).

Private land harvest has resulted in very open stands or clear cuts that are unsuitable or very poor habitat for sensitive wildlife species. Commercial thinning on National Forest lands has helped maintain some dispersal habitat for goshawks by creating open stands that are more resistant to loss from insects and disease, have larger trees with fuller crowns and larger lateral branches. Much of the watershed is marginal to poor habitat for the sensitive species of interest. Regeneration harvest on National Forest lands was all in Knobcone and Lodgepole pine stands, generally not considered suitable habitat for any sensitive species.

On National Forest land the loss of habitat from insects and disease has been the greatest cumulative impact to sensitive species. Approximately 500 acres has been lost in the last three years from Western Pine Beetle infestations killing large blocks of trees. Harvest of dead trees from this mortality did require leaving 2-3 snags per acre for snag dependent species. This has not been a significant impact because none of the three species are known to reside within the project area or the watershed and the habitat lost was of marginal quality.

Cumulative Effects, Redband Trout

As there are no direct or indirect effects, there are not cumulative effects to Redband Trout for the no action alternative. There are no perennial streams with Redband Trout within the cumulative effects watershed. There are intermittent streams considered Redband Trout habitat within the watershed, but these normally go dry sometime in June in an average rainfall year.

Alternatives 1, 2 and 3

Direct and Indirect Effects to Sensitive Wildlife Species and Habitat:

No goshawks, Pallid Bats or martens are likely to be harmed, harassed, or killed by any of the proposed actions for the following reasons: All of the proposed units are unsuitable or very low capability and the presence of these species is unlikely at any time. Activity centers are not in the project area. No recent sightings have occurred and none are expected[213]. A wandering individual may be disrupted from foraging during project implementation, which could occur over a three or four year period.

Marginal foraging/dispersal habitat has been or will soon be lost in the 415 acres of proposed regeneration harvest. Commercial thinning would slightly degrade about 3000 acres of low capability habitat for several years. In the long term (20 years+) habitat conditions would be maintained as stands would be more resilient to insects, disease and stand replacing wildland fire.

Proposed prescribed burning and piling would protect habitat from catastrophic fire losses and stimulate prey diversity on the forest floor, providing a more reliable food supply.

Aspen and oak will provide forage diversity, though at a small scale because so little exists at this time. Oaks and aspen will not be harvested, which potentially improves the habitat for raptors by improving prey base diversity (different vegetation provides a niche for different animals).

Meadow restoration and road management actions have almost no effect on sensitive species habitat because they impact poor or unsuitable habitat.

The concluding determination in the Biological Evaluation is that the project *may impact one or two individual Goshawks, one Pallid Bat and one Marten, but would not cause a trend towards federal listing or loss of viability.*

Direct and Indirect Effects to Redband Trout

There will be no direct or indirect effects on Redband Trout as suitable habitat does not occur within the project area, is very intermittent in adjoining areas and usually goes dry by June in a normal precipitation year.

Cumulative Effects to Sensitive Wildlife Species and Habitat

The combined effects of timber harvest in the past 10 years and the proposed actions will result in the change of approximately 900 acres (500 acres of previous salvage and 415 acres of regeneration harvest of dead and dying trees) of marginal foraging/dispersal habitat for sensitive wildlife species to unsuitable. All of this change has been from root disease centers and Western Pine Beetle infestations killing large areas of trees.

Commercial thinning on National Forest lands in the watershed has or will temporarily degrade approximately 8500 acres of marginal foraging/dispersal habitat for sensitive wildlife species. In the long-term this habitat will be maintained by making it more resistant to insects, disease and stand-replacing wildland fires. Approximately 3200 acres of private lands harvested in the last 10 years will remain marginal to unsuitable habitat for the three sensitive species.

[213] Biological Evaluation, November 2005, p. 8

This cumulative change and degrading of marginal habitat for sensitive species does not change the determination of effects in the biological evaluation because there are no resident sensitive species in the watershed and none are anticipated due to limiting factors of very limited riparian habitat, limited available water and limited prey base.

Cumulative Effects, Redband Trout

Because there are no direct or indirect effects to Redband Trout from the proposed actions, there are no cumulative effects. The determination in the Biological Evaluation is that *the proposed action will have no effect on Redband Trout.*

Threatened, Endangered, and Sensitive Botanical Species[214]

Affected Environment

At present, no plants on the Shasta-Trinity National Forest are federally listed as threatened or endangered[215]. Based on presence of potential suitable habitat, Forest recognized sensitive plant, bryophyte and fungi species of concern for this project are Mountain lady's slipper *(Cypripedium montanum*), Baker's globemallow (*Iliamna bakeri),* and Pacific fuzzwort (*Ptilidium californicum).*

A botanical survey was conducted of the proposed project area from June 2004 through October 2004 with follow-up surveys of suitable habitat areas in 2005. No plant species listed as Sensitive by the Regional Forester, nor listed on the USFWS quarterly listing of species of concern, were found to occur in the project area.

Environmental Consequences

All Alternatives

Direct, Indirect and Cumulative Effects (Sensitive Botanical Species)

No Sensitive plants or bryophytes were found during surveys and sensitive fungi habitat was found to be absent. Therefore, there will be no direct, indirect or cumulative impacts effects from any of the alternatives under consideration. Based on lack of individuals, a "*will not affect Cypripedium montanum, Iliamna bakeri, or Ptilidium californicum*" determination was made in the biological evaluation. The project would not affect any other threatened, endangered, or sensitive botanical species because the project is outside the range of the species, does not contain suitable habitat for the species, and no populations or individuals were found during surveys.

[214] Paraphrased from the *Biological Evaluation for Sensitive and Endemic Species and Supplemental Botanical Report*, November 3, 2005.
[215] USDI Fish and Wildlife Service, October 19, 2005, List of TES Species for the State of California.

Invasive Weeds[216]

Affected Environment

A weed inventory occurred in 2004. Bull thistle (*Circium vulgare*), Woolly mullein (*Verbascum thapsis*), Burgundy hounds tongue (*Cynoglossum offinale*), and cheatgrass (*Bromus tectorum*) are found in the project area in disturbed sites such as landings, young plantations, underburned areas, and along roads. Klamath weed (*Hypericum perforatum*) is known to occur along most roads[217]. There are no weed species rated "A" or "B" by the State of California.

These species tend to be poor competitors and do not tolerate shade well. They do not persist for very long once native vegetation starts to come back. Both Klamath weed and woolly mullein are collected as special forest products for medicinal use.

The project design includes requiring all off-road equipment used in project implementation to be washed before entering the project area to prevent introduction of weed species into the area or spreading weeds from one area to another.

Environmental Consequences

A weed risk assessment was used for determining the risk of introducing or spreading noxious weeds associated with a project. Several factors were evaluated, including known weeds, their locations, and habitats; project design features intended to eliminate or reduce the introduction or spread or noxious weeds; habitat vulnerability; non-project dependant vectors; and habitat alteration and increased vectors expected as a result of the project. This is summarized with an overall risk conclusion.

Alternative 4 - No Action

Direct and Indirect Effects (Invasive Weeds)

The "No Action" alternative poses a very low risk of spreading or introducing noxious weed species initially. However, this alternative will create a severe fuels problem in the future, increasing the chance of a stand replacing fire. Large, hot fires would create an extremely high risk (60 to 100 percent chance) of spreading or introducing noxious weed species.

Cumulative Effects (Invasive Weeds)

Non-project vectors for noxious weeds include general vehicle traffic on forest roads, wildlife, cattle grazing, wind and people walking through the forest. The bounding of cumulative effects for noxious weeds is subjective and effects would be similar for various size areas. The overall

[216] Paraphrased from the Weed Risk Assessment, November 3, 2005.
[217] Bull thistle and woolly mullein are not rated by the state, but are listed by CALEPPC (The California Exotic Pest Plant Council of California) on List B: Wildland Pest Plants of Lesser Invasiveness. Hounds tongue is not listed by the State of California or CALEPPC but is recognized as a possible problem in the future as it is spreading rapidly in some nearby states. Klamath weed is a "C" rated pest by the state and a "B" rated pest by CALEPPC. Cheatgrass is not listed by the State of California, but is on the CALEPPC List A-1: Most Invasive Wildland Pest Plants Widespread. Cheatgrass is found throughout the project area. Klamath weed has been kept under control by biological agents for many years.

effects for past and exiting activities in the general McCloud Flats Area is that there is an ever present moderate risk (30 to 60 percent chance) of introducing new weed species[218].

Alternatives 1, 2, and 3

Direct and Indirect Effects (Invasive Weeds)

There will be an increase in traffic while the project is going on. There will be an increase in off-road machinery being used for harvesting and piling slash. Once the project is completed, vectors will drop back to approximately pre-project levels. Due to measures built into the project to reduce and prevent the spread of noxious weeds[219], the short-term increase in vectors, gives this project a low probability of bringing in new invasive species. Given the presence of noxious weeds in the project area the overall risk of spreading noxious weeks is moderate.

Habitat Vulnerability (Invasive Weeds)

Bull thistle, Klamath weed, hounds tongue, cheatgrass and woolly mullein do not compete well. Once native vegetation has had some time to mature, most plants will disappear. Due to the small number of noxious weed species known to occur in the project area, and their low degree of persistence, the overall risk is low (0 to 30 percent chance) to habitat vulnerability.

Cumulative Effects (Invasive Weeds)

The combined effects of a moderate risk of introducing noxious weeds from past and on-going activities in the McCloud Flats Area and the low risk of introducing noxious weeds for the Pilgrim Project would result in an over moderate risk of introducing noxious weeds in the McCloud Flats Area.

Special Botanical Elements of Interest[220]

Affected Environment

There are several species that are now only present in very small quantities. These species are important for wildlife and maintaining species diversity. Tree species include aspen, black oak, sugar pine, and Douglas fir. Shrub species important for wildlife and maintaining species diversity are chokecherry (*Prunus virginiana* var. *demissa*), serviceberry (*Amelanchier utahensis*), currants and gooseberries (*Ribes* sp.), rose (*Rosa gymnocarpa*), willow (*Salix* sp.), bush chinquapin (*Castanopsis sempervirens*); and bitter brush (*Purshia tridentate*). Important forb species are prince's pine (*Chimaphila umbellatum*), mountain strawberry (*Fagaria virginiana*), butterweeds (*Senecio* sp.), several grass and Carex species, and bracken fern (*Pteridium aqualinum* var. *pubescens*).

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[218] Pilgrim Weed Risk Assessment, November 3, 2005, p. 4
[219] Pilgrim Weed Risk Assessment., p. 3
[220] Paraphrased from the *Biological Evaluation for Sensitive and Endemic Species and Supplemental Botanical Report*, November 3, 2005 and discussions with the author.

A population of Indian tobacco (*Nicotiana attenuatta*) was found during the 2004 season in the project area (where piles were burned[221]). This species is important to all local Native American tribes in the area, especially the Winnemem Wintu tribe who use the area for ceremonies. The Indian tobacco has been flagged and will be avoided except for burning. Indian tobacco seed will be gathered and spread in the area once the area has been burned. Other species important to Native Americans are conifers of all kinds, oaks, aspen, willows, fruit-producing shrubs and forbs, ferns, grasses, rushes and sedges.

Parts of the planning area are known to be collecting areas for edible fungi such as the King boletes (*Boletus edulis*). King bolete is solitary, scattered or in groups on ground in woods; found throughout the world and very common in western North America. It favors conifers (pine, spruce, hemlock, fir) but also grows with hardwoods such as oak and birch. They are mycorhizzal which means they require a mutually beneficial relationship between the fungus and the rootlets of a plant (especially a tree) in which nutrients are exchanged[222]. Several units are known to have boletes. Damage to the duff layer and soils will be kept at a minimum with the design criteria described in chapter 2 so mycorhizzae in the soil are protected as much as possible.

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect Effects (Special Botanical Elements)

Species diversity will decline with this alternative, unless a natural disturbance process sets an area back to early seral conditions. Oaks and aspen will continue to decline and may be lost due to conifer encroachment. Oak seedlings will begin to grow with the shaded conditions but will not mature due to conifer competition. Aspens will not sucker due to lack of sunlight (overshading from conifers). Dry meadows will continue to decrease in acreage due to conifer encroachment. Shrub and early seral species diversity, overall health, and acres will continue to decline. If no thinning occurs, trees in units with boletus habitat may die as seen in other units. If this is the case, fungi habitat will be degraded as host trees die (the fungi depend on the host tree to live). Riparian vegetation will continue to decline due to too much shade from conifers.

Cumulative Effects (Special Botanical Elements)

Past projects, on National Forest lands within the 8th field watershed in the last 10 years, Appendix F, have all met forest plan guidelines for protection of hardwoods and endemic plant species[223]. The acres of hardwoods protected in not available, but are generally small given the limited extent of oak and aspen in the watershed. Currently there are no incentives for private timber land owners to maintain aspen stands so any that might exist are probably in decline.

Areas of boletus mushrooms have also been protected in past timber sales on National Forest lands by either not harvesting or harvesting over snow to minimize ground disturbance.

[221] Donna Sager, Assistant Fuels Officer.
[222] *Mushrooms Demystified by Arora*, 1986. See pages 530 and 916.
[223] Forest Plan, page 4-14

Alternatives 1, 2, and 3

Direct and Indirect Effects (Special Botanical Elements)

Species diversity will be maintained or improve with this alternative. Aspen will be released on about 20 acres by reducing conifer competition for resources (primarily sunlight), improving aspen habitat for suckering and retention of existing trees. Some aspen may be harmed during conifer removal. In some cases this may actually increase aspen sprouting.

Soil disturbance from regular logging activities may impact oak seedlings. Thinning in areas with oak seedlings may encourage oak seedlings to grow by reducing conifer competition to some degree. Planting oaks in small openings may help to increase oak in the project area.

Removing encroaching conifers, burning and seeding bunchgrasses and forb species will enhance 275 acres of dry meadow. Removal of conifers will create some disturbance to soil and understory vegetation in these areas.

The combination of dry meadow restoration, aspen release, underburning, thinning and/or removal of encroaching conifers will improve shrub and early seral habitat, though some soil disturbance is inevitable when logging takes place and some plants will be destroyed. Planting or seeding of deciduous and nitrogen-fixing shrubs will also improve species diversity.

Opening the tree canopy within riparian reserves will stimulate the growth of riparian vegetation. There will be some soil disturbance. Relic plants will not be disturbed because mechanical equipment will not allowing within 20 feet of the channel.

Thinning in older conifer stands will improve *B. edulis* habitat by reducing competition among trees therefore increasing health and vigor of the remaining trees. There will be some soil and duff disturbance from thinning, which may disrupt some mycorrhizza and reduce the presence of fruiting bodies for one to two years.

Cumulative Effects (Special Botanical Elements)

Past actions in combination with the proposed actions will increase the acres of aspen and oak within the watershed. The number of acres is small, estimated to be about 30 to 50 acres in the watershed.

The Coonrod Visual Enhancement Project enhanced 20 acres of dry meadow and the Pilgrim Project will enhance 275 acres of dry meadow.

The Edson Project protected and improved about 185 acres of boletus mushroom habitat by thinning over the snow. The Pilgrim project will improve about 40 acres of boletus mushroom habitat by thinning.

Management Indicator Assemblages[224]

This section addresses management indicator assemblages including significant issue 2. A review was conducted using the Project Level Assessment Checklist to determine if the project affects the habitat of any of the nine management indicator assemblages.

[224] Summarized from Pilgrim Vegetation Management Project Level MIA Report, January, 2007

The following Management Indicator Assemblages were not considered for the Pilgrim Project for the reasons listed:

1. **Riparian**: There is less than an acre of riparian vegetation within the project assessment area and it will not be impacted by harvest activities
2. **Aquatic Habitat**: All streams within the project area are ephemeral or intermittent with the exception of Ash Creek. Field inventories by the unit biologist indicated that the streams in the project area do not support aquatic organisms.
3. **Chaparral**: This vegetation type does not exist in the project area.
4. **Cliffs/caves/talus/rock outcrops**: This habitat does not exist in the project area.

The following management indicator assemblage habitat associations were selected for analysis due to the presence of suitable habitat that could be impacted by the project:

1. openings and early seral stage forest
2. snag and downed logs
3. late-seral forest
4. Hardwoods.
5. Multi-habitat

The species used to represent the selected assemblages are:

1. Mule deer (open/ early seral and Multi-habitat)
2. Red-Breasted Nuthatch (snags and downed logs and late-seral Assemblages)
3. White-Breasted Nuthatch (Hardwood Assemblage).

These species were selected because they are found within the project area, the populations are known to be sensitive to habitat quality and there is high confidence population trend data for each.

Cumulative effects for all assemblages except the late-seral assemblage are bounded by the 8th order watershed for reasons discussed at the beginning of this chapter. The temporal bounding is the last 10 years for reasons discussed at the beginning of this chapter. Refer to Appendix F for a description of the 8th order watershed and actions that have occurred in the last 10 years and predicted future projects. The late-seral assemblage is bounded by the Fifth-field watersheds as the effects to the late-seral forests have already been evaluated in the Vegetation Diversity Section with that bounding.

Openings and early seral assemblage (mule deer)

Affected Environment

Mule deer are typical inhabitants of open pine areas. They are common to abundant in the area, a sought after game species and monitored by the California Department of Fish and Game through deer herd surveys and deer kill statistics. Deer occur in the project area and vicinity based upon frequent sightings and signs of presence (droppings, tracks, etc.). They are extremely mobile and occupy the flats in the summer only.

Quality of Forage

Among the various shrubs deer prefer are deer brush (*Ceanothus*), willow (*Salix*) and bitterbrush (*Purshia*), along with many forbs and a few grasses. Deer also prefer aspen as a tree, and in modest food shortage times, will create a browse line on this species. For fawning and general foraging, deer prefer riparian areas where the forage is more palatable.

In the project area, and also the McCloud flats, a consistent pattern indicates the forage quality averages fairly low. The bitterbrush and deer brush that deer should be eating show almost no signs of browsing[225]. The quality of aspen and willow forage is low because they are almost always overtopped by conifers and thus have lower nutritional quality than normal.

Cover and Water

Trees for shade and escape cover are abundant. Thermal cover is not critical as the project area is not deer winter range. Ash Creek is the only perennial stream in the project area and provides sufficient water for the existing deer population.

Cover/Forage Ratio

The ratio of forage habitat to cover strongly affects habitat quality with a 50:50 (1) ratio providing the highest quality habitat and moderate habitat provided by anything else ranging from a low forage ratio of 20:80 (0.25) to a low cover ratio of 75:25 (3). Any forage to cover ratio below .25 or above 3 is considered poor. Currently the project area provides about 2060 acres of forage habitat and about 1720 acres of cover habitat which is a 1.2:1.0 ratio[226].

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect Effects (Open-early Assemblage)

Taking no action will have no direct effects on deer habitat[227]. Forgoing the project would result in a higher probability of a wildfire becoming catastrophic and uncontrollable. The heavy fuels and abundant dead trees provide strong conditions for severe fire damage. These fires, however, would likely improve the average forage value in deer habitat for a decade. However, it would also reduce the available thermal cover until brush and trees regrew. Under no action, forage would likely continue to be abundant and low-quality and cover would continue to be highly available and of excellent quality.

Cumulative Effects (Open-early Assemblage)

The 8th Field Watershed currently has approximately 16,270 acres of deer forage and about 13,440 acres of deer cover habitat[228]. Regeneration harvest, including salvage, in the past 10

[225] Based on range transects taken annually in the Bartle Cattle Allotment
[226] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 27
[227] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 30-31
[228] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 29

years has converted approximately 2,150 acres (both private and public lands) of cover habitat to forage habitat. The forage/cover ratio is the same as the project area or 1.2 to 1.0.

In general, past harvest operations in the watershed have not affected the occurrence, distribution or apparent local population levels of deer[229].

Alternatives 1, 2 and 3

Direct and Indirect Effects (Open-early Assemblage)

Thinning of dense conifer stands will reduce the canopy closure on approximately 3,000 acres of mid and late seral stands thus reducing the quality of deer cover habitat. In 10 to 15 years tree growth should recover canopy closure to near pre-harvest levels. Alternative 2 would retain higher density stands on about 535 acres which would be somewhat better deer cover habitat.

Regeneration harvest and meadow restoration will shift approximately 515 acres of late-seral stands to early seral or from deer cover to forage habitat. Alternative 3 would retain 15 percent of the oldest trees in these areas but would not change the overall effects.

Release of aspen will convert approximately 20 acres of late-seral stands to aspen or from cover to forage habitat.

Removal of small diameter conifers encroaching on dry meadows will not change the current open and early seral stage of approximately 175 acres.

Overall approximately 535 acres of deer cover habitat would be converted to deer forage habitat for about 15 to 20 years when the planted conifer trees on 415 acres of regeneration harvest grow into pole size stands or mid-seral habitat. The forage/cover ratio in the project area would be about 2.0:1.0 immediately post-harvest. This ratio is within the range of moderate habitat quality.

Cumulative Effects (Open-early Assemblage)

Past harvest and the proposed Pilgrim Project would convert approximately 2,690 acres of deer cover habitat to deer forage habitat in the watershed. The forage to cover ratio would change to about 1.7: 1.0 which is within the range of moderate habitat quality.

The shift of cover into a forage type habitat is unlikely to alter deer use of the area for the following reasons: Neither cover nor forage quantity are limiting factors in this area. Forage quality and water availability are limiting and are unlikely to change given the project’s implementation. Deer use this area only during the summer months where cover is not as important[230].

Habitat Trends at the Forest Scale (Open-early Assemblage)

Open and Early Seral stage habitat on the Forest is decreasing relative to our larger land base. Although new openings and early stage habitat is created through natural disturbances such as wildfire or pest infestations and through management actions such as timber harvest, the large

[229] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 32
[230] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 29

amount of class 2 Openings and Early Seral Assemblage stands on the Forest are currently growing more wood and transitioning into class 3 late-seral stands faster than we are losing them. From 1991 to present there has been a net loss of approximately 218,200 acres of openings and early seral stage assemblage type on the Forest or about 24 percent of the total acres[231].

Population Status and Trends (Open-early Assemblage)

Population information for mule deer has been obtained at the following scales: range-wide, California, Sierra Nevada, and Forest. This species is monitored by the California Department of Fish and Game (CDFG) as part of its program to manage hunted species. CDFG assesses mule deer population status and trend by both Hunt Zone and DAU (Deer Assessment Unit) as part of their Environmental Documentation for the hunting program (CDFG 2003). Annual variation in deer population estimates may be high due to annual changes in environmental conditions, and varies geographically (CDFG 2003) [232].

Current data from the State indicates that mule deer population has been decreasing since the early 1960s[233]. California Department of Fish and Game website on deer populations indicates a declining population from the mid-sixties continuing to the present. This is borne out by hunter’s perceptions (personal communication, Jess Hoopes, Mule Deer Foundation and Rich Kallas, California Department of Fish and Game). The State of California attributes most of this decline to reductions in early seral habitat accompanying less timber harvest and increasingly more effective fire suppression throughout this period. The Mule Deer Foundation however, attributes most of the decline to heavy predator pressure. Currently, the available data is not sufficient to conclude the causes of the decline[234].

Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the species (Open-early Assemblage)

The Pilgrim project will shift approximately 540 acres of deer cover habitat to deer forage habitat for a period of between 15 and 20 years. On a forest scale this is a loss of .0004 percent of late-seral cover habitat and a gain of .0006 percent of forage habitat. The project level habitat impacts will not meaningfully alter or contribute to the existing forest wide trend in deer habitat or populations[235].

Snags and Downed Log Assemblage (Red-Breasted Nuthatch)

Affected Environment

The red-breasted nuthatch is a common resident in local coniferous forests, especially mature, open ponderosa pine and plays an important role as a primary cavity excavator on trees and snags. This particular species’ dependence on snags for nesting sites and its attraction to mature

[231] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 32
[232] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 15
[233] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 33
[234] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 33
[235] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 34

mixed conifer and to a lesser extent, the ponderosa pine forests found within the project area, make it an able representative of the snag and down log assemblage. The red-breasted nuthatch is amongst the fifteen most commonly seen species in the nearby Bartle Breeding Bird Survey route[236].

Habitat Quality and Quantity

Snag densities in regeneration harvest and thinning/sanitation stands are very high and frequently outnumber the live trees in one to ten-acre pockets. Snags and downed logs are scattered throughout the stands proposed for treatment with the exception of about 785 acres of biomass thinning of young plantations and about 175 acres of meadow restoration. Based on field survey plots, snags average about 2.9 per acre within most proposed treatment areas. Snag diameters range from 16 to 36 inches DBH with an average diameter of 23 inches and an average height of 100 feet[237].

Recruitment from tree mortality is estimated at about 20 trees per acre per decade for unthinned pine stands and 1-3 snags per acre per decade for thinned pine stands (see Forest Health section). Ponderosa pine snag fall rates average about 7 percent per year. Small snags (5-14 inches DBH) fall at an annual rate of about 10 percent. Medium pine snags (15-29 inches DBH) fall at an annual rate of about 5 percent. Large pine snags (30 inches + DBH) fall at an annual rate of about 4 percent[238]. Given an average snag fall rate of 7 percent, there should be about two snags falling per acre per decade creating two to six logs depending on breakage.

Habitat Requirements

Forest Plan Guidelines are to maintain snag levels sufficient to support species of cavity nesting birds at 40 percent of potential population levels based on published guidelines or an average of 1.5 snags per acre that are greater than 15 inches in diameter and 20 feet in height[239].

For downed logs the desired condition is to have 4 to 6 logs per acre that are 10 feet long at the largest available diameter[240].

The red-breasted nuthatch forages on arthropods during the breeding season and conifer seeds outside of the season. The mixed conifer and ponderosa pine forests found within this 29,860 acre watershed provide ample suitable habitat for this species[241].

The red-breasted nuthatch prefers excavating nests in dead trees with broken tops. These trees are highly variable in size and range from 5 to 44 inches in diameter[242].

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[236] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 39
[237] Pilgrim Vegetation Data Analysis, Snag Supplement, May, 2005
[238] Landram, et.al., Demography of Snags in Eastside Pine Forests of California, PSW-GTR-181. 2002, page 619
[239] Forest Plan, page 4-62.
[240] Forest Plan, page 4-67
[241] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 38
[242] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 38

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect (Snag and Downed Log Assemblage)

Snag density will remain at about 3 to 4 snags per acre over the next decade as insects and disease mortality continues at high levels and older snags fall adding coarse woody debris to the forest floor[243]. With a continued snag density and downed logs at or above desired conditions, there are no direct or indirect effects to the snag and downed log assemblage.

Cumulative Effects (Snag and Downed Log Assemblage)

As there are no direct or indirect effects to the snag and downed log assemblage from no action, there are no cumulative effects.

Alternatives 1, 2 and 3

Direct and Indirect Effects (Snag and Downed Log Assemblage)

Based on marking to-date (about 90 percent of the areas have been marked), none of the snags identified in the 2005 inventory will be removed. Snag densities should remain at 2-3 per acre and increase over the next decade to 3-4 per acre[244]. In thinning areas, snags will be retained (approximately 3 per acre) to meet snag density requirements unless they are an operational hazard.

Alternative 1 would indirectly reduce the generation of future snags by taking those trees currently dying. However, the thinning of understory trees will most likely result in more vigorous growth in the remaining trees, eventually producing material for better quality, larger snags[245]. The project will extend the time the flats will be forested and thus will be able to produce snags.

Alternative two would have higher snag densities (3.5-4.5 per acre) in the future on about 535 acres where 60 percent canopy closure is maintained, as retaining higher basal area will create higher tree mortality rates.

Alternative three will have higher future snag densities (4-6 snags per acre) on about 415 acres of regeneration harvest areas where 15 percent of the trees are retained as many of these trees have indicators of poor vigor and will be susceptible to mortality from insects and disease. Approximately 100 acres of meadow restoration and 20 acres of aspen restoration will have reduced snag densities as most large trees will be removed.

In the long-term there will be reduced snag densities on approximately 535 acres as dead trees fall in these areas and there are few replacement green trees for future snags.

This project retains old growth trees and generally the larger mature trees in thinning units, ensuring a future supply of very large snags and downed logs on approximately 3100 acres. The

[243] Pilgrim Vegetation Data Analysis, Snag Supplement, May, 2005
[244] Pilgrim Vegetation Data Analysis, Snag Supplement, May, 2005
[245] Pilgrim Salvage Sale. Ash Sink Salvage Sale. 2005.

current snag density is very adequate to support the small population of red-breasted nuthatches in the project and the effect would be unobservable within the project[246].

Cumulative Effects (Snag and Downed Log Assemblage)

In general, past thinnings on approximately 8300 acres and proposed project thinning on approximately 3100 acres have or will opened up stands temporarily, allowing for growth that will eventually create denser canopies once again. Due to concerns for northern spotted owl designated Critical Habitat, most Federal projects (over 75% of the thinning projects in the watershed) do not reduce canopy cover to below 40% . Most of the stands in this group may have opened up but did not shift assemblage type. Thinnings have to maintain, if available, the 1.5 snags per acre averaged over 40 acres minimum required in the Forest Plan.

Past regeneration of approximately 350 acres and salvage of approximately 440 acres on National Forest lands have required leaving a minimum of 2-3 snags per acre. The 2 to 3 snags per acre are above the natural background levels for snags in this forest type[247]. Over time these snags will fall and add to coarse woody debris to the forest floor. When combined with the proposed action approximately 1,300 acres in the watershed on National Forest lands will have reduced snag densities for approximately 60 to 80 years when planted trees in these areas reach maturity.

Habitat Trends at the Forest Scale (Snag and Downed Log Assemblage)

Between 1991 and 2005, approximately 79,300 acres of forest types containing useful snags and downed logs, or about 7.8% of the baseline in 1991, have been burned in wildfire or impacted by timber harvest. Although timber harvest will maintain minimum levels of snag densities, wildfire has highly variable results. Most fires, whether 'hot' or 'cool' will leave ample amounts of snags on the landscape[248].

Also, since 1991 approximately 218,200 acres of younger, early seral forest has grown into the late-seral assemblage category. This also represents an increase in the acreage for the snags and down logs assemblage, over double the acreage for the loss and represents a net increase in the acreage available. This represents an increasing trend in the snag and down log assemblage habitat forest-wide[249].

Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the species (Snag and Downed log Assemblage)

To supplement the habitat information provided by Forest level analysis, the Shasta-Trinity National Forest also monitors the population trends of over 240 species found on the Forest. The large part of this data comes directly from the international Breeding Bird Survey operated by the wildlife research arm of the United States Geological Service (USGS). This data allows us to monitor directly the population trends for a large number of vertebrate species over six

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[246] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 41
[247] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 41
[248] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 42
[249] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 44

geographic areas over three time periods. In some cases, such as the Bartle route on McCloud, we have more than 30 years of data from the BBS program[250].

Bioregional scale analysis gives a more robust and stronger analysis than project or forest level analysis. The Breeding Bird Survey has partitioned North America into Biogeographic strata that have similar habitats, conditions and fauna. Particularly with highly mobile animals such as birds, these biogeographic regions allow us to pool the data from individual routes, evening out the highly variable data at a route level and allowing us to get a much better understanding of population trends. This tends to even out the large local fluctuations of highly mobile species such as birds. Map 1 of the Project Level MIS Report illustrates the nearby BBS routes found on and close to the Forest and places them in the appropriate strata[251].

The Breeding Bird Survey (BBS) results for the red-breasted nuthatch shows a species with statistically insignificant decreases in two nearby strata (Sierra Nevada and Cascade Mountains), statistically insignificant increases in the local strata (Pitt-Klamath Plateau), one nearby strata (California Foothills) and a larger scale (California), statistically significant increases in one nearby strata (South Pacific Rainforests) and a statistically significant increase survey wide (which should cover the entire North American range of the species). With the exception of the California Foothills strata, all of these scales retain the highest credibility given in BBS data. Given the range of data it is hard to conclude that there is any significant relationship between the forest wide increases in the snag and downed log assemblage habitat type and population trends of the red-breasted nuthatch. Both decreases in population trends (the Sierra Nevada strata and the Cascade Mountains strata – both neighboring strata to the local Pitt-Klamath strata) are statistically insignificant whereas the most statistically significant data (where P = 0) is survey wide (the full range of the species) indicating a moderately increasing trend between 1966 and 2005[252].

The alternatives are unlikely to affect the population trend of this species and we would expect that current trends will continue. The results will be a continued population of the red-breasted nuthatch on the flats at roughly the present, uncommon numbers[253]. The project level habitat impacts will not alter or contribute to the existing forest-wide trends[254].

Late-Seral Assemblage (Red-Breasted Nuthatch)

Affected Environment

See the Vegetation Diversity Section for late-seral affected environment at the 5th order watershed scale.

[250] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 14
[251] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 15
[252] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 44-45
[253] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 23
[254] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 46

Within the project area stands proposed for thinning and thinning/sanitation and mature stand thinning are all classified as late seral (Table 7 of Project Level MIS Report). These stands total approximately 2,300 acres or about 60 percent of the proposed treatment areas.

Approximately 415 of regeneration harvest stands are considered late-seral, but due to mortality from insects and disease they are loosing stand structure and converting to a more open-early seral stage.

Approximately 100 acres of proposed meadow restoration units are considered late-seral. These occur in small pockets and stringers of 1 to 5 acres

Approximately 20 acres of late-seral ponderosa pine has an understory of aspen that is declining in numbers due to shade from the larger conifer trees.

Based on the MIS Project level report definition of late-seral, approximately 785 of plantations are also classified as late-seral[255].

Based on marking done to-date, trees to be harvested in thinning and thinning/sanitation stands averages 22 inched (DBH). In all thinning and thinning/sanitation stands the trees retained have an average diameter greater than that of trees being removed, thus the average diameter of leave trees is between 24 and 26 inches (DBH) [256]. The leave trees in these stands are all mature and thus are classified as late-seral after harvest.

Quality and quantity of Forage

The red-breasted nuthatch forages on arthropods during the breeding season and conifer seeds outside of the season. The mixed conifer and ponderosa pine forests found within this 29,860 acre watershed provide ample suitable habitat for this species[257].

Quality and quantity of Nesting Habitat

The red-breasted nuthatch prefers excavating nests in dead trees with broken tops. These trees are highly variable in size and range from 5 to 44 inches in diameter. Late-seral habitat and associated snags make up approximately 25 percent (11,300 acres) of the Ash Creek Watershed and 22 percent (12,000 acres) of the Upper McCloud Watershed. This habitat is highly fragmented by harvest and natural openings. The availability of water is likely a strong limiting factor in this area[258].

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect Effects (Late-Seral Assemblage)

See Vegetation Diversity Section

[255] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 23
[256] Based on field inspection of marked stands by the unit silviculturist
[257] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 47
[258] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 47

Cumulative Effects (Late-Seral Assemblage)

See Vegetation Diversity Section

Alternatives 1, 2 and 3

Direct and Indirect Effects (Late-Seral Assemblage)

See the Vegetation Diversity Section

Cumulative Effects (Late-Seral Assemblage)

See the Vegetation Diversity Section

Habitat Trends at the Forest Scale (Late-Seral Assemblage)

In general, late-seral assemblage habitat is lost through harvest and wildfire and gained through forest ingrowth. Forest ingrowth occurs continuously, but affects assemblage categories when it shifts a stand from a size class 2 or size class 3 stands with less than 40% cover, to a size class 2 stand with greater than 40% cover[259].

Since 1991, wildfire and timber harvesting shifted 61,400 acres of late-seral assemblage habitat to openings and early seral stage assemblage habitat. This reduced the stock of late-seral assemblage habitat from 779,100 acres down to about 777,700 acres (about a 7.9 percent decrease). During the same time period, about 218,200 acres of size class 2 open and early seral assemblage type grew into size class three or late-seral assemblage type. There has been a net gain of approximately 156,800 acres of late-seral stands on the forest since 1991[260].

Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the species (Late-Seral Assemblage)

See the Snag and Downed Log Assemblage for population trends of the Red-Breasted Nuthatch.

Given the small scale of the current activities relative to the Forest, the small increases in the red-breasted nuthatch population trends over most of its range, and the generally increasing quantity of late-seral assemblage habitat on the Forest, it is unlikely that the habitat changes engendered by the project will significantly affect the population trend of this species or the current trend in habitat on the Forest[261].

Hardwood Assemblage (white Breasted Nuthatch)

Affected Environment

Habitat Quality and Quantity

Aspen stands are represented by scattered small groves totaling approximately 20 acres in the project, and most groves are less than one acre in size. The single largest grove in the center of the project contains about 10-12 acres, depending on whether the outlying individuals are included. Black oak does not occur in groves, but as isolated individual trees scattered throughout

[259] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 50
[260] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 50
[261] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 52

the project area. Hardwoods are considered relicts in this area. Attempts to propagate or transplant aspen have failed in the droughty soils of the area, and the present action seeks to save the remaining trees.

The extremely limited riparian vegetation with no hardwood association indicates low-quality habitat.

Habitat Requirements

Although it can survive in coniferous forests, this species has strong associations with hardwoods and uses old woodpecker holes[262] or excavates its own holes in soft snags[263]. It forages on arthropods of all kinds gleaned from live or dead trees, and also eats acorns and seeds when available. The white-breasted nuthatch often will cache large seeds for the winter. White-breasted nuthatches nest and live in old woodpecker holes, but will excavate its own cavity only in soft snags over 14” dbh. They prefers soft snags about 25” dbh and makes a hole about 19’ above ground. Populations in riparian areas are over four times higher than those in coniferous forests[264].

Since this bird is a soft-snag cavity excavator and soft snags are unusual due to rapid decay from termites and ants, the habitat is considered low-quality. Raphael and White[265] summarize that in a good conifer forest habitat about 2.4 breeding pairs per 100 acres may be expected or about 40 acres per pair. Since the aspen component is only 20 acres in scattered clumps over about 3,780 acres, the data implies that at best in the project’s aspen habitat, a nesting pair may occur in conjunction with conifers nearby. Aspen may be providing slight forage diversity in very small acreages, and the occasional oak would be so rare as to make no difference in the low-quality habitat[266].

Quality and Quantity of Forage

Strictly speaking in terms of hardwood habitat, the forage opportunity for the White-Breasted Nuthatch is poor on the basis of having only 20 acres of aspen in the entire project. This bird can survive on insects from conifers, and this could account for its presence in the project area. The periphery of the flats has small oak groves and scattered oaks that may account for the species as a year-long resident. We presently have abundant insect-killed trees on the flats, mute testimony that insect food for birds is likely plentiful at this time. The quantity of acorns varies greatly from year to year and may account for shifting populations, but these are rare in the flats. The extremely limited riparian vegetation with no hardwood association indicates low-quality habitat[267].

[262] (Pravosudov and Grubb 1993)
[263] Zeiner, 1990. WHR Bird Narratives Vol. 2.
[264] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 31
[265] Raphael and White 1978. Cited in Zeiner, 1990 WHR Bird Narratives, Vol. 2
[266] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 35
[267] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 35

Quality and Quantity of Nesting Habitat

Soft snags are very uncommon, probably due to rapid felling from termites, carpenter ants, and snow loading. Very likely the white-breasted nuthatch nests in old woodpecker holes in this area. The onsite snag density is very high at this time, averaging about 3 per acre in timber surveys, but much higher than that in pathogen areas. The high density of snags provides ample resources for other primary excavators such as woodpeckers. These primary excavators create nesting sites for a variety of birds and small mammals including the white-breasted nuthatch. The white-breasted nuthatch prefers riparian areas, and the dry sandy habitat on the flats is low quality for this species.

This nuthatch feeds on insects gleaned from the boles of trees and from the litter beneath the canopy. They will also eat small quantities of seeds. The white-breasted nuthatch population in the flats is very small relative to the population in riparian areas a few miles away[268].

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect (Hardwood Assemblage)

Conifers would continue to encroach on the existing aspen trees resulting in the loss of these trees within one or two decades.

Cumulative Effects (Hardwood Assemblage)

Currently there are approximately 30 acres of aspen in scattered pockets of 0.5 to 10 acres within the Pilgrim 8th Field Watershed. There is no information on the amount of hardwoods on private lands within the watershed or how it is managed. All of these aspen stands on National Forest lands are in a state of decline due to competition with conifer trees. Other than this project, there are no other projects in the past or immediate future that propose treatment on hardwoods within the watershed. Thus, cumulative effects are the same as direct and indirect effect.

Alternatives 1, 2 and 3

Direct and Indirect Effects (Hardwood Assemblage)

Implementation of these alternatives is designed to restore the healthy representation of aspen within an existing area of approximately 20 acres. Aspen are currently present in the area, but are being overshadowed by conifers. Removal of competing conifers in this area will allow existing aspen to persist and will provide site conditions more favorable to aspen regeneration in that area.

Maintaining vegetative species diversity within the relatively homogenous habitats of the McCloud Flats is key to maintaining the diversity of forest wildlife including birds. Enhancement of this aspen stand should provide increased foraging opportunity for this species[269].

[268] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 35-36
[269] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 36

Cumulative Effects (Hardwood Assemblage)

Currently there are approximately 30 acres of aspen in scattered pockets of ¼ to 10 acres within the Pilgrim 8th Field Watershed. There is no information on the amount of hardwoods on private lands within the watershed or how it is managed. All of these aspen stands on National Forest lands are in a state of decline due to competition with conifer trees. There are no other projects in the past or immediate future that propose treatment on hardwoods within the watershed. Thus, cumulative effects are the same as direct and indirect effect.

Habitat Trends at the Forest Scale (MIS- Hardwood Assemblage)

Hardwood habitat occurs both as a separate forest type and as a component of almost all forest types on the Forest. Although we have lost approximately 15,700 acres of hardwood habitat on the Forest due primarily to wildfire, an undeterminable amount of hardwood habitat has also grown in or been established in the same amount of time. Current Best Management Practices and Forest policy favors the protection and enhancement of hardwood habitat components, retaining it and releasing oaks, aspen and other common hardwoods from competition. Harvest in these areas is likely to favor hardwoods by retaining them in the thinned stand or selecting them as leave trees in green tree retention units[270].

In areas of wildfire, hardwoods frequently respond well to fire and hardwoods are likely to replace the burnt stand. Current policy on the Forest is to retain and enhance growing conditions for hardwoods in operational areas. Given this retention, we believe hardwood occurrence is likely to be stable or increasing despite the known losses from wildfire[271].

Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the species (Hardwood Assemblage)

The Breeding Bird Survey provides the most comprehensive and long-term data available on population trends.

Based on this data, the white-breasted nuthatch is increasing in five of the six geographic analysis areas over the years 1966 to 2005. In the three strata (Pitt Klamath Plateau, California and California Foothills) with the highest level of credibility given by the Breeding Bird Survey, the trend is increasing. The only decreasing trend in the six analysis areas presents itself in the Sierra Nevada and is of intermediate credibility. Although populations may or may not be limited by the occurrence of hardwoods in this area, the dominant increasing population trend of this species is consistent with an increasing trend in hardwood occurrence[272].

The project will enhance and protect aspen through elimination of nearby competing conifer. This won't immediately increase the acreage of aspen or hardwoods in the area, but will enhance and protect the current stands allowing for a higher probability of regeneration. Given the focus on maintaining existing aspen stands, and the small number of acres being enhanced, this project

[270] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 37
[271] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 37
[272] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 38

is unlikely to have any significant or observable effect on population trends of the white-breasted nuthatch in this area.

The project-level habitat impacts will not alter or contribute to existing forest-wide trends[273].

Neotropical (migrant) Birds[274]

Affected Environment

The project has low capability habitat for neotropical birds (poor forest diversity, droughty soils, limited riparian habitat, etc). Riparian habitat usually required by some neotropical birds is nearly absent. Ash Creek usually dries up in June below Ash Creek Sink. Creeks are the only natural water source, but are effluent sinking streams in sandy soil with very limited riparian vegetation. In riparian areas outside the project, such as the McCloud River Canyon, neotropical birds are often seen, however, the project area is and always has been remarkably poor for bird watching; neotropical birds are seldom seen there, according to local Audubon Society bird watchers[275]. In 25 years of observations, only the solitary vireo, yellow warbler, and western tanager have been observed, but are unusual. None of these three neotropical birds (nor their related species) are snag-dependent[276]. Other neotropical birds have not been seen on the flats or similar areas[277]. Typically, only the usual resident birds are seen, and those too, are uncommon[278].

Neotropical cavity nesters[279] are seldom seen on the flats, despite snag abundance, due to limited prey base, lack of large nesting trees, limited hardwoods and limited riparian habitat.

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect Effects (Neotropical Birds)

The trend of poor habitat and poor vegetation diversity will continue. The area will continue to be susceptible to insect infestations, root disease, and fire (see also the Forest Vegetation and Fuels and Wildfire sections). Riparian vegetation and hardwoods will be lost through shading out by larger overtopping conifers. The presence of neotropical birds will be severely limited to non-existent due to lack of suitable habitat.

Cumulative Effects (Neotropical Birds)

Cumulative effects for neotropical birds is bounded by the 8th order watershed as described in Appendix F. This bounded area best represent the habitat for neotropical birds found on the McCloud Flats. The watershed has habitat similar to the project area for neotropical birds. Water,

[273] *Management Indicator Assemblages Project Level Assessment*, January, 2007 page 39
[274] Paraphrased from *Neotropical Birds in the Pilgrim Project*, November 30, 2005.
[275] Birds of Siskiyou County, 1990, Audubon Society list.
[276] Cavity Nesting Birds of North American Forests, table 1, pages 5, 6.
[277] Finch, 1991, page11, table 2.
[278] Personal communication, Mangels and other district biologists.
[279] Finch, , 1991

riparian vegetation and hardwoods are very limited, thus limiting the suitable habitat for neotropical birds. Past thinning and salvage harvest would have opened the canopy, allowing any hardwoods and riparian vegetation present to improve growth and vigor. Timber harvest on both National Forest and private lands generally require protection of riparian vegetation. Due to the limited amount of suitable habitat for neotropical birds found in the watershed, the cumulative effects of no action on neotropical birds is unnoticeable[280].

Alternatives 1, 2 & 3

Direct and Indirect Effects (Neotropical Birds)

The direct effects are logging disturbance and tree removal. If this occurs before mid-July, it is probable that some neotropical bird nests will be displaced or destroyed that year in this type of habitat. The habitat affected is not preferred nesting habitat, as neotropical birds generally nest near riparian areas that would have more abundant insects to feed their young. This action affects only about 1-2% of the habitat in the watershed, and the loss would be unobservable in a population in a project area likely limited by low-quality habitat. This is well within losses expected by natural variation.

The indirect effects are that more trees will survive the pathogens and provide more stability (i.e., good forest health). Protection from catastrophic fire will be improved in both the short and long term for neotropical bird habitat. The biggest improvement will be acceleration of growth to larger diameter trees and more under story vegetation diversity. However, poor habitat and the small acreage on a watershed scale make any change negligible.

The project would retain 2-3 snags per acre, exceeding the Forest Plan minimum. The proposed action is designed to forestall total tree loss and provide a relatively stable number of snags over time. The project will improve snag size and availability in the long term due to tree growth acceleration after treatment. It will also maintain and promote now-limited aspen and nearly absent oak diversity. This improvement will be slight because the basic habitat remains naturally low quality and good habitat combinations are absent for neotropicals. Fire re-introduction is an improvement for some neotropical birds, but the benefit will be very limited in the project area due to factors above.

Cumulative Effects (Neotropical Birds)

Because the natural habitat for neotropical birds in the watershed is limited and very low quality, the cumulative effects of past actions and the proposed action are negligible.[281]

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[280] Paraphrased from *Neotropical Birds in the Pilgrim Project*, November 30, 2005, p. 3
[281] *Neotropical Birds in the Pilgrim Project*, November 30, 2005, p. 7

Survey and Manage Species

Survey and Manage Fauna[282]

Affected Environment

The project is within the suspected range of one mollusk species[283] that is in a category requiring surveys prior to habitat disturbing activities under the *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standard and Guidelines*[284], as updated by annual species reviews (December 2004[285]). This species is *Vespericola Shasta*. The project is not within the range or does not contain suitable habitat for other survey and manage species suspected to occur on the Shasta-Trinity National Forest[286].

Protocol surveys were conducted for the *Vespericola Shasta* in the spring of 2006 and none were found.

Environmental Consequences

Alternatives 1, 2, 3 and 4

Direct and Indirect Effects (Survey & Manage Species, Fauna)

As no survey and manage mollusk species were found during recent surveys, there are no direct or indirect effects for any of the alternatives.

Cumulative Effects (Survey & Manage Species, Fauna)

As there are no direct or indirect effects to survey and manage mollusks, there are no cumulative effects.

Survey and Manage Flora

Affected Environment

A small amount of suitable habitat is present within the project area for Mountains lady's slipper (*Cypripedium montanum*) and Pacific fuzzwort (*Ptilidium californicum*). No populations of Pacific fuzzwort or Mountain lady's slipper were found in the assessment area. Field surveys

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[282] *Background information on Terrestrial and Aquatic Survey and Manage Mollusks in the McCloud Flats as related to the Pilgrim Vegetation Management Project*, October 17, 2005.
[283] Duncan, N., Burke, T. Dowlan, S., and P. Hohenlohe, 2003. *Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan, Version 3.0*. Portland, Oregon: USDA Forest Service and USDI Bureau of Land Management. 70 pp.
[284] USDA Forest Service and USDI Bureau of Land Management 2001. *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standard and Guidelines*.
[285] USDA Forest Service and USDI Bureau of Land Management 2003. *Implementation of 2003 Survey and Manage Annual Species Review*. December 19, 2003.
[286] Pilgrim Project Survey and Manage Report, June, 2006.

were completed during the 2004 field season. Areas of suitable habitat were re-visited during the 2005 field season.

There are three bryophytes in "Category A," requiring pre-disturbance surveys. Of the three, only one *Ptilidium californicum* (Pacific fuzzwort) is known to occur in the McCloud Flats. Pacific fuzzwort and *Buxbaumia viridis* (bug-on-a-stick) are now on the Region 5 Sensitive Species List. No habitat was found for bug-on-a-stick, which requires large diameter, advanced decay logs in riparian habitat in coniferous forests. Surveys were done in 2004 for Pacific fuzzwort in older stands containing white fir. No populations were found.

There are no known sites of any Survey and Manage fungi species in the project area. There is one fungi species requiring pre-disturbance surveys and that species is *Bridgeoporus nobilissimus.* This species has not been reported in northern California[287].

There are no known sites of any Survey and Manage lichen species in the Shasta-McCloud Management Unit of the Shasta-Trinity National Forest.

There are two vascular plants listed on the 2004 list of vascular plants that occur in California; *Cypripedium fasciculatum* (Brownie lady's slipper) and *Cypripedium montanum* (Mountain lady's slipper). Both species were added to the Region 5 Sensitive Species List in 2004. Neither species has been found to occur in the McCloud Flats or the Pilgrim Vegetation Management Project area. Surveys for mountain lady's slipper were done during sensitive plant surveys in 2004 and none were found. There are no known sites for brownie lady's slipper on the Shasta-McCloud Management Unit.

Environmental Consequences

Alternatives 1, 2, 3 & 4

Direct and Indirect Effects (Survey & Manage Species, Flora)

Based on the lack of habitat and individuals there are no direct, indirect to survey and manage flora species for this project.

Cumulative Effects (Survey & Manage Species, Flora)

As there are no direct or indirect effects to survey and manage flora species for this project, there are no cumulative effects.

Soils[288]

Affected Environment

The analysis of the soils included a review of a soil survey conducted in 1980 (SRI, Soil Resource Inventory), field verification of soil map units and a qualitative assessment of compaction in

[287] According to Dr. David L. Largent, retired, Humboldt State University, no herbarium specimens are known from Northern California. Dr. Largent is a respected mycologist who put together training on the eight fungi added to the Sensitive Species List, in Arcata, CA. for Forest Service botanists in November 2004.

[288] Paraphrased from *Soils Report*, November 23, 2005.

legacy landings and skid trails. Field verification of soil map units was conducted in Spring and Summer of 2005[289]. A map of the soil series is in the project file.

The project landscape is composed of alluvial terraces and lava flows which have been inundated with outwash from Mount Shasta. The area is dominated by moderately deep and deep soils formed from volcanic ash deposited over andesitic basalt[290]. Topography is mostly flat except for a few lava rims where slopes exceed 35 percent. There are no sustained slopes over 20 percent.

More than half the area is covered by deep alluvial deposits, which tend to be somewhat excessively drained, meaning that water is removed from the soil rapidly[291]. These soils occupy the lower terraces and support open stands of ponderosa pine. The remaining deep and moderately deep soils are formed in tephra and older alluvial deposits and occupy the higher terraces. They tend to support slightly denser stands of ponderosa pine and some white fir at the higher elevations. A small portion of the area (6%) has shallow soils with exposed lava reefs. These areas tend to support open ponderosa pine stands[292].

Since the 1980 SRI, the soil series within the Project area have been reclassified to reflect the taxonomic order of Andisols[293]. The SRI classifies the soils in the project area as being in either Hydrologic Soil Group (HSG) A (low) or B (moderately low)[294]. Generally, this means the soils in this area have a high water infiltration capacity and low runoff potential, due to their coarse surface textures[295].

The soils in the project area have medial or ashy surface textures[296]. Soils with these textures are known to be resistant to the adverse effects of compaction because their initial bulk density is low[297] (i.e., even when compacted by 10 or 15 percent the bulk density is still low enough as to not detrimentally restrict root penetration or porosity[298].) There is even some evidence that increasing the bulk density of these soils, which results in increased water holding capacity, may

[289] All proposed activity units were visited to confirm that the soil types were mapped accurately. The on-site verification confirmed the accuracy of the existing surveys with the following few exceptions (Units 453, 256, 902, 441, 408, and 416 have rock outcrops in areas that were mapped as soil map units not containing rock outcrop as a component or inclusion. In none of these units did rock outcrop comprise more than 15 percent of the area).
[290] Soil Resource Inventory, Shasta-Trinity National Forest, 1980; Personal observation
[291] Internal free water commonly is very rare or very deep. *Field Book for Sampling Soils, Version 2.0*. NRCS. Pg. 1-11.
[292] Soil Resource Inventory, Shasta-Trinity National Forest, 1980; Personal observation.
[293] For the reclassification, see the Soils Report, p.3.
[294] Soil Resource Inventory, Shasta-Trinity National Forest, 1980.
[295] The exception is the Ledmount-Rock Outcrop map unit which is classified as HSG D (high) because it is shallow. However, the highly fractured nature of the parent material and coarse surface texture allows for ample water infiltration and renders the runoff potential low.
[296] Soil Resource Inventory, 1980; Black Fox Ecological Unit Inventory, 1991.
[297] less than 0.9 g/cc
[298] Gomez, A. R. F. Powers, M. J. Singer, and W. R. Horwath. *Soil Compaction Effects on Growth of Young Ponderosa Pine Following Litter Removal in California's Sierra Nevada.* Soil Sci. Soc. Am. J 66:1334-1343, 2002. page 1342. Evidence to the contrary was established under greenhouse conditions and does not necessarily predict a similar response under field conditions (Siegel-Issem, C.M., J.A. Burger, R.F. Powers, F. Ponder, S.C. Patterson. *Seedling Root Growth as a Function of Soil Density and Water Content*. Soil Sci. Soc. Am. J 69:215-226, 2005. page 224-225.)

provide water for plant growth longer into the growing season and promote increased tree growth[299].

Nonetheless, compaction was found to be at or slightly above threshold[300] over approximately 20 percent of the area surveyed in two transects within the project area[301]. Approximately 20% of the area was in skid trails or landings and these areas had a 10% or more decrease in porosity[302]. These transects were conducted in existing, non-plantation stands on the Shasta soil series.

Preliminary results show that while up to 70% or more of a unit may be disturbed by past activities, detrimental compaction was limited to obvious skid trails and landings. The units sampled are fairly representative of those on the Shasta soil within the Project area. The Shasta soil covers about 50% of the Project units. Similar transects were conducted near, but outside, the Project area with similar findings. Approximately 45 percent of the Project area has been harvested within the last 20 years. It is estimated that about 7% (approx. 250 acres) of this area has detrimental legacy compaction[303].

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect Effects (Soils)

Under the no action alternative, there would be no post-harvest treatment, so any existing compaction would persist. Estimates indicate that compaction persists in these soils more than 30 years after harvest, if left untreated[304]. Because alternative 4 does not alleviate known soil compaction, the landings and skid trails currently compacted above threshold would continue to be so and thus would, indirectly, not lead to increase in productivity for those areas.

The no action alternative provides soil organic matter, but perhaps excessively so with the potential increase in downed woody debris from tree mortality. It is unknown what specific consequences might occur if this were to lead to a stand replacing fire. This has most likely occurred at some time in the past and the soils have appeared to recover, though the recovery time is unknown.

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[299] Gomez, A. R. F. Powers, M. J. Singer, and W. R. Horwath. *Soil Compaction Effects on Growth of Young Ponderosa Pine Following Litter Removal in California's Sierra Nevada*. Soil Sci. Soc. Am. J 66:1334-1343, 2002. page 1337

[300] Threshold is the point at which there is a significant decline is soil productivity. Significant is defined as any disturbance in soil productivity which results in a 15% or greater reduction in soil productivity over the next 50 years. Avers, .P. E., J.O Nordin, R.T Meurisse, and C. B. Goudey. Soil Quality Standards in National Forest Management. Internal Forest Service document, page 3.

[301] Transects by Brad Rust, Forest Soil Scientist, Shasta-Trinity National Forest, August 2005

[302] The amount of pore space in a volume of soil.

[303] Personal observation, qualitative sampling during field visits.

[304] Geist, J. Micheal, John W. Hazard, and Kenneth W Seidel. *Assessing Physical Conditions of Some Pacific Northwest Volcanic Ash Soils After Forest Harvest.* Soil Sci. Soc. Am. J. 53:946-950, 1989, p. 950.

Cumulative Effects (Soils)

The boundary for cumulative effects to soils is the areas to be treated. This boundary is used because the very flat topography and high infiltration rate of the soils in the project area and surrounding area make soil movement very unlikely. There has been no observed soil movement in the past 10 years, even after extreme rainfall events, within the project area or the larger 8th order watershed[305].

Because the bounding of cumulative effects is the same as direct and indirect effects, the effects are the same.

Alternatives 1, 2 and 3

Direct and Indirect Effects (Soils)

With thinning, the dominant overstory portion of the forest canopy is retained. Organic cycling is uninterrupted and organic cover quickly recovers. Prescribed levels of coarse woody debris are retained. In regeneration harvest areas, organic inputs to the soil will be reduced for a period of time. Soil disturbance on all harvest units is caused by mechanical cutters, which have minimal ground disturbance because they do not transport logs but merely cut and bundle trees. Skidder tractors carry the bundles of logs to the landings on designated skid trails. Bundled logs and designated skid trails greatly reduces the disturbed area.

Informal and subjective monitoring of soil compaction on other areas that have been harvested in past years show some evidence of decease in soil porosity or increased soil density, but well below threshold. An exception is landings and skid trail networks where they coalesce near landings. Skid trail networks within several hundred feet of landings bear many passes with loaded skidders. Although these areas are of limited extent (6 percent or less of the harvested area), they often show considerable soil compaction. Landings and skid trails within approximately 200 feet of landings are slated for soil rehabilitation with a winged subsoiler to alleviate soil compaction. This activity is common to all alternatives except for the no action alternative.

Fuels activities, including tractor piling, pile burning, and underburning, have low impact on soils as long as adequate organic matter is retained in accordance with Soil Quality Standards[306]. Piling to remove excess fuel from the site is performed by tractor-type equipment with a brush rake. The tractor does not typically cover the same ground repeatedly (as a skidder would). It only occurs in units where it is necessary to meet fuel loading requirements and only on those portions of a unit with excess logging slash. Because it is of limited extent (typically 20 to 30 percent of a unit and only in certain units), tractor piling is generally considered have low potential for compaction beyond threshold.

Soil Quality Standards are not applied to areas not dedicated to productivity. As such, new road construction is not held to the same criteria as other activities[307]. Road closures and

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[305] Personal Comm. with Jonna Cooper, Project Soil Scientist
[306] Forest Plan, Appendix O.
[307] Forest Plan, Appendix O.

decommissioning, when accomplished by ripping, have the effect of reducing compaction and increasing the potential for those areas to be placed back into productivity.

Direct and Indirect Effects by soil productivity indicators

Environmental consequences are discussed within the context of potential adverse or beneficial impacts to soil productivity indicators. These are: Soil Erosion, Soil Compaction, and Loss of Soil Productivity Due to Loss of Soil Organic Matter.

Soil Erosion

All soils within proposed activity units were evaluated and given a Soil Erosion Hazard Rating (EHR) in accordance with the California Soil Survey Committee EHR System[308]. Soils were evaluated for both thinning and regeneration harvest treatments[309]. Any ratings product less than 4.0 is considered low[310]. EHR for proposed treatment units is uniformly low[311], regardless of the remaining vegetative cover following treatment. This means there is little potential for significant amounts of soil to be removed from the site by water or wind. This applies to all alternatives.

[308] *Soil and Water Conservation Handbook*, R-5 FSH 2509.22. Chapter 50.
[309] One factor which contributes to accelerated soil erosion is slope. An average slope of 10 percent was used for this analysis, though most of the area falls below that value. A query of GIS data returned those parts of proposed activity units where slope exceeds 35%. The query response indicates that only a few percent of the units exceed 35% slope in any portion. These areas fall on lava rims where they are exposed within units and will be avoided in layout.
[310] *Low* is a qualitative rating applied to a numeric value that is obtained by rating various factors such as soil texture and structure, climate, water movement, rock outcrop and slope. It means that there is little potential for significant amounts of soil to be removed from the site by water or wind.
[311] Ratings products ranged from 1.0 (thinning on Germany soils) to 3.7 (regeneration harvest on Ledmount soils). Soils Report, September 27, 2005, p. 6.

Table 8. Soil Erosion Hazard Ratings

		I. Soil Erodibililty Factors			II. Runoff Production Factors							IV. Soil Cover Factors				
	Treatment	A. Soil Texture Erodibility Factors	B. Aggregate Stability Adjustments	C. Soil Erdodibility Rating (A+B)	A. Climate (from NOAA Atlas 2, Vol. XI-Calif.)	B. Water Movement in the Soil	C. Runoff from Adjacent Areas	D. Uniform Slope Length	E. Runoff Production Factor (A+B+C+D)	F. Runoff Production Rating (E ÷ 3)	III. Runoff Energy Rating (Slope % ÷ 100)	A. Quantity and Quality	B. Cover Distribution	C. Soil Cover Rating (A+B)	V. Ratings Product (IC x IIF x III x IVC)	VI. Adjective Rating
Germany	Thinning	2	-1	**1**	3	1	0	6	10	**3.3**	**0.10**	3	0	**3**	**1.0**	Low
Germany	Harvest & Replant	2	-1	**1**	3	1	0	6	10	**3.3**	**0.10**	5	0	**5**	**1.7**	Low
Sadie	Thinning	2	0	**2**	3	1	0	6	10	**3.3**	**0.10**	3	0	**3**	**2.0**	Low
Shasta	Thinning	2	0	**2**	3	1	0	6	10	**3.3**	**0.10**	3	0	**3**	**2.0**	Low
Shasta	Harvest & Replant	2	0	**2**	3	1	0	6	10	**3.3**	**0.10**	5	0	**5**	**3.3**	Low
Ledmount	Thinning	2	0	**2**	3	2	0	6	11	**3.7**	**0.10**	3	0	**3**	**2.2**	Low
Ledmount	Harvest & Replant	2	0	**2**	3	2	0	6	11	**3.7**	**0.10**	5	0	**5**	**3.7**	Low

Soil Compaction

Given that detrimental compaction will be alleviated in areas that are currently compacted at or beyond threshold, the consequence of treatments will be an overall improvement to the soil resource. This is true for all action alternatives as there is no discernable difference in impact between the different density treatments or the tree retention level in regeneration harvest units.

Loss of Soil Productivity Due to Loss of Soil Organic Matter

Thinning units maintain most of their vegetative cover and the organic input from needle cast and leaf fall assure the organic cover will be quickly reestablished. Regeneration harvest units will fall below the natural vegetative cover and thus, reduce the normal input of organic matter for a period of time following harvest. A study of biomass harvesting and whole tree removal[312] indicates that this does not affect long term soil productivity as long as longer rotations are used. Past experience on these sites supports that conclusion. Given that replant units will be brush raked and hand-planted, soil disturbance and organic matter removal will be minimized. All

[312] Wells, C.G and J.R. Jorgensen. *Effects of Intensive Harvesting on Nutrient Supply and Sustained Productivity*. USDA Symposium Proceedings, 212-230, 1979, pages 225-226.

action alternatives provide similar and adequate maintenance of soil organic matter and support long term soil productivity.

There are no known or measurable indirect effects of soil erosion or soil productivity due to loss of organic matter as a consequence of any action associated with this Project. Thresholds are not expected to be exceeded for these soil productivity indicators, thus any indirect consequences which might occur would be in line with the natural or existing condition of the soil and not due to any action as a result of this Project.

Reduction in overall soil compaction from any of the action alternatives could result in an increase in the amount of land capable of growing desirable vegetation. The alternatives are consistent with Soils Quality Standards[313] and Forest Plan Standards and Guidelines[314].

Cumulative effects (Soils)

Because the bounding of cumulative effects is the same as direct and indirect effects, the effects are the same.

Hydrology[315]

Affected Environment[316]

The project area is within two 5th field watersheds, Ash Creek and the Upper McCloud River[317]. Pilgrim Creek lies within the Upper McCloud River Watershed. Ash, Dry, Trout and Edson Creeks flow through the Ash Creek Watershed.

The McCloud Flats has developed a sandy basin with high rates of water infiltration. While Ash Creek has perennial flow into the project area, it joins the other four streams, flowing intermittently[318] and finally becoming ephemeral[319] in the southern portion of the project area. Surface terrain exhibits low relief with occasional undulations, exposed volcanic flows, and uplifted rock along faults that interrupt the otherwise flat terrain. Debris flows are not uncommon.

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[313] Forest Plan, Appendix O.
[314] Forest Plan, page 4-25
[315] Paraphrased from the *Hydrology Report*, December 2, 2005.
[316] Discussed in the context of water quality and the Aquatic Conservation Strategy. In addition, the State of California has agreements with the Forest Service to control non-point source discharges by implementing control actions certified by the state Water Board as best management practices (California Regional Water Quality Control Board Central Valley Region, *The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region Fourth Edition, the Sacramento River Basin and the San Joaquin River Basin*, 2004. Ch. IV-3.00.)
[317] *The McCloud Flats Ecosystem Analysis* (1995) provides a watershed analysis of the Pilgrim Creek project area. Watershed boundaries were redrawn several times before the Hydrologic Unit Code (HUC) system (now accepted as the definitive watershed coverage) was created for this area. The area that was addressed in the Watershed Analysis differs from the 5th Field HUC (Ash Creek Watershed) because the latter watershed coverage had not been completed at the time of the original planning efforts.
[318] Intermittent character refers to the interruption of surface flows along the length of the channel as well as the duration of flow.
[319] Ephemeral character is a response to peak snowmelt, precipitation, and diurnal evapotranspiration in the summer.

Stream form ranges from having poor- to well-defined banks. In-stream features, such as pools and riffles, are variable as well, dependent on flow and the integration of woody debris. Mature trees contribute woody materials to the channel corridor, serving to dissipate high energy during normal runoff events and to trap sediment during receding flow. Without woody material, energy dissipation is limited and leads to channel down cutting. Down cutting tends to eventually create a gully that contains all stream flow and prevents floodplain access and interaction.

The existing condition of overstocked conifer stands within the riparian reserves has provided abundant large woody debris, necessary for in-stream structure, while also limiting sunlight. With limited light, the riparian species vigor and abundance necessary for increasing soil strength to form and maintain stream banks is absent.

Where the channel form is functioning, woody debris is capturing sediment and providing opportunities for riparian species to establish. Too much woody debris can have adverse impacts for low gradient channels due to insufficient energy and competence to carry the bedload[320].

Surface flow in the project area is very rare. Stream flow is fed by spring rain and snowmelt runoff with occasional rain-on-snow events that cause extensive flooding.

Water quickly infiltrates into the ashy soil during the day from conifer respiration during evapotranspiration[321] and likewise quickly surfaces at night as diurnal variation occurs. Perennial reaches of the intermittent streams are mostly limited to the upstream reaches located well outside the project area; these streams become intermittent as they flow downstream to the alluvial fan.

All streams vary from low to severe entrenchment into the floodplain. Flow connectivity among the Ash Creek sink channels and the McCloud River only occurs for short periods at 3-6 year intervals during exceptional runoff events. Besides episodic flood events, over-bank flooding occurs with the diurnal nature of the flow regime and high infiltration capacity of the ashy soils. Stream flow and sediment move across the landscape unhindered by normal channel boundaries and construction processes. These dynamic conditions determine the timing, variability and duration of floodplain inundation and water table elevation in the area. Spatial and temporal connectivity within and between watersheds is interrupted by the intermittent nature of these streams. However, during significant runoff events stream networks form and supply the McCloud Flats and the McCloud River with water and sediment necessary for fulfilling life

[320] Rosgen, D. 1996. *Applied River Morphology*, Ch.6. p.26.
[321] After seasonal flows diminish, surface water flow is more dependent on daily rates of evapo-transpiration. In this case, surface water flowing down the channel recedes in the upstream direction as diurnal changes in evapo-transpiration rates occur. As the wetted front of the stream recedes, sediment falls out of suspension and is deposited in situ. The accumulation of sediment falling out of suspension as surface water infiltrates becomes a depositional form unique to the amount of sediment that was in transport at the time of flow recession. At the next time of surface flow, the interception by these previously deposited forms, and other features, such as fallen trees or branches, directs the stream accordingly. In this area, channel migration is common, so much so that mature trees having established prior to channel migration are growing in the wetted channel, an unlikely location for most conifer to establish or survive. The highly migratory character of the streams is in response to changing hydrologic conditions across a relatively young landscape on a watershed scale.

Creek Descriptions

Pilgrim Creek, the western-most creek in the project, is primarily ephemeral in the project area, though it experienced several days of debris flow in 1996. The creek is dry for miles from its confluence with the McCloud River. Only in significant flow events does it reach the river with any surface flow.

Ash Creek flows through the project area until reaching the Ash Creek sink where it is characterized by fluctuating intermittent stream flow. It becomes ephemeral towards its confluence with the McCloud River.

Swamp Creek is intermittent/ephemeral through Elk Flat and into the project area. The creek is captured by the road, becoming the channel by default, flowing down it for a half-mile, before turning off the road to Elk Flat in an incised channel. The influence from a culvert outlet is causing channel straightening and entrenchment. Conifer encroachment in Elk Flat is such that the conifer overstory out competes other plants like willow that would benefit soil strength and channel form maintenance.

Edson Creek is intermittent becoming ephemeral in the downstream direction within the project area. Limited riparian vegetation occurs in association with intermittent stream channels.

Dry Creek contributes flow from its confluence with Trout, then Swamp and finally Edson, before its entry into Ash Creek. Channel character and flow is well to poorly defined, intermittent becoming ephemeral. About 3 miles upstream from the project (along Trout Creek) is the nearest portion that has recorded fish populations during spring runoff. It is currently recommended for Putative Redband Trout Intermittent Refugia down to forest road 40N12 by the California Division of Fish and Game. A stream crossing on road 41N44Y is contributing sediment to the channel from repeated crossings by vehicles.

An intermittent **Trout Creek** channel lies adjacent to unit 457 for a very short distance (500 feet) before it joins with Dry Creek.

history requirements of aquatic and riparian-dependent species[322].

There are no known aquatic communities in these intermittent streams. However, a portion of Trout Creek upstream from the project area, approximately 3 miles, was electro-shocked last spring runoff and a single fish was observed. Trout Creek flows into Dry Creek, which is known to flow during most years down to Forest Road 40N12, the length of intermittent flow down to 40N12 is currently being recommended for Putative Redband Trout Intermittent Refugia by the California Division of Fish and Game as identified in an October 2005 draft map[323].

Edson, Swamp, Dry and Trout Creeks unite with Ash Creek in the project area and in years of extremely high flows connect with the McCloud River during a period determined by the storm events. During the receding flood period, when fish are more likely to move upstream, the infiltration rate is so high that the likelihood of fish becoming stranded is higher than their ability to migrate into favorable habitat[324].

[322] Reid, L.M. and R.R. Ziemer, USDA Forest Service, Pacific Southwest Research Station. *Evaluating the Biological Significance of Intermittent Streams*, Summary of workshop held at the Humboldt Interagency Watershed Analysis Center May 4, 1994.
[323] Curt Babcock, DFG, Staff Environmental Scientist memo 6/22/05.
[324] Curt Babcock, DFG, Staff Environmental Scientist.

Riparian Reserve widths for streams are based on the site-potential tree height[325] representative of stands in the project area[326]. The site potential tree height for the project area was identified to be 175 feet[327]. Because of the proposed extension of Putative Redband Trout to 40N12, those units adjacent to the putative refugia will be prescribed a two-site potential tree height Riparian Reserve buffer width for fish-bearing streams, until further evaluation of the presence of fish habitat is completed. One potential tree height applies for the stream reaches within other units, as these are not fish-bearing,

Water quality parameters[328] for the basin in the Water Quality Control Plan for the Central Valley Region were reviewed to identify the dominant water quality concern for aquatic and riparian resources in the project area most critical to maintaining beneficial uses[329] and water quality. The project area does not contain any unique riparian habitats (i.e., wet meadows, lakes, seeps, etc.) with the exception of a short reach of perennial flow in Ash Creek. The duration of surface flow in the upper reaches of the project area ranges from several weeks to about 2 months during an average water year[330]. The occurrence of surface flow in the creeks decreases in a downstream direction in the project area. The lower four-mile reach of Ash Creek usually does not flow at all during years of below normal precipitation. Due to the beneficial uses, water quality parameters and the lack of surface-flow connectivity with the McCloud River there are no water quality concerns identified in this analysis.

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect Effects (Hydrology)

Water and riparian conditions as described above would remain unchanged. Dense canopy cover within riparian reserves would cause the loss of vigor to riparian plant species and reduced plant community diversity. Continued conifer tree mortality may add excessive amounts of woody debris to some stream channels causing blockage and diversion of flows[331].

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[325] The site-potential tree height is based on the average maximum height of the tallest dominant trees (200 years or older) for a given site class. Forest Plan 4-54.
[326] USDA Forest Service and USDI Bureau of Land Management, 1994. *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl*, including Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Related Species.
[327] McCloud Flats Ecosystem Analysis, 1995
[328] Bacteria, biostimulatory substances, chemical constituents, dissolved oxygen, floating material, oil and grease, pH, pesticides, radioactivity, salinity, sediment, settleable material, suspended material, tastes and odors, temperature, toxicity, turbidity (*Hydrology Report*).
[329] Beneficial uses of any specifically identifed waterbody generally apply to its tributary streams (CVRWQCB, 1998 II-2.0). The designated beneficial uses for streams within and downstream of the project are established in the Water Quality Control Plan for the Central valley Region. For the McCloud River: municipal and domestic supply, hydropower generation, water contact recreation, canoeing and rafting (proposed), non-contact water recreation, cold freshwater habitat, cold water spawning habitat, and wildlife habitat.
[330] Steve Bachmann, Unit Hydrologist, personal communication.
[331] Hydrology Report for the Pilgrim Project, May 2006, page 21

Cumulative Effects (Hydrology)

Cumulative effects for hydrology are bounded by the 8th order watershed as described in Appendix F. This scale watershed was used because it best represents the hydrologic characteristics found on the McCloud Flats. A larger 5th order watershed would have included activities whose effects are not hydrologically connected to activity in this project and thus do not contribute to cumulative effects[332]. This is due to the nearly flat terrain within and surrounding the project area and the absence of any perennial streams running into and through the project area.

The Equivalent Road Acres method of assessing cumulative watershed impacts was not used in this analysis because the degree to which cumulative impacts can occur is a function of the amount of sensitive ground in the watershed. Erosion hazard ratings for the Pilgrim Project are low in all proposed treatment units. The probability of soil loss from any of the action alternatives is very low. The Project area lacks inner gorges, perennial streams and steep topography, all of which are sensitive features that the ERA model is designed to address. The ERA methodology is based on a rainfall-runoff driven model that identifies potential for land-use activities to affect peak flows and water quality. This model is not suited to areas that lack rainfall-runoff characteristics, such as found in the Pilgrim Project Area.

Also, the 5th order watershed has a high threshold of concern (18 percent) [333]. Characteristics of almost flat terrain, high soil infiltration rates and very low erosion hazards associated with the McCloud Flats are responsible for this high threshold.

Based on these conditions, there are no cumulative effects to water and riparian resources from past or future actions within the watershed.

Alternatives 1, 2 & 3

Direct and Indirect Effects (Hydrology)

Because activities (about 175 acres of thinning and about 55 acres of regeneration harvest) are proposed within Riparian Reserves in the project area, the proposed action was evaluated to determine how implementation of planned activities would affect attaining Aquatic Conservation Strategy Objectives[334]. The proposed action is designed to improve stand conditions in Riparian Reserves and thereby contribute to the overall health of this portion of the watershed.

A description of how the proposed action will affect each of the nine Aquatic Conservation Strategy Objectives[335] is located in Appendix G. The project has neutral to beneficial effects with respect to all Aquatic Conservation Strategy Objectives.

Thinning activities will reduce the risk of stand-replacing fires in the Riparian Reserves and promote stand and aquatic health by maintaining woody debris inputs without overwhelming the streams with an excessive supply of woody debris from a stand-replacing fire. The proposed

[332] Personal Comm. with Heidi George
[333] Hydrology Report for the Pilgrim Vegetation Management Project, March, 2006, page 22
[334] Forest Plan, page 4-53
[335] Forest Plan, page 4-53.

action would also promote proper functioning condition within riparian reserves compared to the current status of decline[336, 337]. The shrub component of plant communities should improve as sunlight reaches the forest floor. Thinning activities adjacent to and within the riparian reserve, which maintain mature healthy conifers and open the canopy will favor regeneration and establishment of riparian plant communities including willow.

Regeneration units that include riparian reserves should reduce the incidence of insect infestation and root disease within riparian areas. Reforestation with a mix of conifer species should improve the overall health of the riparian plant community.

Renewal of riparian vegetation will eventually lead to stream processes that reduce energy, detain sediment, build banks and discourage entrenchment. With sufficient improved vegetation along the banks, the channel should narrow and the channel bottom should sustain attributes that reflect a higher proper functioning condition[338,339]. For entrenched channels, coarse woody debris will add channel roughness favorable for the channel building processes; for low-gradient channels, too much woody debris can have adverse impacts, such as encouraging channel abandonment[340]. Entrenchment of streams may lower the adjacent water table responsible for sustenance of deep-rooted riparian communities and lead to conversion of the plant community representative of a drier type[341].

A reduction in evapotranspiration from removal of conifers may temporarily prolong and slightly increase seasonal runoff/base flows in the project area until the riparian vegetation becomes re-established. Studies indicate that forest openings that receive shade and wind protection from a perimeter of conifer retain snow longer compared to forested stands as sublimation occurs more rapidly on branch surfaces[342]. This would tend to have a beneficial effect on increasing the duration of snowmelt.

[336] USDI Bureau of Land Management, *Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas*, Technical Reference 1737-11, 1994.
[337] Reid, L.M. and R.R. Ziemer, USDA Forest Service, Pacific Southwest Research Station. *Evaluating the Biological Significance of Intermittent Streams*, Summary of workshop held at the Humboldt Interagency Watershed Analysis Center May 4, 1994.
[338] USDI Bureau of Land Management, *Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas*, Technical Reference 1737-11, 1994.
[339] Stermer, C. J., T. S. Burton, R. L. Callas, and Dr. Lawrence Fox III, 1998. *Habitat Predictability Model for Willow Flycatchers (Empidonax trailii) in Northern California, using Landsat Thematic Imagery, Organization of Fish and Wildlife Information Managers* In: 4th Microcomputer Applications in Fish & Wildlife Conference, Symposium 4,Technology in the Wildlife Profession: Research, Application, and Education.
[340] Rosgen, D. 1996. *Applied River Morphology*
[341] Minshall, G., S.E. Jensen, and W.S. Platts. 1989. *The Ecology of Stream and Riparian Habitats of the Great Basin Region: a Community Profile*. U.S. Fish & Wildlife Service Biological Report 85 (7.24) p. 44.
[342] Pomeroy, J. W. and J. Parviainen, N. Hedstrom, D. M. Gray. *Coupled modeling of forest snow interception and sublimation*. Hydrological Processes Vol. 12, Issue 15, Date: December 1998, pps: 2317-2337; www.Interscience.Wiley.com.

Best Management Practices[343] have been identified for the proposed activities in the project area (Appendix E). Objectives and implementation strategies have been identified for key practices that will protect aquatic and riparian resources and prevent degradation of water quality.

Best Management Practices are field monitored every year on the Shasta-McCloud Management Unit. Monitoring reports for the last three years indicate that all management practices related to timber harvest on the McCloud Flats have been effective in protecting riparian resources and water quality.

Based on this analysis, none of the action alternatives will have an adverse affect on water quality or riparian reserves located within, upstream or downstream of the project area[344].

Alternatives 1, 2 & 3

Cumulative Effects (Hydrology)

As there are not direct or indirect effects to water and riparian resources, there are no cumulative effects.

Range[345]

Affected Environment

The project is entirely within the Bartle Cattle Allotment, which has 240 cattle from June 1 to October 30. Cattle prefer to graze near the central troughs and along Ash Creek. Cattle forage mainly on secondary Rossi sedge. Bitterbrush is abundant, but used only if near water and hedging is light to none. Aspen, willow, oak, elderberry, and serviceberry are sometimes browsed severely when isolated or suppressed, but grow well despite grazing if substantially released from conifers. The allotment has no outstanding forage areas and forage is widespread and of low quality.

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect Effects (Range)

Forage values will remain at the present low level, due to prolonged canopy cover, but may slowly increase where pathogens kill trees and create openings. Pine needle duff (and shading) will continue to prevent good grass growth.

Cumulative Effects (Range)

Cumulative effects for range are bounded by the 8th order watershed as described in Appendix F. This watershed was used because it encompasses approximately 70 percent of the Bartle Cattle

[343] *Water Quality Management for Forest System Lands in California*, USDA Forest Service, Pacific Southwest Region, September, 2000.
[344] Hydrology Report for the Pilgrim Vegetation Management Project, March, 2006, page 22
[345] Paraphrased from Range Report, November 30, 2005.

Allotment. Past actions of thinning, regeneration, underburning and salvage on both National Forest and private lands have slightly increased forage values and acres by opening stand canopy and allowing grasses to grow more vigorously. Despite these actions, the allotment continues to have low quality forage, due mainly to the ashy soils that have high water infiltration rates and the continued accumulation of needle duff on the forest floor that impede grass growth.

Alternatives 1, 2 & 3

Direct and Indirect Effects (Range)

Alternative 1 allows maximum diversity and exposure of the forage species to more sun and water, providing much better forage growth conditions in the understory. Removal of trees will reduce the rate of duff buildup from pine needles, allowing for better grass growing conditions. Forage will increase directly proportional to the acreage burned because fire will reduce the duff such that grasses, forbs, and shrubs can reestablish.

Forage amounts will be less under Alternative 2 than that produced by the open canopy of Alternative 1 because of the denser overstory on 535 acres.

Alternative 3 is similar to two, but the immediate canopy and eventual death and fuel buildup in 15% retention areas within the 415 of regeneration harvest areas will delay forage increases in those areas.

Cumulative Effects (Range)

Past and future actions, including the alternatives proposed by the Pilgrim Project result in some increases in forage value and amounts for cattle. Overall forage values would remain low due to the factors of low soil moisture retention and continued needle duff accumulation.

Overall effects on the Bartle Allotment are insignificant and no plans exist to change the grazing season or numbers of cattle as a result of the past or future actions.

Transportation System[346]

Affected Environment

The Pilgrim assessment area has approximately 51 miles of classified system road[347]. The 51 miles of classified road include 6.3 miles of arterial routes[348], 10 miles of collector routes[349], and 35 miles of local roads. In addition there are about 4 miles of unclassified low standard roads[350]. They are not part of the official forest road system, but are considered a potential resource impact and access need, which must be addressed with any road analysis of an area. Together, these

[346] Paraphrased from *Transportation Report,* October 11, 2005, as updated by discussion with the author.
[347] Classified roads are part of the inventoried forest road system and have road maintenance and traffic service levels assigned according to designed use, safety, traffic mix, cost, and other factors.
[348] Forest arterials are primary forest roads that serve large land areas and connect with public roads. They are usually double-lane and hard surfaced.
[349] Forest collectors are secondary forest roads that serve smaller land areas but are still relatively high standard for forest roads, often double-lane with gravel surface.
[350] Unclassified roads are low standard roads, often user-built by hunters, campers, woodcutters, OHV-users, and other recreationists.

roads equate to a relatively high road density of 4.1 miles per square mile. The terrain is generally flat which has historically made effective road closures difficult to implement and maintain in this area and, along with heavy road use, is a primary factor in the high open road density of this area.

The area has a concentration of multiple user traffic due to the intersection of several arterial and collector routes[351] and supports year-round recreation use. Local features that draw users include the Pilgrim Creek Snowmobile Park, dispersed campsites, and popular mushroom and deer hunting areas (see also the Public Use section). Vehicle counts show an average of approximately 8,500 vehicles, including log truck traffic, travel through this transportation corridor during the spring through fall seasons and approximately 3,000 vehicles travel to the Snowmobile Park during the winter.

A Roads analysis of the project assessment area was completed in April of 2005. The recommendations of that analysis are included in the proposed action. See Appendix D for a detailed list of these proposed actions.

A culvert across Trout Creek on road 41N44Y (SE¼ Sec. 27, T41N, R1W) was identified by the hydrologist as being an undersized and having the potential to cause road damage and erosion during flood level runoff (it is recommended for replacement with a larger culvert). An open stream road crossing (ford) on forest road 41N52 is causing bank erosion and is recommended for decommissioning.

The forest standard and guidelines are that no more than 15 percent of harvested lands are to be dedicated to non-productive purposes such as roads, trails and landings[352].

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect Effects (Transportation System)

Road conditions and road density will remain the same in the short term. Local road systems will eventually become overgrown and close over next 5 years, decreasing road densities and roaded recreation opportunities. Local road maintenance needs and related issues will increase in short-term as conditions continue to deteriorate, but as corresponding use decreases these will abate. Less access from overgrowth may reduce sources for person-caused fires. Minor road and erosion problems associated with stream crossings may increase slightly. This alternative does not address access needs required to implement Forest Standards and Guidelines[353].

Cumulative Effects (Transportation System)

Cumulative effects for the transportation system are bounded by the 8th order watershed as described in Appendix F. This bounded area best represents the transportation system conditions as it relates to the McCloud Flats.

[351] FA13 Pilgrim Creek, FA19 Military Pass/Sugarpine Butte, and 40N12 Bear Wallow Roads.
[352] Forest Plan, page 4-25, j
[353] Forest Plan, pages 4-16 & 4-17

Projects on National Forest lands in the past 10 years, mainly timber sales, have not added any miles of classified roads to the transportation system. Past timber harvest on National Forest lands did result in the construction of approximately 250 landings[354] of about ½ acre in size each. This resulted in the loss of approximately 130 acres of commercial forest lands to long-term timber production. Main skid trails associated with these landings have affected approximately 150 acres of commercial forestland. This loss is assumed because many of these landings and skid trails will be used again in future timber sales.

There are approximately 190 miles of roads in the 8th order watershed including 20 miles of arterials (impacting about 60 acres), 40 miles collector roads (impacting about 100 acres) and 130 miles of local roads (impacting about 200 acres). These roads have removed about 360 acres of commercial forest lands from production. Roads and landings together have removed about 530 acres of commercial forest lands in the watershed from long-term timber production. This is about 2.0 percent of the commercial forest lands in the watershed.

Overall road density has remained static or decreased slightly due to roads being overgrown by trees and brush.

Other construction projects have removed approximately 7 acres of commercial forest lands from long-term timber production.

Alternative 1, 2, and 3

Direct and Indirect Effects (Transportation System)

Road density will increase slightly during project implementation (from 4.1 to 4.2 miles of road per square mile), but post project, the open road density will be reduced to 3.4 miles of road per square mile. Classified roads will be reduced from about 51 miles to 45 miles. Unclassified roads will be reduced to 0 miles.

Local road maintenance needs and related issues will be addressed for roads affected by this project[355]. Open road densities increase in the short term until road closures and decommissioning are put into effect 3-5 years from the start of timber harvest (after post-sale activities are complete). Road maintenance costs decrease slightly with road closures but administrative costs increase (signing, maintenance of closures, enforcement, etc.). In the long term the risk to man-caused fires should decrease as the road density will be reduced once the road closures and decommissioning is completed. Roaded recreation opportunities remain about the same, despite the reduction in roads due to the access to similar opportunities throughout the project area and vicinity.

Decommissioning approximately 2 miles of roads will return about 4 acres of roadbed to productive land. Initially grasses and brush will revegetate these acres and over time conifer trees will seed into the area.

[354] Based on an average of 25 harvest acres per landing
[355] Not all roads used or stands treated with this project.

The proposed project will require approximately 150 landings of about ½ acre in size each. Approximately 40 of these landings already exist from previous timber harvest activities in the project area. These approximately 80 acres of landings would be lost to long-term timber production even though they will be subsoiled and trees will naturally start to grow on them. This is because they will be probably be used again in 10-15 years for timber harvest in these same stands.

The proposed project will require approximately 0.3 miles of new road construction. This action will remove approximately 0.6 acres of commercial forest lands from long-term timber production. The road will be located on flat terrain with no streamcourses within about one mile. The location follows open areas and avoids large trees and areas of conifer tree reproduction.

Existing roads in the project assessment area have removed approximately 100 acres of commercial forest lands from production. Main skid trails will impact approximately 50 acres and landings will impact about 80 acres as noted above. A total of approximately 230 acres of commercial forest lands will be dedicated to roads, landings and skid trails for the project. This is approximately 6 percent of the harvest acres

Cumulative Effects (Transportation System)

Approximately 760 acres of commercial forest lands has been/would be lost to long-term timber production from the cumulative losses of past projects when combined with this project and the existing roads in the watershed. This is about 3.0 percent of the commercial forest lands in the watershed.

Open road density would be reduced in the project area to about 3.4 miles per square mile. Overall road density will decrease slightly in the watershed from proposed closures and natural closure of some roads as they are overgrown with brush and trees.

Scenic Quality

Affected Environment

The McCloud area boasts of flat terrain covered in prolific mixed conifer stands with a variable understory. Usually, only foreground views[356] can be seen due to the flat topography[357]. The existing scenery ranges from management activities being unnoticed (Retention Visual Quality Objective [VQO][358]) to dominating the landscape (Modification VQO[359]) as seen from Pilgrim

[356] Foreground views: The portions of a view between the observer and up to ¼ to ½ mile distant. Surface patterns on objects and visual elements are important in foreground views. *Scenery Assessment*, October 5, 2005, page 3.

[357] The Forest Plan uses the Visual Management System (VMS)357 to reduce scenery impacts caused by management activities. VMS utilizes the distance of the project from the viewer, duration of the view, variety class and the sensitivity level of the viewpoint to assess visual impacts. Visual Quality Objectives (VQO's) were established for areas seen from travel routes. VQO's indicate allowable changes to scenery as a result of management activities.

[358] Retention VQO: Management activities are not evident to the casual forest visitor. *Scenery Assessment*, October 5, 2005, page 2.

Creek Road and Mount Shasta due to prior vegetation management activities, the Pilgrim Creek Snowmobile Park and roads.

A portion of the project area is within the foreground view of Pilgrim Creek Road. The Forest Plan identifies the foreground views from Pilgrim Creek Road[360] must meet a minimum of Modification VQO per the Forest VQO map[361]. There may also be background views of the entire project area from the Mount Shasta summit, which must meet a minimum VQO of Modification to Maximum Modification per the VQO map.

Local residents use Pilgrim Creek Road for hunting, woodcutting, dispersed recreation, and snowmobiling. Mitigations for foreground views within the Pilgrim Creek corridor were integrated into the project design to minimize impacts to scenery as much as possible while addressing ecosystem health (Design Criteria Common to All Action Alternatives).

Environmental Consequences

Alternative 4 - No Action

Views from Pilgrim Creek Road - Direct and Indirect Effects

No action may change the future landscape character by creating a forest with dense under growth, which creates less visual diversity and inhibits the sight distance of the viewer (Photo 3 in Appendix A), thus resulting in a less interesting visual experience[362]. The No Action Alternative may result in an increasing number of dead and dying trees as a result of both root disease and bark beetle mortality as evident in 2004 and 2005 insect mortality flights. The dead trees will look ‘natural,’ but may not meet the publics’ expectations to see a green and healthy forest.

The No Action Alternative will perpetuate the existing conditions of dense undergrowth, over stocked stands, and high mortality from disease and insect infestations. Tree mortality may continue to spread causing an increase in dead, brown tree canopies. Dead trees are usually not seen as scenic by most of the public. Increase in fuels may add to the likelihood of a stand replacing fire. A devastating forest fire would leave a charred, denuded landscape, which many people find as visually undesirable.

Cumulative Effects Views from Pilgrim Creek Road

Past projects in the last 10 years along the Pilgrim Creek Road within the 8th order watershed have included portions of the Elk and Old Station Salvages (.5 miles), the Pilgrim Hazard Tree Removal (5 miles) and portions of the North Flats (1.5 miles) and Flow (1.0 mile) sales. All these

[359] Modification VQO: Management activities may dominate the characteristic landscape, but must follow naturally established form, line, color, and texture characteristics. *Scenery Assessment*, October 5, 2005, page 2.
[360] The units considered for scenery analysis within the Pilgrim Creek corridor are 404, 23, 24, 424, 240, 230, 414, 240, 230, 414, 266, 421, 436, 422, 455, 324, 460, 456, 452, 401, 467, 128, and 305.
[361] On file at the Shasta Trinity National Forest Headquarters in Redding, California.
[362] Based on professional experience on the McCloud Flats and current conditions.

projects met or exceeded the Visual Quality Objectives of modification within the viewshed of this road.

Views from Mount Shasta - Direct and Indirect Effects

The existing visual condition will not be affected by Alternative 4, which meets the VQO of modification.

It is difficult to estimate if the scale of tree mortality would be large enough to be seen from Mt. Shasta. The scale of forest devastation through insects, disease and fire could have effects large enough in scale to be seen from Mount Shasta.

Cumulative Effects - Views from Mount Shasta

The cumulative effects boundary for visual quality as seen from the Mt. Shasta is generally all of the McCloud Flats when looking east from the summit. Projects on National Forest lands should not be highly visible because they are viewed from a distance of 10 miles or more and through hazy atmospheric conditions. Also, management activities are less noticed on flat topography.

The No Action Alternative will not affect the existing visual condition, which meets or exceeds the VQO's of Modification as seen from Pilgrim Creek Road and modification/maximum modification as seen from the Mount Shasta summit.

Alternative 1 - Preferred Alternative

View from Pilgrim Creek Road - Direct and Indirect Effects

Thinning and biomass units will meet a VQO of Partial Retention post completed management activities. The management activities may be noticed, but the area will primarily look natural. The units may meet a VQO of Retention after one or two years post management activities when grasses and forbs reestablish.

The mature stand thin units will meet a VQO of Retention post management activities. The mature trees that will be left will still dominate the viewshed, thus making the management activities unnoticed. Thinning may help to achieve a desired future condition for scenery that would meet the public's expectation to view a forest that has a variety of species and age classes, including mature trees and open areas. Light to moderate thinning would allow light to shine through the canopy, which would highlight mature trees, extend the foreground views, and create interesting shadow patterns. See photo 4 in Appendix A.

The harvested and replanted units will meet a VQO of Modification post management activities. The management activities within the units may be evident, but will be subordinate to the natural characteristic landscape (Partial Retention) within 5 to 10 years when shrubs and small trees are established. Since there are natural meadows within the project area the units may look like natural openings after 1 to 2 years when grasses and forbs reestablish.

The tractor pile and burn units will meet a VQO of Modification post management activities. Initially, the soil disturbance and brush piles will be apparent, however, within 1 to 2 years the effects will probably not be noticed when grasses and forbs are reestablished. Within 5 years the

VQO may rise to Partial Retention, the management activities may be evident, but will be subordinate to the natural characteristic landscape, when shrubs and small trees are established.

The underburning fuel treatments in units 460, 401, 421, and 422 will meet Partial Retention to Modification post completion. The lower portion of the tree boles and other vegetation may turn black / brown, however site disturbance to soil and vegetation isn't as great as the effects of a tractor piling. The units should meet Partial Retention in 1 to 2 years when grasses and forbs reestablish and the blackened boles are not as noticeable. Often, prescribed fire results in growth of visually attractive combinations of trees, shrubs, herbaceous plants and grasses[363].

The dry meadow restoration units will meet a VQO of Modification post management activities. However, they may look more visually interesting than the current dense undergrowth along the road that prevents views into the meadows. The management treatment will reduce the dense undergrowth and open views. The units should meet Partial Retention after a year or two post management activities when grasses and forbs reestablish. See photo 5 in Appendix A for an example.

Hardwood management and knobcone sanitation units are unseen from Pilgrim Creek Road.

These management activities may increase the size of trees. Larger, vigorous trees appear more scenic than small, diseased trees with dense understory to many people. The mature trees, increased visual access, and shadow patterns emulate a park-like setting which can be very scenic. The meadow like openings and mature tree stands will enhance visual diversity in form, color, texture, and scale in vegetative material, which is seen as more interesting than a monotonous landscape[364].

Cumulative Effects - Views from Pilgrim Creek Road

Projects in the past 10 years and the proposed action will meet or exceed the visual quality objectives for the viewshed along the Pilgrim Creek Road.

Views from Mount Shasta - Direct and Indirect Effects

A variety of visual studies were utilized to analyze views from Mount Shasta towards the project area. A Geographic Information System (GIS) analysis was used to determine the size and shape of regeneration harvest units that may be seen from Mount Shasta. Only approximately 50% of the scattered units could be seen from Mt. Shasta with the largest opening being approximately 35 acres. Photos were also taken from Mt. Shasta and compared with orthophotos to correlate the size of an opening and how readily it could be viewed from Mount Shasta (see photo 6 in Appendix A).

The project should not be noticed as viewed from Mount Shasta Summit. The project will not be highly visible because it is approximately 10 miles from the viewer, seen through hazy atmospheric conditions, and occur on flat topography. According to the GIS analysis, the largest opening of the regeneration harvest units that will be seen is approximately 35 acres. This is

[363] USDA Forest Service, *National Forest Landscape Management Volume 2*, Chapter 6, Fire.
[364] USDA Forest Service, *National Forest Landscape Management, Volume 2*, Chapter 1. The Visual Management System, Handbook 462.

approximately half the size of Airport Pasture, which is barely visible from this view. Elk Flat and other meadow restorations may appear slightly larger than current conditions, but should look like natural occurrences as viewed from Mount Shasta and not be noticed. Thinning, knobcone sanitation, hardwood management and other treatments, including a short segment of road construction are much smaller in scale than the largest opening created with this project, and thus should be barely perceptible or not noticed at all. Overall there are no direct or indirect effects to visual quality as seen from the summit of Mt. Shasta.

Cumulative Effects Views from Mount Shasta

As there are no direct or indirect effects to visual quality as seen from the summit of Mt. Shasta, there are no cumulative effects.

Alternative 2

View from Pilgrim Creek Road - Direct and Indirect Effects

Visually this alternative differs from Alternative 1 by retaining more canopy closure in thinning units 266 and 436 along the Pilgrim Creek Road. The proposed average 60% canopy retention could meet a VQO of Partial Retention to Retention as seen from Pilgrim Creek Road. The direct effects for all other units would be the same as Alternative 1, since they have the same proposed action.

The indirect effects are the same as Alternative 1, since most of the units on Pilgrim Creek Road have the same proposed action.

Cumulative Effects Views from Pilgrim Creek Road

The cumulative effects for scenery from Pilgrim Creek Road are the same as Alternative 1.

Views from Mount Shasta - Direct and Indirect Effects

The effects for views from Mt. Shasta are the same as Alternative 1, since most of the units have the same proposed action and the small changes in stand density on about 535 acres would be imperceptible from Mount Shasta.

Cumulative Effects Views from Mount Shasta

As there are no direct or indirect effects to visual quality as seen from the summit of Mt. Shasta, there are no cumulative effects.

Alternative 3

Views from Pilgrim Creek Road - Direct effects:

Visually this alternative differs from Alternative 1 by retaining more vegetation in the regeneration harvest units. In the short term, leaving more trees per acre would result in a more natural look, thus slightly raising the VQO. However in the long term, if the diseased trees die then the forest would still look ‘natural’, but may not meet the publics’ expectation to see a green and healthy forest. The regeneration harvest units would still meet a Modification VQO as in

Alternative 1, since 85% of the vegetation would be removed, but the units probably would not be as noticeable as in Alternative 1.

Cumulative Effects Views from Pilgrim Creek Road

The cumulative effects for scenery along the Pilgrim Creek Road are that the Visual Quality Objectives of Modification will met or exceed.

Views from Mount Shasta - Direct and Indirect Effects

The effects for views from Mount Shasta are the same as Alternative 1.

Cumulative Effects - Views from Mount Shasta

Since there are no effects to scenery as seen from Mount Shasta (the project should not be noticed), there are no cumulative effects.

Public Use/Recreation[365]

Affected Environment

The Pilgrim Creek Snowmobile Park (“snowpark,” unit 421) is the only developed recreation site within the project area. Vehicle counts within the area show an average of 8,500 vehicles travel through the area during the spring through fall seasons and 3,000 vehicles travel to the snowpark during the winter. These numbers are generated from traffic counters located on the Pilgrim Creek (FA-13) and the Sugar Pine Butte (FA-19) roads. Recreation visitor travel through the assessment area is concentrated on these two roads. In addition to the snowmobile park, these two paved roads are the primary travel routes for visitors going to the trail heads on the east side of the Mount Shasta Wilderness. They also access other dispersed recreation sites located at Ash Creek Mill, Ash Creek, Trout Creek Meadows and Harris Springs. There is also some incidental traffic going towards geologic features in the Medicine Lake Highlands and travel towards Tennant and Mt. Hebron, California.

The other roads receive very little recreation traffic with the exception of deer hunting and mushroom gathering seasons. Hunters travel most of the interior roads during deer hunting season. Upland game bird and squirrel hunting occurs through out the area also. Within the assessment area, the activity is concentrated along Ash Creek and Trout Creek. Since this particular type of hunting is done primarily by walking, moving vehicles are not encountered as frequently.

Firewood cutting occurs in the project area although the preferred firewood species, lodgepole pine, in the southern Siskiyou County area does not grow in great abundance in the project area. There is incidental cutting of ponderosa pine for personal use firewood that occurs throughout the area but is a minor activity that is occurring because of the species preference.

There are several informal dispersed camps that occur within the assessment boundary in the vicinity of the Pilgrim Creek Experiment Station in Unit 423 and at the Pilgrim Creek

[365] Paraphrased from the *Public Use Report*, November 14, 2005.

Snowmobile Park in Unit 421. Use at these locations occurs mainly during deer hunting and mushroom gathering season. There are two well-established undeveloped campsites to the north of the assessment boundary. They are located at Ash Creek Mill and where Ash Creek crosses the Pilgrim Creek Road. Use at these two sites are again primarily during deer hunting season but contractors have been known to occupy these locations also during the summer months. There are also two hunting camps in the vicinity of Elk Flat to the north of the project area. These sites only receive use during deer hunting season.

The primary use season for the Pilgrim Creek Snowmobile Park (unit 421) is between December 1 and April 15. The park is one of four trailheads that access the Tri-forest Snowmobile Trail System. The primary activity associated with this facility is snowmobile use and general snow play. There has been an increase over the past couple of years of both cross country and skate ski activities on the maintained trails. During the winter months, the only road that is plowed in the area is the Pilgrim Creek Road up to the Snowmobile Park. From that point, both the Pilgrim Creek and Sugar Pine Butte Roads are converted to winter trails. These are the main trails leaving the park. Other use periods of this facility are mainly during the spring mushroom season and deer hunting season. There is also sporadic use of this facility during the summer months. The main activity during these seasons is overnight camping. This use is considered to be incidental to the main purpose for this facility.

Design criteria listed in Chapter 2 area intended to minimize or eliminate disturbance or effects related to this unit and to winter recreation.

Environmental Consequences

Alternative 4 - No Action

Direct and Indirect Effects (Public Use/Recreation)

There will be no direct benefits or impacts to recreation use in the project area. The indirect impacts will be further spread of insect and disease centers. The spread could eventually reach both dispersed and developed use areas and make them undesirable for use.

Cumulative Effects (Public Use/Recreation)

Cumulative effects for recreation is bounded by the area ¼ mile on either side of the Pilgrim Creek Road from State Route 89 to the beginning of the project and from that point a width of 1 mile on either side of the Pilgrim Creek Road to the end of the project in the SE¼ of Section 27, T41N,R1W. This is the area of concentrated public use within the project assessment area and the 8th order watershed. The time frame is the past decade, the period when developed recreation facilities were constructed and public use the highest.

Actions in the past 10 years have had no effect on hunting, mushroom gathering or dispersed recreation except short-term (several weeks to a month) displacement. Some past actions have created openings that are adjacent to the snowmobile trail along the Pilgrim Creek Road. These openings create early icing and early melt out of the trail. This causes snowmobilers to leave the groomed trail for engine cooling and track lubrication. This is not a major problem as it only occurs early and late in the winter season.

Alternatives 1, 2 & 3

Direct and Indirect Effects (Public Use/Recreation)

The snowmobile park will be closed when large equipment is operating in unit 421 for public safety. This will affect public use for a short period, possibly two weeks[366], if this occurs during the winter.

Opening the canopy at the intersection of Pilgrim Creek and Sugar Pine Butte roads will indirectly benefit visitor safety and snow removal operations during the winter. This is because the increased solar effects on the snow and road surface helps to melt the ice accumulations and snow plow berms. The duration of this effect is expected to persist for about 10-15 years, because the canopy of the remaining trees and any regenerating trees is expected to grow in by this time.

Reduction of canopy in the intermediate and larger tree size classes will affect the winter trails north of the snowmobile park on both Pilgrim Creek and Sugar Pine Butte road. It will increase the rate of snowmelt and potentially shorten the season of use. Primary effects will be in those treatment areas that are adjacent and on the south side of Pilgrim Creek road and the west side of the Sugar Pine Butte road (from increased solar radiation from reduced canopy[367]). The greatest impact will be in units 456 and 305, from a major reduction in canopy from proposed treatments. These units are deteriorating rapidly from disease and insect infestations, which will eventually remove the shading of the trails regardless of implementation. This impact will be limited because other areas along the trial already experiences earlier melt out of the groomed trail. A benefit would be the increased spacing between trees that allow riders to leave the trail for short distances for motor cooling and track lubrication.

The dry meadow restoration will remove most of the trees and natural regeneration along the Pilgrim Creek road and improve access to the Elk Flat snowmobile play area for winter use.

The effect of unit 421 on the snowmobile park will be improved access to trails in the future. It will provide easier options for riders to get to the main trials without traveling on the plowed roadways. It will also provide an opportunity for creating a larger area where snow can be placed during snow removal operations. The planned fuel treatments will further reduce the number of hazards to people by removing limbs and material that can be hidden under snow.

The potential exists for damage to existing facilities, improvements, and public use areas from logging in unit 421. Visual resource and traffic flow problems created by the need for landing locations in developed public use areas may still exist, but design features described in chapter 2 minimize this impact as much as possible[368].

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[366] Typically felling and removal of trees and biomass material within stand this size and density takes about two weeks. Dave Smyth, Timber Management Officer.
[367] Ed Hatakeda, personal communication.
[368] Ed Hatakeda, personal communication.

Hunters and mushroom gatherers will be displaced from areas where activity is occurring. Once active treatment is completed, public use will recur. This is generally of short duration of several weeks to one month in any one harvest area.

Dispersed camping will be affected by equipment noise, increased large vehicle traffic, fuel treatments and closure of the area during project activity. These effects will be only during the period of time when project activities are close by or along haul routes and will only last for several weeks to several months over the 3 to 5 year life of the project. Aesthetics of the camping areas may change for better or worse, either discouraging or encouraging use, depending on the person. The effects will be small in relation to the land base that is available to the public since all of these activities can occur in other areas. All of these activities are transient in nature and move with the availability of resources and desired aesthetics[369].

Overall there is a minor benefit from this project to snowmobile use by opening the understory of some stands along the snowmobile trail for more access. There is a minor effect to the snowmobile trail through potential shortening of the use season. This effect is highly variable as snow accumulations vary from year to year in the project area.

All other dispersed recreation use will have short term displacement when harvest occurs within the corridor of concentrated use.

Cumulative Effects (Public Use/Recreation)

All past activities have been completed and do not occur within the same timeframe as the proposed action. Thus, there are no cumulative effects to hunting, mushroom gathering or dispersed recreation. There has been no reduction in these uses within the cumulative effects corridor over the past 10 years[370].

Creation of opening along the snowmobile trail on the Pilgrim Creek Road had had some cumulative effect when combined with the proposed action. Past actions when combined with the proposed action will create opening along about 1.5 miles of the snowmobile trail within the defined corridor of concentrate use. This is about half the trail length within the corridor. This is not a major effect to the use of the trail as it only impacts the trail during period of low snow levels either early or late in the season of use.

Heritage[371]

Affected Environment

An archeological pre-field investigation and field reconnaissance identified nine archeological properties within the project boundary. One site is a Traditional Cultural Property. Of the remaining properties, three are wagon roads, one is a logging railroad grade system, one a sheep camp, one a refuse scatter, one a multi-component site (obsidian lithic scatter and refuse scatter),

[369] Ed Hatakeda, personal observation.
[370] Public Uses for the Pilgrim Vegetation Management Project, Nov. 2005.
[371] Paraphrased from the transmittal letter for the Pilgrim Vegetation Management Project: ARR #05-14-01051, November 8, 2005.

and one the Pilgrim Creek Nursery and Experimental Station (circa 1910 to 1940s). All sites and features eligible or potentially eligible to the National Register of Historic Places have been flagged for identification and will be protected during project activities. The archeological reconnaissance and management measures performed conform to the procedures identified in the Region 5 Heritage Programmatic Agreement.

The Pit River and Wintun Tribal Organization have been consulted regarding the proposed project as required under 36 FR 800. Native American Tribal organizations did not express any significant issues relating to Section 106 of the National Historic Preservation Act. Documentation is located in Archeological Reconnaissance Report 05-14-01051.

Environmental Consequences

All Alternatives

Direct and Indirect Effects (Heritage)

All alternatives require the same protections for sites. There will be pre-designated crossings of linear features where needed to best protect overall resources. Therefor, in consideration of the management and protection measures identified for archeological sites and features associated with the project area, and that no Native American Tribal Organizations issues or concerns were identified regarding Section 106 of the National Historic Preservation Act, this project will have no direct or indirect effect on any archeological properties either eligible or potentially eligible to the National Register of Historic Places.

Cumulative Effects (Heritage)

As there are no direct or indirect effects to heritage resource, there are no cumulative effects.

Economics

Affected Environment

The economic area of influence for the Shasta-McCloud Management Unit includes the several surrounding counties: Siskiyou and Shasta in California as well as Jackson, Josephine, and Klamath in Oregon. Siskiyou County traditionally had a high degree of dependence on lumber and wood product manufacturing.

Currently, there are no saw mills in Siskiyou County. There are two veneer mills, one in Weed and one in Yreka. Saw log material from the local area goes mostly to mills in Burney and Redding, California (Shasta County). Biomass material goes to one of three co-generation plants in Burney, CA. Veneer material from the two mills in Siskiyou County goes to plywood plants in Medford and Roseburg, Oregon.

The California Timber Yield Tax program sets the harvest value of timber and collects an in lieu tax when it is harvested. The revenue from this program is allocated to the counties where the timber was harvested. In 2004 approximately 24 million board feet of timber, with a harvest value of about $3,325,000 was harvested from public lands in Siskiyou County[372]. The Yield Tax rate for 2006 is 2.9 percent of the assessed timber value[373].

Environmental Consequences

Alternative 4

Direct and Indirect Effects (Economics)

This alternative would not produce any economic benefits. Timber would not be available to regional markets, and demands for lumber and other wood products would be satisfied by timber cut from other sources, both domestic and foreign. No Yield Tax revenue would be collected and distributed to Siskiyou County.

Cumulative Effects (Economics)

Yield tax was collected for past and current timber sales within Siskiyou County on public lands, however the rates and assessed values for those years is not available from the State Board of Equalization.

Alternatives 1, 2 & 3

Direct and Indirect Effects (Economics)

Actions used to accomplish forest health, fuels, and hardwood/dry meadow objectives will use various implementation methods, including Forest Service crews, timber sales, and/or service contracts. Timber products are a direct output of actions to improve forest health, reduce fuel loads, and maintain hardwoods and dry meadows.

The economic effects of the timber product removal can be expressed in monetary terms, while other effects such as improved tree growth, resistance to insects and disease and reduced fire hazard are not as easily quantifiable. Predictions of project receipts and costs, even for short periods into the future, may prove to be inaccurate due to variables such as inflation, market supply and demand, and the accuracy of the timber cruise. While these forecasts may not predict actual product values, receipts and costs, most deviations from these figures would likely remain constant with other general economic indicators, i.e., rate of inflation. This makes it possible to conduct a reasonable analysis of the relative revenue and costs.

A Financial Efficiency Analysis was done in accordance with Forest Service Handbook 2409.18, to provide a comparison of anticipated costs and revenues. The indicators used to compare the various economic effects of each alternative are (1) harvest volume for proposed activities, (2) Present Net Value, which is a comparison of short-term costs and revenue to the Federal government, and (3) number of jobs generated by proposed activities based on harvest volume.

Although harvest volumes, costs and revenue, and jobs created are estimates, they can be used to compare the relative economic value of timber management activities for each alternative. The following tables display these estimated costs and revenue by alternatives.

[372] California State Board of Equalization Web Site, Report YT-36
[373] California State Board of Equalization Web Site, January 6, 2006 letter

Table 9. Project Costs, Alternatives 1 & 3

Cost Description	Quantity	Unit of Measure	Unit Cost 2006$	Total Cost
Planning/Prep/Administration	50,000	CCF (thousands of cubic feet)	$30/CCF	$1,500,000
Reforestation-Seedlings	190,000	M (thousands)	$300/M	$57,000
Reforestation-Site Prep	400	acres	$289/ac	$115,600
Reforestation-Pile Burning	400	acres	$80/ac	$32,000
Reforestation-Planting	400	acres	$160/ac	$64,000
Reforestation-Survival Exam, 1st yr.	400	acres	$13/ac	$5,200
Reforestation-Survival Exam, 3rd yr.	400	acres	$14/ac	$5,600
Reforestation-Survival Exam, 5th yr	400	acres	$15/ac	$6,000
Reforestation-Release	400	acres	$470	$188,000
Landing and skid trail subsoiling	150	landings	$155 ea	$23,250
Road Construction	.3	miles	$17,750/mi	$5,325
Culvert Replacement	1	each	$3,500 ea	$3,500
Road Closure-barricades	11	each	$900 ea	$9,900
Road Closure-berms	9	each	$150 ea	$1,350
Road Decommissioning	2.12	miles	$1,500/mi	$3,180
Fuels Treatment- Machine Piling	700	acres	$289/ac	$202,300
Fuels Treatment- Pile burning	700	acres	$80/ac	$56,000
Fuels Treatment- underburn	200	acres	$200/ac	$40,000
Total Project Costs				**$2,318,205**

Table 10. Project Revenue, Alternatives 1 & 3

Species	Est. Vol. in CCF	Wt. Ave. Value Per CCF*	Revenue
Ponderosa Pine	36,200	$157	$5,683,400
White Fir	6,400	$114	$729,600
Chips (all species)	**9,200**	**$.30**	**$2,760**
Total Volume/Revenue	**50,000**		**$6,415,760**

*Weighted average high bid from the last three sales sold

Table 11. Project Costs, Alternatives 2

Cost Description	Quantity	Unit of Measure	Unit Cost 2006$	Total Cost
Planning/Prep/Admin	44,000	CCF	$30/CCF	$1,320,000
All other costs the same as Alts. 1 & 3				$818,205
Total Project Cost				**$2,138,205**

Table 12. Project Revenue, Alternative 2

Species	Est. Vol. in CCF	Wt. Ave. Value Per CCF*	Revenue
Ponderosa Pine	31,000	$157.	$4,867,000
White Fir	5,200	$114.	$592,800
Chips (all species)	**7,800**	**$.30**	**$2,340**
Total Volume/Revenue	**44,000**		**$5,462,140**

*Weighted average high bid from the last three sales sold

Table 13. Economic indicators for the Pilgrim Vegetation Management Project.

<table>
<tr><th>Economic Indicators</th><th>Alternative 1</th><th>Alternative 2</th><th>Alternative 3</th><th>Alternative 4</th></tr>
<tr><td>Est. Volume (CCF)</td><td>50-54 CCF</td><td>44-48 CCF</td><td>50-54 CCF</td><td>0</td></tr>
<tr><td>Present Net Value
(low vol. est.)</td><td>$4.3 million</td><td>$3.3 million</td><td>$4.3 million</td><td>0</td></tr>
<tr><td>Estimated Yield Tax</td><td>$180,000</td><td>$156,000</td><td>$180,000</td><td>0</td></tr>
<tr><td rowspan="2">Jobs Created, direct and indirect for lumber and wood products industry only[374].
(number of)</td><td>750-810</td><td>660-720</td><td>750-810</td><td>0
No new jobs will be created.</td></tr>
<tr><td colspan="4">The area will continue to provide some employment (mostly indirect) from its recreational uses and other resource values, under all alternatives.</td></tr>
<tr><td>Jobs Income[375]</td><td>$7,382,500</td><td>$6,496,600</td><td>$7,382,500</td><td>0</td></tr>
</table>

These alternatives would meet a portion of the regional demand for lumber, plywood and biomass and provide employment for local workers in the wood products industry. It would off-set some of the demand that is now being met through foreign markets. Revenue received that is above the project costs is returned to the U.S. Treasury. Yield Tax revenue and a portion of the jobs income noted above would be realized by Siskiyou County.

Jobs include both those for the wood products industry and subsequent service contracts for growing seedlings, planting seedlings, site clearing for planting and fuels reduction and seedling release. Jobs would be created over a period of about 3 to 7 years when timber harvest and subsequent work is accomplished.

Cumulative Effects

Alternatives 1, 2 & 3 (Economics)

Within the 8th order watershed there is one timber sale on National Forest lands currently under contract. The Edson Timber Sale, sold in 2005, has a total volume of 19,246 CCF and was bid at a total value of $2,105,000. This sale is similar to the proposed Pilgrim Project and treats approximately 1,700 acres by thinning and sanitation harvest. This sale has an approximate

[374] *Forestry, Forest Industry and Forest Products Consumption in California*, Pub. 8070, 2003, University of California, Division of Agriculture and Natural Resource
[375] Based on the median family income for Siskiyou County of $29,530, 2000 Census.(low jobs number)

present net value of approximately $1,000,000 and will create about 100 jobs for a period of about 3 to 5 years[376].

Current timber harvest on National Forest lands within the watershed and the proposed Pilgrim Project would have a positive present net value of approximately $4.0 to $5.0 million dollars and create about 700 to 900 direct and indirect jobs over a period of about 5 to 7 years.

Air Quality

Affected Environment

The Pilgrim Project is located in the Northeast Plateau Air Basin. The project vicinity is primarily forested federal and private lands with no substantial emission sources other than fugitive dust from logging operations. Other emission sources are smoke and haze from seasonal prescribed fires, both within and outside the air basin.

The climate is a Mediterranean subtype with warm dry summers and cool moist winters. The Average maximum temperature is 65°F with a range of 45 to 87° F. The Average minimum temperature is 34°F with a range of 23 to 47° F. Average total precipitation is 51 inches with an average snowfall of 80 inches. Wind speeds range from 0 to 7 miles per hour on average with gusts to 10 and 20 miles per hour[377].

The Northeast Plateau Air Basin is classified as “attainment” for both National Ambient Air Quality Standards under the Federal Clean Air Act and the California Air Resource Board standards[378].

The Mt. Shasta Wilderness is a Class II Airshed that is approximately 7 to 10 miles northwest of the project area. Table 14 displays the current air quality standards.

Table 14. State and Federal Ambient Air Quality Standards

Emission	Averaging Time	Federal Primary Standard	California Primary Standard
PM_{10}	Annual	50	20
	24-hour	150	50
$PM_{2.5}$	Annual	15	12
	24-hour	65	30
CO	8-hour	10,000 (9)	10,000 (9)
	1-hour	40,000 (35)	40, 000 (20)

The project area is located away from populated areas where emissions are generally higher due to industries and smoke from private residence.

Air quality in the project area and Siskiyou County is good. Data compiled by the California Air Resources Control Board indicate that air quality with respect to PM_{10} has improved from 1988 to the present. The annual state standard has not been exceeded during that time except the

[376] Estimates based on costs for the Pilgrim Project
[377] NOAA RAWS weather station, Ash Creek
[378] Per. Comm. with Elden Beck, Siskiyou County Air Pollution Control Officer

24 hour state standard was exceeded in 2002 due to smoke incursions from the Biscuit Complex wildfires in southwest Oregon.

Alternative 4 - No Action

Direct, Indirect and cumulative Effects (Air Quality)

As there would be no timber harvest there would be no dust from logging operations and no smoke or haze from underburning or pile burning. As there are no direct or indirect effects, there are no cumulative effects.

Alternatives 1, 2 & 3

Direct and Indirect Effects (Air Quality)

Logging operations will produce some dust, primarily from tractor skidding of log bundles and hauling over earth surface roads. Dust from hauling will be minimized by requiring abatement with either water or an acceptable alternative. Logging operations are generally done over several years and localized dust from skidding and hauling dissipates rapidly.

The approximately 700 acres of slash pile burning and about 200 acres of underburning will produce smoke and ash from partially burned plant matter. This burning of organic matter will produce emission of particulates suspended in the atmosphere for from one to several days. An estimated 38 tons of particulate matter (PM_{10})[379] will be produced from slash pile burning and an estimated 6 tons of particulate matter (PM_{10})[380] will be produced from underburning. Burning would be done only on designated "burn days" as designated by the Siskiyou County Air Pollution District. All burning is also done under the approved Northeast Air Alliance Smoke Management Plan. It is unlikely that the 24 hour State or Federal standard for PM_{10} or $PM_{2.5}$ would be exceeded as the only time it has been exceeded in the past five years is when a large wildfires burn over considerable time. Burning will also be done under an approved burn plan, which will schedule burning when wind conditions dissipate smoke rapidly and direct it away from populated and other sensitive (Class II Airsheds) areas.

The action alternatives will reduce the overall fuel loading on approximately 3100 acres treated by various prescriptions. This will decrease the expected emissions from a wildland fire if it occurs in the project area.

Cumulative Effects (Air Quality)

Within the 8th field watershed there has been an average of approximately 160 acres of underburning and approximately 100 acres of pile burning every year over the past 10 years. There has also been an unestimated amount of burning on private lands within the watershed. Compliance with burn day designations and permitting from the Siskiyou County Air Pollutions Control District has minimized the effects of this annual burning so that Federal and State air quality standards have not been exceeded.

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[379] USFS Region 5 Conformity Handbook, Tables 6-8, 1995
[380] USFS Region 5 Conformity Handbook, Tables 6-8, 1995

The only other current project in the watershed on National Forest lands is the Edson Timber Sale, which has approximately 350 acres of pile burning and 200 acres of underburning. This project is near completion and fuels treatments will probably occur within the next two years.

The Pilgrim Project fuels treatments will not occur until harvesting is completed, which could be four to six years from now. In that time the average number of acres of underburning should be about the same as the current 10 year average. The average acres of pile burning might increase to 250 for one or two years in the future, if all the proposed pile burning is done.

Overall cumulative emissions are expected to be similar to the past years when controlled burning of fuels in the McCloud Flats area has not exceeded Federal or State air quality standards.

Short Term Uses and Long Term Productivity[381]

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity (40 CR 1502.16). As declared by Congress, this includes using all practical means and measures, including financial and technical assistance, in a manner calculated to foster and promote general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations of Americans (NEPA Section 101)

Under the Multiple-Use Sustained Yield Act and the National Forest Management Action, all renewable resources are to be managed in such a way that they are available for future generations. The harvesting of timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be reestablished and grown again if long-term soil productivity is maintained through application of resource protection measures described in Chapter 2.

Short-term use (2 to 5 years during harvest operations and subsequent treatments) for the Pilgrim Project will remove forest products and generate revenue for the Federal Government, Siskiyou County and workers in the wood products industry. There will be a loss of some acres of late-successional forest and marginal dispersal habitat for the Northern Spotted Owl. There will be a loss of soil productivity on a small number of acres (about 130) dedicated to landings, main skid trails and new road construction. Dust and air pollutants will be created in the project area, but will disperse quickly and not impact long-term air quality. Smoke from burning will put particulate matter into the air, which will disperse within several hours to several days and not exceed Federal or State Air Quality Standards. Some recreation users may be displaced for short periods of time (several weeks to a month). Noxious weeks will be monitored and removed when found.

In the long-term (5 to 15 years), removal of dead and dying trees will reduce the spread of disease pathogens and keep future ground fuels within forest plan desired conditions, reducing

[381] From conclusions described in this chapter as well as interdisciplinary discussion.

wildland fire hazard. Thinning will improve forest health and make stands of trees more resistant to insects and disease. Vegetation diversity will increase with more acres of both early and late seral vegetation and more acres of aspen, oaks and willows. Soil productivity will be improved by subsoiling areas with residual soil compaction. Renewal of riparian vegetation will improve stream channel processes, which will have a beneficial effect toward meeting the Aquatic Conservation Strategy Objectives. Road density will be reduced and scenic quality along the Pilgrim Creek Road will be improved. Recreation visitor safety will be improved with the removal of hazard trees in developed and dispersed recreation sites.

Unavoidable Adverse Effects

Implementation of any of the alternatives, including no action, could cause some adverse environmental effects that cannot be effectively mitigated or avoided. Unavoidable adverse impacts often result from managing the land for one resource at the expense or condition of other resources. Some adverse effects are short-term and necessary to achieve long-term beneficial effects. The application of Forest Plan standards and guidelines and resource protection measures are intended to limit the extent, severity and duration of potential impacts.

No action will have an adverse affect on fuel loading and fire hazard. Over the next ten years, fuel loading of 25 to 50 tons per acre will accumulate on about 22 percent of the project area or about 800 acres. These acres will be at high risk of causing a stand replacing fire that could destroy several hundred, if not several thousand acres of surrounding forest. Forest health will be adversely affected on about 3500 acres as root disease centers continue to spread and weaken trees, making them susceptible to insect infestation.

Regeneration harvest treatments will remove dying trees from approximately 415 acres, creating openings on the landscape of up to 40 acres in size, including openings in riparian reserve uplands. Even though these areas will be reforested, creating openings in the forest is seen by some as an adverse effect to the environment. Also, removing dying trees from the forest can be considered and adverse impact to snag dependent wildlife species.

Regeneration harvest and meadow and aspen restoration will reduce the amount of late-successional forest by less than 1 percent (535 acres total) in each of the two fifth-field watersheds affected by the project. Even though the watersheds will remain above the 15 percent threshold, some will consider this an adverse impact.

Approximately 670 acres of marginal dispersal habitat for the Northern Spotted Owl will be “removed” (temporary reduction of canopy closure below 40 percent) and approximately 844 acre of marginal dispersal habitat degraded in the short-term in a critical habitat unit. Even though the entire project area is considered marginal Northern Spotted Owl habitat and no owls have ever been found to inhabit the project area, this is considered an adverse effect to Northern Spotted Owl critical habitat.

Approximately 130 acres of commercial forest lands will be lost to long-term timber production where landings, main skid trails and new roads are constructed. Although these areas are necessary for conventional ground based logging operations and the acres lost are within Forest Plan standards, some will see this as an adverse impact to the environment.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irreversible commitments of resources are permanent losses of non-renewable resources.

Irretrievable commitments are those that are lost for a period of time, such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road. Irretrievable commitments of resources are temporary losses of renewable resources.

With implementation of this project, there are no irreversible commitments of forest resources. The irretrievable commitment of resources for the action alternatives includes:

- The temporary loss of productive timber lands from creation of landings, main skid trails (approximately 130 acres) and new permanent roads (approximately 0.6 acres).
- The temporary loss of approximately 670 acres of marginal dispersal habitat for the Northern Spotted Owl within a critical habitat unit. This loss will be regained in 5 to 15 years as thinned stands, mainly the 785 acres of plantations, grow into suitable dispersal habitat.

Legal and Regulatory Compliance

NEPA at 40 CFR 1502.25(a) direct “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with… other environmental review laws and executive orders.” The proposed action and alternative must comply with environmental laws, as well as direction provided to agencies through executive orders.

Principal Environmental Laws

The following laws contain requirements for protection of the environment that apply to the proposed actions and the alternatives:

Endangered Species Act

See Threatened and Endangered Species Section, Chapter 3.

Clean Water Act

See Hydrology Section, Chapter 3.

Clean Air Act

See Air Quality Section, Chapter 3.

National Historic Preservation Act

See Heritage Section, Chapter 3.

National Forest Management Act

The National Forest Management Act requires projects to be consistent with the Forest Plan, and to make the following findings [16 U.S.C. 1604 (g)(3)(E)]:

1. **Soil, slope, or other watershed conditions will not be irreversibly damaged;**
   See Soils and Hydrology Sections of Chapter 3.
2. **There is assurance that such lands can be adequately restocked within five years after harvest;**
   All areas proposed for tree planting have been review by a certified silviculturist and a soil scientist to ensure adequate soils for planting and growth of conifer seedlings.
3. **Protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat;**
   See Hydrology Section, Chapter 3 and Design Criteria Common to All Action Alternative, Chapter 2.
4. **The harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber.**
   See Purpose and Need, Chapter 1.

A Responsible Official may authorize project and activity decisions on National Forest administered lands using clearcutting, seed tree cutting, shelterwood cutting, and other cuts designed to regenerate an even-aged stand of timber as a cutting method only where:

1. **For clearcutting, it is determined to be the optimum method, and for other such cuts it is determined to be appropriate, to meet the objectives and requirements of the relevant land management plan.**
   All harvest units have been reviewed by a certified silviculturist. Some units have also been review by the forest entomologist and pathologist to verify the presence and extent of insect and disease infestations. Also see the Forest Plan Direction Section, Chapter 1.
2. **The interdisciplinary review as determined by the Secretary has been completed and the potential environmental, biological, esthetic, engineering, and economic impacts on each advertised sale area have been assessed, as well as the consistency of the sale with the multiple use of the general area.**
   See Chapters 3 and 4.
3. **Cut blocks, patches, or strips are shaped and blended to the extent practicable with the natural terrain.**
   See Alternatives maps.
4. **There are established according to geographic areas, forest types, or other suitable classifications the maximum size limits for areas to be cut in one harvest operation, including provision to exceed the established limits after appropriate public notice and review by the responsible Forest Service officer one level above the Forest**

Service officer who normally would approve the harvest proposal; provided, that such limits shall not apply to the size of areas harvested as a result of natural catastrophic conditions such as fire, insect and disease attack, or windstorm.
See Forest Plan Standards and Guidelines, page 4-27.

5. **Such cuts are carried out in a manner consistent with the protection of soil, watershed, fish, wildlife, recreation, and esthetic resources, and the regeneration of the timber resource.**
   See Design Criteria Common to all Action Alternatives, Chapter 2.
6. **Even-aged stands of trees scheduled for regeneration harvest generally have reached culmination of mean annual increment of growth, unless the purpose of the timber cutting is excepted in the land management plan.**
   See Purpose and Need, page 5.

Forest Plan Amendment & Analysis

Modify Forest Plan 4-61 "Emphasize green-tree and snag retention in Matrix management" (GTR) to read;

For Pilgrim Vegetation Management Project regeneration harvest treatment units 14-408, 419, 420, 438, 439, 44 & 442, 16-46 & 466, 8-411, 412, 413, 41 & 415 (approximately 255 acres) the largest healthiest ponderosa pine trees and all other conifer species will be retained. Adequate treatment of these units to control the annosus and black stain root infection will require that, less than15 percent of the area associated with cutting units can be retained[382].

Specific measures for green tree retention and snag retention follow. These measures are to be applied to the treatment units listed above for implementation of these projects, only. Upon completing these Projects the 1995 Forest Plan standard and guide will apply to these treatment units.

1. Retain healthy green trees up to 15 percent of the area associated with each cutting unit (stand). It is estimated the less than 15 percent of the area will be retained due to existing mortality and treatment needs to control the root disease.
2. Trees will be retained as individuals and patches where feasible to meet project objectives.
3. As a minimum, snags will be retained within these harvest units at 1.5 per acre greater than 15 inches in diameter and 20 feet in height.

Significance Analysis (16 U.S.C. 1604(f)(4), 36 CFR 219.10(f) 1982: Forest Service Handbook FSH 1909.12.5.32 (WO Amendment 1909.12.91-1, 8/3/92) directs consideration of significance of change to a forest plan. The following factors are used to determine whether the proposed forest plan amendment is significant or not significant.

a. **Timing**. Amendment of the GTR standard and guideline of the Forest Plan direct the regeneration harvest of approximately 255 acres in cutting units 14-408, 419, 420,

[382] Pilgrim Vegetation Management Project FEIS page 38

438, 439, 440 & 442, 16-461 & 466, 8-411, 412, 413, 41 & 415 of the Project. This change is only in effect for the treatment duration of these cutting units. Once harvest of these units is complete the 1995 Forest Plan standard and guide will apply. This change will take place prior to revision of the Forest Plan.

b. **Location and Size**. These regeneration harvest units (14-408, 419, 420, 438, 439, 440 & 442, 16-461 & 466, 8-411, 412, 413, 414 & 415) are within the Matrix (250 acres) and Riparian Reserve (5 acres) land allocations on the McCloud Flats[383]. They range in size from 5 to 40 acres (average of 18 acres) and total approximately 255 acres. The Project will treat approximately 3,800 acres. The assessment area is 8,500 acres. Units 16-461 & 466 are in the Ash Creek 5th Field Watershed and total about 12 acres or less than .0001 percent of the commercial forestlands and less than .0001 percent of the late successional forest in the watershed. The other units are in the Upper McCloud Fifth Field Watershed and total about 243 acres or less than .004 percent of the commercial forestlands and less than .02 percent of the late successional forest in the watershed.

c. **Goals, Objectives, and Outputs**. The GTR amendment would not alter long-term relationships between the levels of goods and services projected by the forest plan. The amendment would not alter timber outputs projected by the Forest Plan because it does not adjust the capable, available, and suitable land base. The amendment would not significantly alter the amount of very old forests used by dependent organisms,[384] because treatment would retain healthy trees up to 15 percent within the cutting units. These units are dispersed throughout the project area and are surrounded by predominantly late-successional forest.

d. **Management Prescription**. The amendment would change the GTR standard and guideline for cutting units 14-408, 419, 420, 438, 439, 440 & 442, 16-461 & 466, 8-411, 412, 413, 41 & 415 of the Project, only. The amendment would not apply to future decisions for those cutting units.

Conclusion: The amendment to change Forest Plan 4-61 “Emphasize green-tree and snag retention in Matrix management” is not a significant change to the forest plan, because;

- It is a site-specific amendment that applies only to the identified Project cutting units.
- It is a small portion of the total project and a very small portion of the watersheds and late successional forests in those watersheds.
- It is minor in context of the achievement of Forest Plan goals and objectives.
- It will make improvements towards meeting the goals of the Forest Plan by controlling a root disease problem that would result in greater losses to forest cover if no action is taken[385].

383 Pilgrim Vegetation Management Project FEIS page 2
384 Forest Plan 4-61
385 Pilgrim Vegetation Management FEIS pages 30-32

The proposed Mudflow project also includes the same forest plan amendment for approximately 228 of regeneration and sanitation harvest units in the Upper McCloud Fifth Field Watershed. This is about 8.0 percent of the total harvest units proposed for the Mudflow Project. Cumulatively, there would be approximately 480 acres of harvest in this watershed that would not meet the Green Tree Retention Standard. This represents approximately .009 percent of the commercial forest land in the watershed and approximately .04 percent of the late-successional forest in the watershed. The addition of about 228 acres of harvest not meeting the GTR Standards in the Upper McCloud Watershed does not change the above analysis and conclusions.

Executive orders

The following executive orders provide direction to federal agencies that apply to proposed action and alternatives:

Invasive Species, Executive Order 13112 of February 32, 1999

See Invasive Weed Section, Chapter 3 and Design Criteria Common to All Action Alternatives, Chapter 2.

Migratory Birds, Executive Order 12962 of January 10, 2001

See Neotropical Birds Section, Chapter 3.

Environmental Justice, Executive order 12898 of February 11, 1994

This order requires an assessment of whether implementation of this decision would disproportionately affect minority or low-income populations. Although there are a high proportion of lower income people living in this portion of the State, as well as a number of tribal groups of Native Americans, neither action alternative will affect them any differently than any other member of the public. Adverse environmental effects and effects on human health are minimal. Tribal groups have been contacted about proposed actions on the Forest and did not express any interest in this particular project.

Special Area Designations

There are no Research Natural Areas, Inventoried Roadless Areas, Wilderness or Wilderness Study Areas, Wild and Scenic Rivers or municipal watersheds within or adjoining this proposed project.

Federal, regional, state, and local land use plans, policies, and controls

- All timber harvest sales that could affect water quality are submitted to the Central Valley Water Quality Control Board for coverage under the Timber Harvest Waiver (Resolution No. R5-2005-0052). Timber sales are submitted when they are sold. Due to the lack of surface water flow and the low probability of downstream impacts to water quality and riparian habitat, this project will not be submitted to the board.

- All vegetation burning is done under permits from the Siskiyou County Air Pollution Control District.

Energy and natural or depletable resource requirements and conservation potential

Consumption of fossil fuels would occur with the action alternatives during logging and timber hauling as well as road and fuel treatment actions. There are no unusual energy requirements associated with the action alternatives nor is it the type of proposal that provides an opportunity to conserve energy at a large scale. Wood is a renewable resource. With the proper application of Forest Plan standards and guidelines and design criteria described in Chapter 2 for soils, water, wildlife, forest vegetation, and other resources, the project would conserve resources, as described in this chapter.

Urban quality, historic and cultural resources, and the built environment

Historic and cultural resources will be protected (flagged and avoided), as described under the Heritage section. There would be no changes to urban quality or the built environment with this project.

Chapter 4: Consultation and Coordination

Preparers and Contributors

The Forest Service consulted with the following individuals, federal, state, and local agencies, tribes, and non-Forest Service persons during the development of this environmental impact statement:

Federal, State, and Local Agencies

U.S. Environmental Protection Agency
U.S. Fish and Wildlife Office, Red Bluff, CA
California Department of Fish and Game, Redding, CA
California Department of Forestry and Fire Protection, Cascade Region Office, Redding, CA
California Water Quality Control Board, Central Valley Division, Redding, CA
Siskiyou County Air Pollution Control District, Yreka, CA

Native American Tribal Organizations

Pit River Tribe
Winnemem Wintu

Interdisciplinary Team Members

William Banek: 28 years experience as a professional Archaeologist. BA, Anthropology, CSU, Sacramento; responsible for compliance with Section 106 of the National Historic Preservation Act and its implementing regulations 36 CFR Part 800. Responsible for archaeological reconnaissance and report.

Emelia Barnum: Ten years experience in environmental planning and project development, National Environmental Policy Act environmental analysis documentation, and team leading. Bachelor of Science in Zoology. Planning and NEPA sufficiency specialist. Responsible for team leading and writing and editing the Draft Environmental Impact Statement.

Julie Cassidy: 25 years as a professional archaeologist. BA in Near Eastern Studies and Archaeology from U.C. Berkeley and an MA in Anthropology from Chico State University. Has conducted numerous archaeological excavations, written historic contexts, evaluated significance of traditional cultural properties and many prehistoric, and historic archaeological site. Responsible for project coordination with Native American Tribes and Nations.

Jonna Cooper: Fifteen years experience as a Soil Scientist, including 5 years of field mapping. Bachelors of Science in Soil Resource Management, emphasis in mapping and soil taxonomy. Concurrently, 11 years experience in GIS. Responsible for soils input and analysis. Provided coordination and technical advice for GIS mapping information.

Debbie Fleming: Twenty four years experience in timber stand improvement, sale preparation and silviculture. Bachelors of Science in Wildland Recreation Management/Forestry and Silvicultural Institute (certified silviculturist) Expertise as a Certified Silviculturist. Responsible for vegetation analysis and silvicultural prescriptions.

Steve Funk: Project developer and planner to scoping, now retired.

Heidi George: Hydrologist, 15 years Forest Service, 2 years Calif. Dept. of Water Resources. MS in Watershed Science, BS in Geology. Publication: George, H. and R.C. Sidle, 1995. *Geomorphic and Pedologic Influence on Small-Scale Ephemeral Channel Dimension in Rangelands*. AWRA Paper Number 94085 · Volume 31, No. 6. Responsible for hydrology input and analysis. Responsible for hydrology input to the project.

Ed Hatekeda: Fifteen years experience in public uses and facilities planning and operations at the local level; including environmental documentation and social analysis. Eleven years experience in timber management planning and preparation. Responsible for public use input and analysis for the project.

Jeff Huhtala: Twenty-five years experience as Civil Engineering Technician, transportation planner, and interdisciplinary team member providing technical engineering support and planning for watershed and environmental analyses. AS in Forest Technology 1976 and graduate of Forest Engineering Institute #27, Oregon State University, 1985. Responsible for leading the roads analysis process and for project transportation planning.

Stephanie Joyce: Fourteen years experience in scenery analysis, recreation planning and design. Bachelors of Science in Landscape Architecture, Cal Poly San Luis Obispo. Responsible for scenery management, recreation site analysis and design, and Accessibility Coordinator, focusing on integrating the human dimension into the environment. Responsible for Scenic Assessment of the project.

Francis Mangels: Thirty-three years experience in range, wildlife, forestry, soils, fisheries, and botany. Bachelors of Science in Forestry and Masters of Science in Zoology. Worked on this district 24 years, currently serving as range conservationist and district biologist. Responsible for wildlife input and analysis for the project.

Dennis Poehlmann: Twenty two years experience in timber sale preparation, administration and planning. Ten years experience in lands and minerals management. Bachelor of Science in Forestry. Unit Planning Officer and co-team leader responsible for completion of the FEIS.

Rhonda Posey: Twelve years experience in botany and vegetation ecology. Bachelor of Science in Agriculture with an emphasis on Range Management. Six years in vegetation mapping and classification and six years providing botanical and ecology input to timber sales, restoration projects and other projects. Also, 3 years as the greenhouse manager for Mt. Shasta Greenhouse, which grows plants for restoration projects. Responsible for the botanical input and analysis for this project.

Donna Sager: Nineteen years experience in fires and fuels management. Integrated experience in timber sale layout, silvicultural treatment implementation, and wildlife surveys. Focus on prescribed fire and fuels reduction treatment planning and implementation. In process of obtaining professional series accreditation in fire and fuels management. Responsible for the fuels input and analysis for this project.

Other Contributors and Technical Support

Peter VanSustren: Forest Service Soil Scientist for 28 years with 25 years stationed at the McCloud Ranger District. He holds a Bachelors of Science in Natural Sciences from the University of Wisconsin (1975). His expertise is in soil mapping, mitigations of impacts on the soil resource and ecosystem restoration.

Joe White: Twenty-two years experience in Geographic Information Systems (GIS) and fire and fuels management. GIS Cartographic Technician responsible for producing map products for Forest Fire Management, NEPA/ EIS projects, Forest Watershed Analysis and District timber sales contracts maps.

Steve Bachmann: Hydrologist, 13 years Forest Service, 3 years U.S. Geological Survey. MS in Earth Science, Colorado State University, 1994. BS in Parks and Recreation Administration, Ohio State University, 1988. Responsible for hydrology input and analysis

Kelly Wolcott: Forest Wildlife Biologist with the Shasta-Trinity National Forest since 2003. Before that, he was an instructor at the National Conservation Training Center and a senior consulting biologist with the U.S. Fish and Wildlife Service in Red Bluff, California. He has worked as a wildlife biologist for approximately 25 years and has a Master's Degree in Forest Ecology from the University of Washington with a specialty in Wildlife Habitats. Responsible for review and revisions to the project biological assessment and biological evaluation.

David E. Schultz: B.S. Forestry, 1968, S.U.N.Y. Coll. Forestry, Syracuse, N.Y. Ph.D. Forest Entomology, 1976, S.U.N.Y. Coll. Forestry, Syracuse, N.Y. Advanced Course in Silviculture and Forest Ecology (Silvicultural Certification), 1981, University of California Extension, Berkeley. Entomologist, 1977-1988, USDA Forest Service, San Francisco, CA (Regional Office, Region 5). Entomologist, 1988-Present, USDA-Forest Service, Redding, CA. (Shared Services Area: Mendocino, Six Rivers, Klamath and Shasta-Trinity NFs). Total 29 years employment as a Forest Service Entomologist. Field reviewed project and provided input to silvicultural prescriptions.

Pete Angwin: Plant Pathologist with the US Forest Service for 17 years. BA in Biology, Colgate University, 1978. MS, PhD in Plant Pathology, Oregon State University, 1985, 1989. As Plant Pathologist for the four National Forests of northwest California, Pete provides information and advice on a wide variety of disease and insect management situations. Field reviewed project and provided input to silvicultural prescriptions.

Circulation of the Final Environmental Impact Statement

This final environmental impact statement will be distributed to the following government agencies as well as to those organizations and individuals who submitted comments during the 45 day comment period. Other parties on the project mailing list will get a summary of the FEIS and be notified that the full document is on the Forest Web Site.

Federal Agencies

U.S. Fish and Wildlife Service, Red Bluff Office

Director, Planning and Review
Advisory Council on Historic Preservation

Deputy Director
USDA APHIS PPD/EAD

Natural Resources Conservation Service
National Environmental Coordinator
U.S. Department of Agriculture

USDA, National Agricultural Library
Head, Acquisitions & Serials Branch

National Marine Fisheries Service
Habitat Conservationists Division
Southwest Region

U.S. Army Engineer Division, South Pacific
CESPD-CMP

Environmental Protection Agency
Region 9
EIS Review Coordinator

Director, Office of Environmental Policy and Compliance
U.S. Department of the Interior

U.S. Coast Guard (USCG)
Environmental Impact Branch
Marine Environmental and Protection Division

Western-Pacific Region
Regional Administrator
Federal Aviation Administration

Division Administrator
Federal Highway Administration

U.S. Department of Energy
Director, Office of NEPA Policy and Compliance

State Agencies

California Department of Fish and Game

California Water Quality Control Board, Central Valley Division

County

Siskiyou County Board of Supervisors, Jim Depree, Natural Resources Advisor(copy)

Mt. Shasta Public Library (copy)

Organizations

Pete Harrison, Californians for Alternatives to Toxics

Kyle Haines, Klamath Forest Alliance

Michelle Berditschevsky, Mount Shasta Bioregional Ecology Center

Scott Greacen, Environmental Protection Information Center (copy)

Denise Boggs, Conservation Congress (copy)

George Sexton, Klamath-Siskiyou Wildland Center

Richard Svilich, American Forest Resource Council (copy)

American Indian Tribes and Nations

Michelle Berditschevsky, Pit River Tribe Environmental Department

Caleen Sisk-Franco, Winnemem Wintu Tribe (copy)

Jessica Jim, Tribal Chair, Pit River Tribe

Individuals

Joy Newcom

Chuck and Denise MacDonald

Tom Glunt

Joe and Michael Wirth

Steve Courtney, Sierra Pacific Industries (copy)

Regina Chichizola

Claude Douglas

Michael Taff

Charles Picard

Katy Ostroski

Robert Diment

Wes Truax

Steve Funk (copy)

Appendix A: Photo Gallery

Photo 1.Trees weakened by root disease in harvest and replant areas are being killed by bark beetles. Mortality is approaching stand replacement levels with pockets of dead trees ranging in size from 1 to 5+ acres with up to 40 dead trees per acre interspersed throughout the entire stand area.

Photos 2a and 2b. Examples of tree mortality within Harvest and Replant Stands #412 (left) and #414.

Photo 3. Existing condition between Pilgrim Creek road and Elk Flat.

Photo 4. This photo is an example of a Mature Stand Thin with an underburn, a few years post treatment. The proposed Mature Stand Thin units will look similar to this.

Photo 5. Desired Future Condition - Restore Elk Flat, retain larger trees.

Photo 6. View of Project Area from Mt. Shasta

This photo was taken in approximately 1990. It was the most illustrative photo on file for the project area.

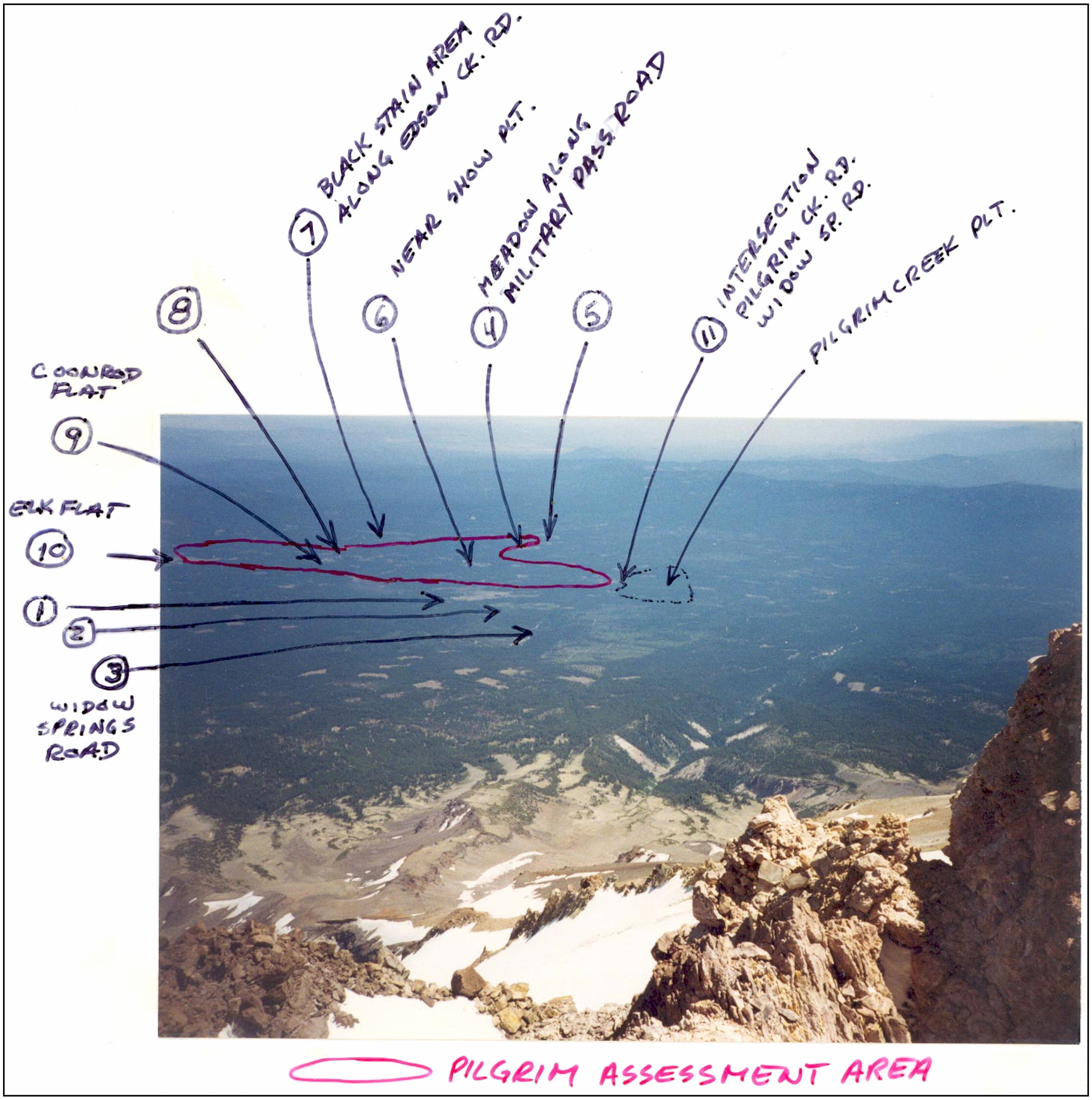


Photo Legend

1 - Unnamed – 463 acres - Large private plantation established 1985-1990. This area appears freshly cleared and planted on 1990 aerial photos. On 2003 aerial photos this area is a well-stocked plantation and probably less impact from the top of Mount Shasta today.

2 - Unnamed - Large private plantation established 1980-85. This area appears freshly cleared and planted on 1985 aerial photos. On 2003 aerial photos this area is a well-stocked plantation and probably less impact from the top of Mount Shasta today.

3 - Widow Springs Road - This road is visible on the photograph because of its alignment with the top of Mount Shasta

4 - Meadow along the Military Pass Rd. (43N19) - This is a large natural meadow with scattered large trees. It has generally stayed in the same condition since 1990 – although there appears to be minor encroachment and a slight increase in tree size.

5 - Plantation in Ash Creek Sink - In 1980 this was open meadow (probably rabbitbrush). It was converted to plantation prior to 1985. Today it is a well-stocked 20 yr. old plantation and probably not as obvious as on the photograph

6 - Near Show Plantation - This was a large natural meadow in 1990. There has been significant planting and natural encroachment since then and it is probably much less obvious from the top of Mount Shasta. I estimate 50% of the area in 1990 remains as fairly open forest (~30% cover)

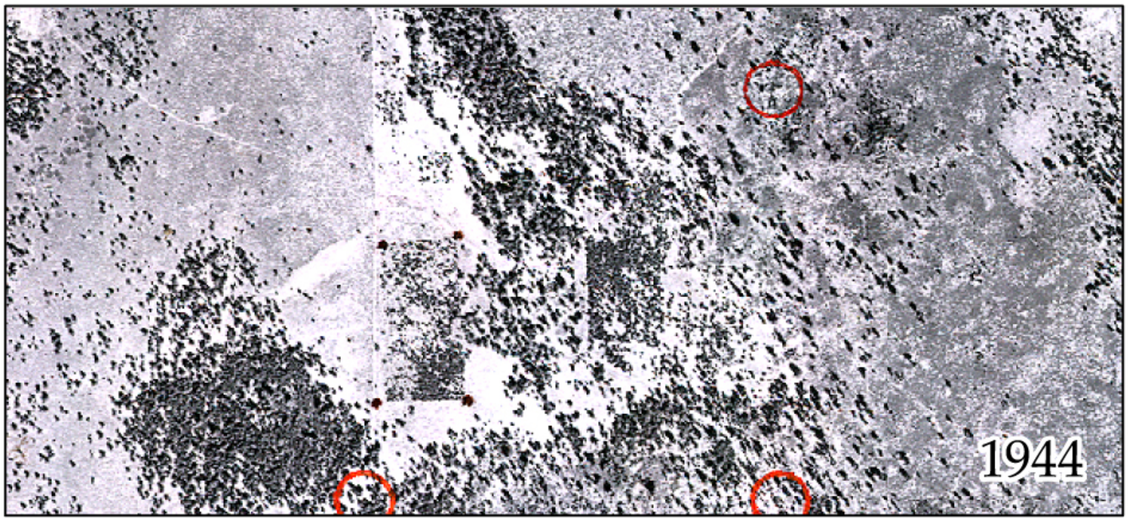
7 - Black Stain Area - This is a very large clearcut created in 1975-80 in an attempt to control black stain root disease. It would have been obvious when the photo was taken but has been gradually “greening up” and would be less obvious from the top of Mount Shasta today.

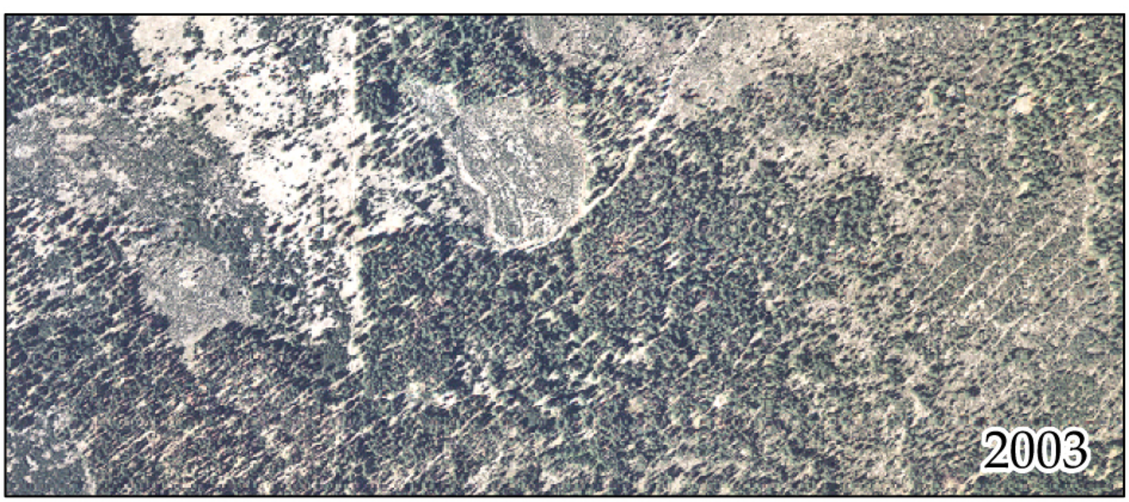
8 - Airport Pasture – 61 Acres - This large natural meadow had fewer trees than Coonrad Flat in 1990 but natural conifer encroachment and development of surrounding plantations would make it less obvious from the top of Mount Shasta

9 - Coonrod Flat - This natural meadow has undergone significant conifer encroachment since the photograph was taken and is probably much less obvious today from the top of Mount Shasta

10 - Elk Flat - This natural meadow has undergone significant conifer encroachment since the photograph was taken and is probably much less obvious today from the top of Mount Shasta.

Pilgrim Vegetation Management Project
Aerial Photography Sequence





Appendix B: Responses to Comments Received During Scoping and Significant Issues

Scoping Summary - Pilgrim Project

We received 11 written letters in response to the Notice of Intent, spring 2005 scoping letter and the spring 2005 ads in the Record-Searchlight and Mount Shasta Herald.

1. Michelle Berdichevsky, representing the Pit River Tribe. (recd. by FAX)
2. Michelle Berdichevsky, a separate faxed letter representing the Mount Shasta Bioregional Ecology Center (MSBEC).
3. Pete Harrison representing Californians for Alternatives to Toxics. (CATS) (Received by FAX and E-mail)
4. Kyle Haines, representing the Klamath Forest Alliance Klamath Basin and Eastside Forest Protection Program. (KFA) (Received by post office and E-mail). Denise Boggs of Wildlaw and Conservation Congress is listed as co-author, but did not sign the hard copy.
5. Scott Graecen, representing the Environmental Protection Information Center (EPIC). (Received by E-mail). George Sexton of Klamath Siskiyou Wildlands Center, and Kimberley Baker of Klamath Forest Alliance are listed as coauthors.
6. Michael Taff, a concerned citizen, supporting the project.
7. Katy Ostrowski, a concerned citizen, supporting the project.
8. Claude C. Douglas, concerned citizen and inholder, supporting the project.
9. Charles and Cleo Picard, concerned citizens, supporting the project.
10. Steve Courtney, of Sierra Pacific Industries (SPI) supporting the proposed action but recommending inclusion of all overstocked stands.
11. Joy Newcom, a concerned citizen, recommending conversion of National Forests to National Parks.

Two telephone comments were received.

1. John Kessler, representing the local Society of American Foresters, supporting the project and requesting information.
2. Steve Courtney, representing Sierra Pacific Industries, supporting the project.

Also received telephone requests for information from Stacy Stanish, of California Dept. of Fish and Game, Jim Pentrack, former representative of Klamath Forest Alliance, and George Sexton of Klamath-Siskiyou Wildlands Center.
Also received a request for information from Alex Breitler of the Record-Searchlight.

The following table summarizes comments received. Significant issues are in boldface.

Comments go through two basic screens

1. Comments identify an issue if they identify a point of disagreement, are relevant to the proposed action, and discuss effects of the proposed action.
2. Issues are significant unless they are already decided by law, regulation or higher-level decision and outside the authority of the decision-maker, or are conjectural and not supported by scientific evidence.

Pilgrim Vegetation Management Project, Scoping Comments					
Comment #	**Submitted by:**	**Comment**	**Issue?**	**Significant issue?**	**Response**
1	Pit Tribe	The proposed action could affect traditional Pit River territory. Tribal consultation should be initiated.	No	No	Consultation with the Pit River Tribe has been initiated.
2	MSBEC	Both the harvesting and the reforestation in the proposed action could adversely impact the diversity of understory vegetation.	Yes	No	Site preparation for tree planting will occur only where needed, using a brush rake (versus a blade) to minimize vegetation disturbance. Trees will be hand planted to reduce soil and vegetation disturbance. Slash will only be mechanically piled in units where needed. Native grass and forb seeds will be collected for seeding disturbed areas.

Pilgrim Vegetation Management Project, Scoping Comments

Comment #	Submitted by:	Comment	Issue?	Significant issue?	Response
3	3 EPIC	The project could harm or extirpate native plant species, including native bunchgrass.	Yes	No	Some plant species may be harmed depending on the treatment prescribed for a certain unit. Plant species are common and are in no danger of extirpation. Some treatments will improve habitat for some species by reducing canopy cover. Grass species generally increase in thinned areas, including bunch grasses. Native, perennial grass seed will be collected and used to seed skid trails and landings once the project is completed. Mitigation measures for improving diversity are listed below: • Tree planting in many units will be hand planted to reduce soil and vegetation disturbance. • Slash will only be mechanically piled where necessary. • Native grass and forb seeds will be collected for seeding in disturbed areas. • Aspen will be released from conifer competition in one stand of about 11 acres, and six groups of less than one acre within other stands. Black oak will be released from some conifer competition. In units where it is found, oaks will be left as a favored species. • Conifers: White fir and incense cedar will generally be favored, but some will be harvested. A few suppressed and intermediate sugar pines may be harvested if there are healthier ones in the stand. Douglas fir will be retained. It will be planted in appropriate units. • Indian tobacco, grass seed, shrubs and other forbs: Tobacco seeds were gathered this season. Some seed will be grown in the greenhouse in Mt. Shasta and the rest will be scattered in areas of the project. Grass and forb seeds will be collected for seeding skid trails and landings. Shrub cuttings and/or seeds will be collected, gown and out planted where appropriate to increase species diversity and wildlife habitat. Shrubs may include but are not limited to chokecherry, serviceberry, currents, gooseberry and rose.

Pilgrim Vegetation Management Project, Scoping Comments					
Comment #	**Submitted by:**	**Comment**	**Issue?**	**Significant issue?**	**Response**
4	KFA CATS	The Project could spread noxious weeds through skidding and landing construction, and reduction of canopy closure.	Yes	No	This issue is addressed in the Noxious Weed Risk Assessment prepared for this project. Mitigations for noxious weeds include: • Equipment washing clauses will be included in all contracts. • Old landings with known bull thistle populations will be cleared prior to plants flowering and going to seed. Bull thistle generally starts to flower in July and has gone to seed by September or October. This will reduce the spread of seed by equipment and wind dispersal. • Heavily disturbed sites such as landings and skid trails will be seeded with native grasses and forbs. • Annual monitoring of the project area will be conducted for three seasons after project completion. Monitoring and hand treatment will be done concurrently.
5	CATS	Borax could adversely impact non-target vegetation.	Yes	No	The use of Borax (Sporax is the formulation registered for forest use) is specified by FSM 3409.11 and any action alternative would include the proper timber sale C clause (C6.412) for specified use. Borax (sodium tetraborate decahydrate) is a registered pesticide (fungicide) EPA Reg. No. 2935-501, EPA Est. No. 66196-CA-1. Borax is applied to freshly cut stumps at a rate of one pound per 50 square feet of stump surface. This is equivalent to one pound of borax on 60 twelve inch stumps (Sporax, Wilbur-Ellis Label). Borax as used in forestry is identical to the material sold throughout North America as a household cleaning agent[1]. Monitoring data has not indicated elevated levels of boron in foliage, litter or soil adjacent to the stump[2] and therefore the comment is not supported by scientific evidence.
6	**MSBEC** **KFA**	**Removal of trees greater than 20 inches would adversely impact habitat for the northern spotted owl, goshawk and other old-growth dependent species.**	Yes	Yes	With respect to specific diameter limits for harvest, there is no such restriction in the Forest Plan. Imposing such a limit would be over restrictive and would not achieve the desired conditions by leaving many stands overstocked and preventing the removal of low vigor and dead/dying trees greater than 20 inches that are undergoing mortality from root disease and bark beetle mortality.
7	**MSBEC** **EPIC**	**The proposed action could adversely affect critical habitat for the Northern Spotted Owl.**	Yes	Yes	Impacts on NSO Critical Habitat will be evaluated in the BA.

[1] Dost, Frank N., et al. 1996, *Assessment of Human Health and Environmental Risks Associated with Use of Borax for Cut Stump Treatment* USDA-Forest Service. Page 1.
[2] Dost, Frank N., et al. 1996, *Assessment of Human Health and Environmental Risks Associated with Use of Borax for Cut Stump Treatment* USDA-Forest Service. Page 11.

Pilgrim Vegetation Management Project, Scoping Comments					
Comment #	**Submitted by:**	**Comment**	**Issue?**	**Significant issue?**	**Response**
8	**KFA**	**Thinning and/or sanitizing to less than 60% crown closure will have an adverse impact on dispersal habitat for the northern spotted owl and forage habitat for the goshawk.**	Yes	Yes	Thinning to 60% crown closure (approximately 200 square feet basal area/acre) is not an appropriate or sustainable density for pine stands when the stated purpose and need for the project is forest health. Research by Schmid and Mata (Research Note RM-515) and Sartwell and Stevens (Journal of Forestry 1975) have shown that stands carrying greater than 120-150 square feet of basal area/acre in the pine component are increasingly susceptible to bark beetle attacks which can indiscriminately kill individual trees and/or groups of trees irregardless of size. Bill Oliver's research using SDI (Stand Density Index) as a corresponding measure has shown that stands with SDI's greater than 230 are in the zone of imminent mortality from bark beetles. Thinning to 200 sq ft/acre corresponds to an SDI range of 294 (avg dbh of 26") to 320 (avg dbh of 18") which are also well above the 230 level threshold. There has been significant bark beetle mortality already in stands within the project area some of which are included in current salvage sales and these areas were thinned to 60% canopy cover, Stand 311 (33 acres/98 harvest), Stand 208 (27 acres/90 harvest) Stand 443 (11 acres/90 harvest). Maintaining stand densities at 60% canopy cover would continue this current trend of increased beetle infestation and would require more frequent subsequent entries which would add to cumulative effects and soil compaction concerns.
9	KFA	Reducing crown closure below 60% will adversely impact thermal cover for game species.	Yes	No	Thermal cover is only critical on winter range for game species. This project is not on winter range.
10	**KFA** **EPIC**	**Removal of trees over 20" DBH and diseased trees could adversely impact snag-dependent wildlife. (MIS snag guild)**	Yes	Yes	Impacts of the project on snag-dependent species will be addressed in MIS report.
11	**KFA** **EPIC**	**The proposed action could adversely impact MIS**	Yes	Yes	Potentially significant with regard to the Late-successional MIS guild and the snag-dependent guild.

Pilgrim Vegetation Management Project, Scoping Comments

Comment #	Submitted by:	Comment	Issue?	Significant issue?	Response
12	KFA EPIC	The cumulative impact of this project and others in the McCloud and Goosenest Districts, including private land, could adversely impact habitat for sensitive, threatened and endangered species	Yes	No	Cumulative impacts to TE&S species will be addressed in the BA and BE.
13	EPIC	Cumulative effect of proposed action, barred owl competition and sudden oak death could adversely impact NSO	Yes	No	There are few, if any, oaks in the project area. Barred owls are not present.
14	EPIC	The proposed action could adversely impact the Pacific Fisher	No	No	No Pacific Fisher habitat present in the project area.
15	**EPIC**	**Harvest and Replant regeneration areas would adversely affect late-successional species by creating fragmentation**	Yes	Yes	Potential significant impacts will be addressed in the BA,BE and MIS reports.
16	KFA EPIC	Recent changes to the planning rules eliminating the MIS survey requirements may be illegal.	No	No	Not within the scope of the project.
17	KFA	The proposed action could adversely impact S&M species.	Yes	No	The project is outside the range or does not contain habitat or individuals of survey and manage species.

Pilgrim Vegetation Management Project, Scoping Comments					
Comment #	**Submitted by:**	**Comment**	**Issue?**	**Significant issue?**	**Response**
18	EPIC	Regeneration and Salvage harvests will reduce coarse woody debris below the natural range of variability.	Yes	No	Mitigation measures will provide for meeting Forest Plan standards and guidelines for coarse woody debris. Historically, frequent wildland fire regulated the amount of coarse woody debris and snags. It was rare that any sizable areas would have escaped fire for more than a few decades. The frequent fires would have burned with varying severity related to topography and weather. The probable result was a landscape with many snags and logs clustered both in time and in space and very sparsely distributed in the intervening time and space[3].
19	EPIC	Ground based logging and road construction could cause permanent damage to soil	Yes	No	In thinning operations, forest canopy is retained. Organic cycling is uninterrupted and organic cover quickly recovers. Prescribed levels of coarse woody debris are retained. Soil disturbance on thinning units is caused by mechanical cutters that fall and bunch trees to create a desired spacing. The mechanical cutters have a minimal ground disturbance because they do not transport logs but merely cut and bundle. Skidder tractors carry the bundles of logs to the landings on designated skid trails. Bundled logs and designated skid trails greatly reduces the disturbed area. Thousands of acres have been treated similarly on the McCloud Ranger District over the past twenty years. Informal and subjective monitoring of soil compaction on other areas that have been thinned in past years on these sales shows little evidence of decease in soil porosity or increased soil density. An exception is landings and skid trail networks where they coalesce near landings. Skid trail networks within several hundred feet of landings bear many passes with loaded skidders. Although these areas are of limited extent, they often show considerable soil compaction. Landings and skid trails within 200 feet of landings are slated for soil rehabilitation with a winged subsoiler to alleviate soil compaction, where compaction is above threshold. Harvest and replant units will fall well below the natural vegetative cover, and thus, reduce the normal input of organic matter for a period of time following harvest. Past experience with regeneration on these soils indicates that this does not significantly affect long-term soil productivity. Road construction will likely cause permanent damage to the soil but it is of such a limited extent as to be insignificant.

[3] Skinner 2002. *Influence of Fire on the Dynamics of Dead Woody material in Forests of California and Southwestern Oregon*. In: Laudenslayer, W.F., Shea, P.J., Valentine, B.E., Weatherspoon, C.P., and T.E. Lisle technical coordinators. Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests. Gen Tech. Rep. PSW-GTR-181. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S> Department of Agriculture; 949 p. (p. 445-454). http://www.fs.fed.us/psw/publications/documents/gtr-181/.

Pilgrim Vegetation Management Project, Scoping Comments					
Comment #	**Submitted by:**	**Comment**	**Issue?**	**Significant issue?**	**Response**
20	MSBEC KFA	The proposed action could cause soil compaction, thereby increasing the problems from insect attacks.	Yes	No	Adhering to Best Management Practices (BMP's) will minimize compaction and subsequent root damage. The proposed action of thinning and thinning/sanitation will promote tree health and vigor which will reduce the stand's susceptibility to bark beetle related and root disease related mortality.
21	KFA	Skidding and landing use will cause root damage.	Yes	No	Skidding and landing use will be restricted to existing skid trails and landings where possible. Adhering to Best Management Practices (BMP's) will minimize erosion, compaction and subsequent root damage.
22	CATS	Borax may not be effective against annosus disease	Yes	No	The use of Sporax on cut stumps 14 inches and larger has shown to be effective in reducing stump infection from *H. annosum* and therefore this concern is mitigated with the project design[4].
23	CATS	Borax can cause health problems to applicators	Yes	No	Borax does not pose health problems to applicators as long as the safety measures on the label instructions are followed. The toxicity of borax is very low.
24	EPIC	No studies have shown that logging reduces losses from bark beetles	No	No	There is an extensive body of research that shows how thinning helps reduce the incidence of pest damage to a stand. Some examples are as follows: Cochran, P.H. and James W. Barrett. 1995. *Growth and mortality of ponderosa pine poles thinned to various densities in the Blue Mountains of Oregon*. Res.Pap. PNW-RP-483. Portland OR:U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 27 p. Fiddler, G.O., D.R. Hart, T.A. Fiddler, P.M. McDonald. 1989. *Thinning decreases mortality and increases growth of ponderosa pine in northeastern California*. USDA For. Serv. Res. Paper PSW-194. 7pp. Oliver, William W. 1995. *Is Self-Thinning in Ponderosa Pine Ruled by Dendroctonus Bark Beetles?* Pages 213-218 in Lane G. Eskew, ed. Forest Health Through Silviculture-Proceedings of the 1995 National Silviculture Workshop. USDA For. Serv. Gen. Tech. Rpt.RM-GTR-267 Sartwell, Charles and R.E. Stevens. 1975. *Mountain Pine Beetle in Ponderosa Pine - Prospects for silvicultural control in second growth stands*. J. of Forestry 73: 136-140.

[4] Kliejunas, John; Woodruff, Bill; *Pine Stump Diameter and Sporax Treatment in Eastside Pine Stands*, June 2004, Report # R04-01; USDA Forest Service, Pacific Southwest Region, Forest Health Protection

Pilgrim Vegetation Management Project, Scoping Comments					
Comment #	**Submitted by:**	**Comment**	**Issue?**	**Significant issue?**	**Response**
25	EPIC	Thinning may increase the reproduction of Ips beetles	Yes	No	The proposed action including biomass utilization and avoiding the piling of any green slash larger than 3-4 inches in diameter from January through June will prevent the buildup of Ips beetles.
26	EPIC	Dwarf-mistletoe is a valuable species for habitat creation. The project will adversely impact dwarf-mistletoe	No	No	This comment is not relevant to the proposed action because there is relatively little dwarf mistletoe in the project area and it is not a primary target in sanitation prescriptions.
27	KFA	Thinning could increase the incidence and spread of black-stain disease by creating favorable habitat for Hylastes macer, a probable insect vector of this disease.	Yes	No	Thinning could increase the habitat for *Hylastes macer*. *Hylastes macer* is a "suspected vector" of black stain root disease in ponderosa pine. This has not been proven so the rest of the statement is speculation[5]. The black stain disease strain in the project area is specific to ponderosa pine. Most of the research quoted by the commenter is not applicable because it refers to the Douglas-fir variant, which has different insect vectors. Steremnius, for example, does not occur in this area. It is acknowledged that Otrosina and Ferrell's study is relevant. However, follow up studies done on the Devil's Garden RD by John Kliejunas of the Regional Forest Health Protection Staff shows that five years after thinning, the most extensive blackstain infections were in the unthinned control plot. This indicates that stand density is more critical than disturbance factors. Any condition that results in excessive demand for moisture such as tree crowding or any condition that reduces the ability of the roots to supply water to the tree such as root disease can cause moisture stress and increase susceptibility to attack by bark beetles. The proposed action of thinning and thinning/sanitation will promote tree health and vigor which will reduce the stand's susceptibility to bark beetle related and root disease related mortality.
28	KFA	Ground based logging and road building has created conditions favorable for root diseases. The proposed action could worsen this problem.	Yes	No	This is a generic statement about "root diseases." Only black stain root disease in ponderosa pine, annosus root disease in ponderosa pine, and annosus root disease in fir are present in the project area. Ground based logging and road building are not noted as key factors in the initiation or intensification of these diseases[6].

[5] Dave Schultz, Forest Entomologist, Personal Correspondence, April 2005
[6] Dave Schultz, Forest Entomologist, Personal Correspondence, April 2005

Pilgrim Vegetation Management Project, Scoping Comments					
Comment #	**Submitted by:**	**Comment**	**Issue?**	**Significant issue?**	**Response**
29	KFA	Road construction can increase the incidence of black-stain disease.	Yes	No	The black stain disease strain in the project area is specific to ponderosa pine. Most of the research quoted by the commenter is not applicable because it refers to the Douglas-fir variant of the disease. "This statement would be true in Douglas-fir. There is no evidence this is true in ponderosa pine[7]."
30	KFA	Logging is likely to increase the incidence of annosus root disease	Yes	No	Creation of stumps that remain untreated would increase the incidence of annosus root disease. Treatment of stumps shortly after cutting with a borate compound will prevent most infections and therefore this concern is mitigated with the project design[8].
31	KFA	Seasonal restrictions are not effective in controlling the spread of annosus root disease.	No	No	Cutting during the hottest part of the year will reduce annosus root disease infections. Because there could be occasional summer showers and because there could be extensions of contracts, seasonal restrictions would not be as effective as the use of borate compounds on newly cut stumps. Seasonal restrictions in combination with the use of borate compounds on newly cut stumps would give some extra protection[9].
32	CATS	Seasonal restriction should be considered as an alternative to borax in combating annosus root disease	No	No	Cutting during the hottest part of the year will reduce annosus root disease infections. Because there could be occasional summer showers and because there could be extensions of contracts, seasonal restrictions would not be as effective as the use of borate compounds on newly cut stumps. Seasonal restrictions in combination with the use of borate compounds on newly cut stumps would give some extra protection[10].

[7] Ibid
[8] Ibid
[9] Ibid
[10] Dave Schultz, Forest Entomologist, Personal Correspondence, April 2005

Pilgrim Vegetation Management Project, Scoping Comments					
Comment #	**Submitted by:**	**Comment**	**Issue?**	**Significant issue?**	**Response**
33	KFA	The proposed action thinning in stands more than 50 years old would have a minimal impact in changing stand and tree growth.	Yes	No	John Tappeiner's research found stand density before age 50 is the most important factor controlling tree diameter growth in both young and old-growth Douglas fir stands in coastal and western Oregon. While this research implies thinning stands before age 50 maximizes potential tree diameter growth, other research has shown that thinning increases diameter increment of older trees as well. In fact Ponderosa pine responds to release at almost any age if it has sufficient crown to take advantage of the additional growing space[11]. Additional research includes the following publications relating to Ponderosa pine which is the dominant species throughout the Pilgrim project area. Fiddler, G.O., D.R. Hart, T.A. Fiddler, P.M. McDonald. 1989. *Thinning Decreases Mortality and Increases Growth of Ponderosa Pine in Northeastern California*. USDA For. Serv. Res. Paper PSW-194. 7pp. Cochran, P.H. and James W. Barrett. 1999. *Growth of Ponderosa Pine Thinned to Different Stocking Levels in Central Oregon: 30 Year Results*; Res.Pap. PNW-RP-508. Portland OR:U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 27 p.
34	KFA, EPIC	Regeneration harvests are likely to increase fire intensity.	Yes	No	There is no evidence to support that fire intensity would increase in the project area with the type of topography it represents. Ladder fuels will be removed which helps reduce fire intensity. Open canopy promotes growth of grass which in turn produces less BTU's when burned than the current fuel model. These areas will be monitored and fuels reduction maintenance will be applied to stands to prevent encroachment by less desirable fuel models.
35	KFA	The proposed action could increase fire intensity by reducing crown closure.	Yes	No	There is no evidence to support that fire intensity would increase in the project area with the type of topography it represents. Ladder fuels will be removed which helps reduce fire intensity. Open canopy promotes growth of grass which in turn produces less BTU's when burned than the current fuel model. These areas will be monitored and fuels reduction maintenance will be applied to stands to prevent encroachment by less desirable fuel models.

[11] Barrett, James, "*Silviculture of Ponderosa Pine in the Pacific Northwest: The State of Our Knowledge,*" December 1979, Technical Report PNW-97 p.67, Pacific Northwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture.

Pilgrim Vegetation Management Project, Scoping Comments

Comment #	Submitted by:	Comment	Issue?	Significant issue?	Response
36	MSBEC	The proposed action could adversely impact scenic values as seen from Mt. Shasta.	Yes	No	The project should not be noticed as viewed from Mt. Shasta summit (Retention VQO). The project will not be highly visible because it is approximately 10 miles from the viewer and seen through hazy atmospheric conditions. Plus, management activities are noticed less on flat topography. According to the GIS studies, the largest opening of the harvest and replant units that will be seen is approximately 35 acres. Elk Flat and other meadow restorations may appear slightly larger, but should look like natural occurrences and not be noticed.
37	CATS	Borax could spill into streams	No	No	Volcanic soil type and flat terrain will make it almost impossible for borax to enter any stream when applied according to label directions.
38	MSBEC KFA	The proposed action could adversely impact riparian areas.	Yes	No	There are very sparse amounts of riparian vegetation within riparian area on the project. Because of flat terrain and soils with low erosion hazard rating there is low probability for significant impacts to riparian areas.
39	MSBEC KFA	There is an existing problem with road density, which should be addressed in the proposed action.	Yes	No	A Roads Analysis for the project area was completed and recommend closures and decommissioning will be considered in the alternatives.
40	KFA	The recent change to the Northwest Forest Plan eliminating survey and manage may be illegal.	No	No	Outside the scope of the project.
41	EPIC	Biomass harvest may not be sustainable	No	No	Outside the scope of the project.
42	EPIC	Knobcone sanitation would result in stands managed like a woodlot. There is no need for this treatment.	Yes	No	Conversion of Knobcone to a more desirable conifer species is a standard silvicultural practice on both public and private timber lands.

Pilgrim Vegetation Management Project, Scoping Comments					
Comment #	**Submitted by:**	**Comment**	**Issue?**	**Significant issue?**	**Response**
43	SPI, Douglas, Ostrowski, Picard, Tafff, Kessler	Supports project	No	No	Agree with support of the project.
44	Newcom	National forests should be changed into parks	No	No	Outside the scope of the project
45	SPI	Proposed Action does not treat all overstocked stands. Proposal should be expanded.	No	No	The project silviculturist looked at all stands within the project assessment area to determine those of highest priority for treatment.

Significant issues

The six significant issues shown in the above table have been grouped together into two issues related to late-successional habitat and snag habitat.

1. The proposed action could adversely impact critical habitat for the northern spotted owl, including dispersal habitat and forage habitat, by reducing crown closure and harvesting trees greater than 20 inches DBH, and by removing and fragmenting habitat in stands to be regenerated. These actions would also reduce habitat for the northern goshawk and other old-growth dependent species, including the late-successional group of management indicator species.
   Unit: Acres dispersal and forage habitat degraded. Acres removed.

2. The proposed action could adversely impact snag-dependent management indicator species by harvesting existing snags, diseased trees and potential future snags over 20 inches DBH..
   Unit: Estimated snags/acre removed, compared to remaining snags. Estimated snag recruitment.

Fall Scoping

On September 21, 2005 the public was invited to comment on a proposed Non-Significant Forest Plan Amendment specific to the Pilgrim Project wherein the 15% GTR guidelines would not be met on approximately 275 acres. Two written comments specific to this proposed amendment were received. Steven Courtney from Sierra Pacific Industries supported the plan amendment. Kyle Haines of the Klamath Forest Alliance proposed a "Natural Selection Alternative" which would require meeting the 15% GTR Guidelines and setting a 21 inch dbh cut limit. These comments were considered in developing alternatives to the proposed action.

Appendix C: Treatment Acres by Unit

ALTERNATIVE 1													
Sum of ACRES		TREATMENT											
CMPT_	UNIT	Aspen	Biomass	Dry Meadow	Dry Meadow-Uburn	Regen < 15	Regen = 15	KPG	Mature Stand-Uburn	Mature Stand	Thinning	Thinning/San	Grand Total
12	231											32	32
	401			116	25								141
	421								13				13
	422								16				16
12 Total				116	25				29			32	203
14	23		93										93
	408					9							9
	419					40							40
	420					22							22
	423											68	68
	424											216	216
	425											126	126
	438					15							15
	439					15							15
	440					33							33
	441										59		59
	442					14							14
	444											62	62
	68		55										55
	69		10										10
14 Total			159			149					59	472	838
15	1										14		14
	2										8		8
	207											46	46
	208						40						40
	213										61		61
	25		15										15
	266										41		41
	2901		40										40
	2902		10										10
	30		7										7
	3003		108										108
	308						26						26
	4		26										26
	402										17		17
	403										47		47
	405										18		18
	406										31		31
	407							10					10
	409										26		26
	416										206		206
	417										46		46
	426										124		124
	427										85		85
	443											184	184
	445						6						6
	446						12						12
	447											21	21
	448											21	21
	451										61		61
	454										69		69
	463											42	42
	464											35	35
	5		174										174
	67		9										9
	68		27										27
	902	11											11
15 Total		11	415				84	10			854	350	1725
16	127		36										36
	128		46										46
	129		16										16
	146										38		38
	3		30										30
	305						30						30
	324										16		16
	431									12			12
	432										11		11
	433										23		23
	434										19		19
	435										25		25
	436										49		49
	449										20		20
	450										8		8
	452		34										34
	453						27						27
	455										52		52
	456						17						17
	457										11		11
	458				39								39
	459				34								34
	460				61								61
	461					7							7
	462										6		6
	466					5							5
	467											17	17
	502											33	33
16 Total			162		134	12	74			12	279	50	724
8	230											130	130
	24		47										47
	240		2										2
	404										12		12
	411					19							19
	412					22							22
	413					18							18
	414					15							15
	415					15							15
8 Total			49			89					12	130	279
Grand Total		11	785	116	159	250	158	10	29	12	1203	1034	3768

ALTERNATIVE 2														
Sum of ACRES		TREATMENT												
CMPT_	UNIT	Aspen	Biomass	Dry Meadow	Dry Meadow-Uburn	Regen < 15	Regen = 15	KPG	Mature Stand-Uburn	Mature Stand	Thinning	Thinning/San	Thinning 60%CC	Grand Total
12	231											32		32
	401			116	25									141
	421								13					13
	422								16					16
12 Total				116	25				29			32		203
14	23		93											93
	408					9								9
	419					40								40
	420					22								22
	423											68		68
	424											216		216
	425											126		126
	438					15								15
	439					15								15
	440					33								33
	441										59			59
	442					14								14
	444											62		62
	68		55											55
	69		10											10
14 Total			159			149					59	472		838
15	1												14	14
	2										8			8
	207											46		46
	208						40							40
	213										8		53	61
	25		15											15
	266										28		13	41
	2901		40											40
	2902		10											10
	30		7											7
	3003		108											108
	308						26							26
	4		26											26
	402												17	17
	403										47			47
	405										18			18
	406										31			31
	407							10						10
	409										6		21	26
	416										133		73	206
	417												46	46
	426										83		42	124
	427										85			85
	443											184		184
	445						6							6
	446						12							12
	447											21		21
	448											21		21
	451										61			61
	454										69			69
	463											22	20	42
	464											21	14	35
	5		174											174
	67		9											9
	68		27											27
	902	11												11
15 Total		11	416				84	10			576	316	312	1725
16	127		36											36
	128		46											46
	129		16											16
	146										21		18	38
	3		30											30
	305						30							30
	324										16			16
	431									12				12
	432												11	11
	433												23	23
	434												19	19
	435												25	25
	436												49	49
	449												20	20
	450												8	8
	452		34											34
	453						27							27
	455										19		33	52
	456						17							17
	457												11	11
	458				39									39
	459				34									34
	460				61									61
	461					7								7
	462												6	6
	466					5								5
	467											17		17
	502											33		33
16 Total			162		134	12	74			12	55	50	224	724
8	230											130		130
	24		47											47
	240		2											2
	404										12			12
	411					19								19
	412					22								22
	413					18								18
	414					15								15
	415					15								15
8 Total			49			89					12	130		279
Grand Total		11	785	116	159	250	158	10	29	12	702	1000	536	3768

ALTERNATIVE 3												
Sum of ACRES		TREATMENT										
CMPT_	UNIT	Aspen	Biomass	Dry Meadow	Dry Meadow-Uburn	Regen = 15	KPG	Mature Stand	Mature Stand-Uburn	Thinning	Thinning/San	Grand Total
12	231										32	32
	401			116	25							141
	421								13			13
	422								16			16
12 Total				116	25				29		32	203
14	23		93									93
	408					9						9
	419					40						40
	420					22						22
	423										68	68
	424										216	216
	425										126	126
	438					15						15
	439					15						15
	440					33						33
	441									59		59
	442					14						14
	444										62	62
	68		55									55
	69		10									10
14 Total			159			149				59	472	838
15	1									14		14
	2									8		8
	207										46	46
	208					40						40
	213									61		61
	25		15									15
	266									41		41
	2901		40									40
	2902		10									10
	30		7									7
	3003		108									108
	308					26						26
	4		26									26
	402									17		17
	403									47		47
	405									18		18
	406									31		31
	407						10					10
	409									26		26
	416									206		206
	417									46		46
	426									124		124
	427									85		85
	443										184	184
	445					6						6
	446					12						12
	447										21	21
	448										21	21
	451									61		61
	454									69		69
	463										42	42
	464										35	35
	5		174									174
	67		9									9
	68		27									27
	902	11										11
15 Total		11	415			84	10			854	350	1725
16	127		36									36
	128		46									46
	129		16									16
	146									38		38
	3		30									30
	305					30						30
	324									16		16
	431							12				12
	432									11		11
	433									23		23
	434									19		19
	435									25		25
	436									49		49
	449									20		20
	450									8		8
	452		34									34
	453					27						27
	455									52		52
	456					17						17
	457									11		11
	458				39							39
	459				34							34
	460				61							61
	461					7						7
	462									6		6
	466					5						5
	467										17	17
	502										33	33
16 Total			162		134	86		12		279	50	724
8	230										130	130
	24		47									47
	240		2									2
	404									12		12
	411					19						19
	412					22						22
	413					18						18
	414					15						15
	415					15						15
8 Total			49			89				12	130	279
Grand Total		11	785	116	159	409	10	12	29	1203	1034	3768

Appendix D: Road Actions

Road Construction/Reconstruction and Road Closure List and Prescriptions

Road Construction - At the beginning of planning for this project several areas were identified as having excessively long skidding distances for timber harvest which would potentially require some low standard road construction. After field review and discussion during the Pilgrim Vegetation Management Project Roads Analysis process the following was identified as an opportunity to use an existing unclassified road and an extension of it as a long-term improvement for continuing management of a particular area within the project. The terrain is flat and construction is fairly easy with little clearing required:

Road ID	Distance	Description	Objective(s)
P40N50YA	Approximately 0.3 miles	Extension of U40N50Y Sec's 9 & 16, T40R1W	Reduce skidding distance Est. cost: $5,325

Road Reconstruction - The only road reconstruction need identified with this project is replacement of the culvert on road 41N44Y to reduce the chances of road damage and erosion during flood runoff, as identified by Steve Bachmann, SMMU hydrologist:

Road ID	Distance	Description	Objective(s)
41N44Y	Approximately 0.1 miles	Replacement of culvert SE ¼ Sec.27 T41NR1W	Reduce road damage/ erosion concerns Est. cost: $3,500

Road Closure List

Road Closure with Guardrail Barricade - The following classified and unclassified roads have been identified under the Pilgrim Vegetation Management Project Roads Analysis process as opportunities to reduce impacts to resources while still retaining the road for future protection and management needs. Closure with a guardrail barricade provides quick access where fire protection is a concern and where frequent entries are anticipated for management activities. Road closures will follow Forest-wide Standards and Guidelines as described in the LMP (pg 4-17, item 7-f):

Road ID	Road Length	Used in Pilgrim Project?	Add to Transp. System?	Prescription	Objective(s)	Priority
41N02Y	1.0	No	N/A	Barricade at FA13 NW ¼ Sec.4, T40NR1W	Reduce road density in and adjacent to LSR, provide fire access	1
42N13E	0.3	No	N/A	Barricade at FA13 E ½ Sec.5, T40NR1W	Reduce road density adjacent to LSR, provide fire access	1
41N77	1.0	Yes	N/A	Barricade at FA13 SW ¼ Sec.5, T40NR1W	Reduce road density in and adjacent to LSR, provide fire access	1
41N96	0.7	No	N/A	Barricade at 41N19X SE ¼ Sec.31, T41NR1W	Reduce road density in and adjacent to LSR, close other end of above closures; provide fire access	1
40N78, 40N78A	0.8 0.4	Yes	N/A N/A	Barricade at intersection of 40N78/40N16 SE ¼ Sec.17,T40NR1W	Reduce road density, provide fire access	2
40N54Y, 40N54YA, U40N54YB	0.8 0.2 0.2	Yes	N/A N/A yes	Barricade at intersection of 40N50Y/40N54Y SW ¼ Sec.14, T40NR1W	Reduce road density, provide fire access	2
U40N47YA (aka 40N47Y)	0.6	Yes	yes	Barricade at FA13 S ½ Sec.7,T40NR1W	Reduce road density	2
U43N19G	0.3	no	yes	2 Barricades (both ends) W ½ Sec.16, T40NR1W	reduce road density, provide fire access, provides waterline access	2
U41N75A	0.1	yes	yes	2 Barricades (both ends) Sec's 26 & 34,T40NR1W	reduce road density, provide fire access	2
Total	**6.4**	**4.1**	**1.2**	**11 Barricades @ $900 ea.**	**Est. cost: $9,900**	

Road Closure with Earth Berm[1] **-** The following roads have been identified as opportunities to reduce impacts to resources while still providing for future protection and management needs. Closure with an earth berm is preferred where quick fire access to large areas is not a concern and where repeated entries for resource management activities are anticipated to be less frequent. These roads are typically shorter spur roads and overgrown roads where heavy equipment is needed to reopen and provide access. Road closures will follow Forest-wide Standards and Guidelines as described in the LMP (pg 4-17, item 7-f):

Road ID	Road Length	Used in Pilgrim Project?	Add to Transp. System?	Prescription	Objective(s)	Priority
43N19F	0.3	yes	N/A	Block at 43N19 SE ¼ Sec.8,T40NR1W	Reduce road density	2
40N57Y	0.3	yes	N/A	Block about 2,000 ft from Ash Ck SE ¼ Sec.22,T40NR1W	Reduce road density near riparian reserve	1
40N57YA	0.3	yes	N/A	Block at 40N57Y SE ¼ Sec.22,T40NR1W	Reduce road density	2
40N64YD	0.2	no	N/A	Block at 40N64Y SE ¼ Sec.18,T40NR1W	Reduce road density	2
U41N12AB	0.4	yes	yes	Block at FA13 NW ¼ Sec.3,T40NR1W	Reduce road density	2
40N12A	0.5	yes	N/A	Block at 40N12 SE ¼ Sec.4,T40NR1W	Reduce road density and impacts to cultural site.	1
U42N13G	0.3	yes	yes	Block at FA13 NW ¼ Sec.18,T40NR1W	Reduce road density	2
U41N06YB	0.4	no	yes	Block at 41N06Y SE ¼ Sec.3,T40NR1W	Reduce road density	2
U40N50YA & P40N50YA	0.6	yes	yes	Block at 40N50Y S ½ Sec.9,T40NR1W	Reduce road density	2
Total	**3.3**	**2.7**	**1.7**	**9 berms @$150 ea.**	**Est. cost: $1,350**	

[1] "Earth Berm" is a generic term for a physical closure, which could also include log and boulder barriers, and trenches.

Road Decommissioning - The following roads have been identified as opportunities to remove and restore unneeded roads to a more natural state:

Road ID	Road Length	Used in Pilgrim Project?	Prescription	Objective(s)	Priority
40N47Y	0.7	yes	Decommission from U40N47YA north, NW Sec.7,T40NR1W	Reduce road density, eliminate maintenance problems over shifting ephemeral stream channel	1
41N52	0.1	no	Decommission ford and approaches NE ¼ Sec.3,T40NR1W	Reduce road density, eliminate stream ford	1
U40N66YA	0.5	no	Decommission all S ½ Sec.10,T40NR1W	Reduce road density	2
U40N64YE	0.3	yes	Decommission all Sec's 17 & 20, T40NR1W	Reduce road density	2
U41N06YA	0.01	no	Decommission all SE ¼ Sec.33,T41NR1W	Reduce ORV disturbance in Coonrod	1
U41N52A	0.4	yes	Decommission all SW ¼ Sec.34,T41NR1W	Reduce road density and impacts to cultural site	1
U41N75AA	0.01	yes	Decommission all NE ¼ Sec.34,T41NR1W	Eliminate one side of double intersection	2
U42N13P	0.1	no	Decommission all NW ¼ Sec.4,T40NR1W	Reduce ORV disturbance in Coonrod	1
Total	**2.12**	**1.41**	**8 roads/road segments for total of 2.12 mi. @ $1,500/mi.**	**Est. cost: $3,180**	

Road Abandonment - The following roads have been identified as unneeded and are currently unusable due to the encroachment of vegetation and the accumulation of slash and debris (essentially already decommissioned). These roads are returning to a natural state without intervention and are often not discernable on the ground. These roads can be removed from the transportation system without further management activity.

Road ID	Road length	Prescription	Objective(s)	Priority
40N78Y	0.6	no action needed N ½ Sec.9, T40NR1W	reduce road density	N/A
41N12A	0.5	no action needed S ½ Sec.27, T41NR1W	reduce road density	N/A
Total	**1.1**	**2 roads/road segments**	**Estimated cost: $0**	

Total opportunities to reduce open road density include approximately 12.7 miles, with 8.5 miles of system roads and 4.2 miles of unclassified roads. Of the total, 7.9 miles are roads associated with the Pilgrim Project, 1.1 miles are already closed, and 3.7 miles would be outside the scope of the Pilgrim Project (either not to be used with project or just outside the boundary). 2.9 miles of existing unclassified roads will be added to the system for future use but will be closed with guardrail or earth barricades.

Unclassified Roads to be added to Transportation System

Road ID	Road Length	Used in Pilgrim Project?	Prescription	Objective(s)
U40N12B	0.05	yes	Maint. Level 2, renumber 40N12B	Actual intx of 40N53Y/40N12
U40N47YA	0.6	yes	Maint. Level 2 w/Guardrail barricade, renumber 40N47Y .	Needed for long-term access (actual location of 40N47Y) but close with G.B.
U40N50YA	0.3	yes	Maint. Level 1 w/earth berm, renumber 40N50YA	Needed for long-term access
U40N54YB	0.2	yes	Maint. Level 1 Closed with GB on 40N54Y, renumber 40N54YB	Needed for long-term access
U41N06YB	0.4	no	Maint. Level 1 w/earth berm, renumber 41N06YB	Needed for long-term access
U41N12AB	0.4	yes	Maint. Level 1 w/earth berm, renumber #?	Needed for long-term access
U41N75A	0.1 (within project boundary)	yes	Maint. Level 2 w/guardrail barricades at both ends, renumber 41N75A.	Needed for fire access
U42N13G	0.3	yes	Maint. Level 1 w/earth berm, renumber 42N13G	Needed for long-term access
U43N19G	0.3	yes	Maint. Level 2 w/guardrail barricades at both ends, renumber 43N19G.	Provides access to Pilgrim Creek waterline and water troughs.
Total	**2.7**	**2.3**		

Appendix E: Best Management Practices

The use of the following mitigation measures and recommendations will enable the implementation of the proposed action or action alternatives in and around Riparian Reserves and prevent negative impacts to Riparian Reserves. All mitigation measures and recommendations are presented within the context of Best Management Practices.

Best Management Practices (BMPs) should be applied for all activities occurring in the Pilgrim Vegetation Management Project Area. A complete description of each best management practice is provided in the publication 'Water Quality Management for National Forest System Lands in California' (USDA, 2000). While all applicable BMPs should be applied to each proposed activity, the following BMPs are emphasized in order to protect aquatic and riparian resources in and adjacent to Riparian Reserves.

Timber Harvest BMPs

1-1: Timber sale planning process. The objective of Practice 1-1 is to incorporate water quality and hydrologic considerations into the timber sale planning process. This BMP is addressed by including a soil scientist, botanist and hydrologist on the ID Team for the Pilgrim Vegetation Management Project. This report documents water quality and hydrologic considerations as identified by the resource specialists, Pilgrim Vegetation Management ID Team, and public scoping.

1-2: Timber harvest unit design. The objective of Practice 1-2 is to ensure that timber harvest unit design will secure favorable conditions of water quality and quantity while maintaining desirable stream channel characteristics and watershed conditions. This practice was implemented by ground verifying hydrologic conditions for all units that were in close proximity to or within Riparian Reserves.

1-3: Determination of surface erosion hazard for timber harvest unit design. The objective of Practice 1-3 is to identify high erosion hazard areas in order to adjust treatment measures to prevent downstream water quality degradation. The erosion hazard for soils in the *Pilgrim* Project Area was assessed by a soil scientist using the Soil Resource Inventory for the project area. This survey is used to determine the soil mapping unit for each of the proposed management areas. The interpretations listed in the soil map unit description include an assessment of the Erosion Hazard Rating (EHR). This rating was made using the USDA Forest Service Soil and Water Conservation Handbook (FSH 2509.22), Computation of Erosion Hazard Rating (2/90).

1-4: Use of sale area maps (SAM) and/or project maps for designating water quality protection needs. The objective of Practice 1-4 is to ensure recognition and protection of areas related to water quality protection delineated on a SAM or Project Map. This practice will be accomplished by displaying all stream channels located adjacent to or within the units on the Sale Area Map and the Project Map for Timber Sale Contract.

1-5: Limiting the operating period (LOP) of timber sale activities. The objective of Practice 1-5 is to ensure that the purchasers conduct their operations, including erosion control work and road maintenance in a timely manner and within the timeframe specified in the timber sale contract. The extent of the wet weather and snowmelt season in Northern California can be very unpredictable, therefore a fixed LOP for wet weather conditions will not be set for any of the proposed actions described in the Pilgrim EIS. Timber sale contract provision B6.6 can be used to close down operations because of wet weather, high water, or other considerations in order to protect resources. The spring snowmelt period (April-May) is the time when the potential for erosion impacts are greatest. The sale administrator will be responsible for ensuring that timber harvest activities will not degrade the soil and water resource[1].

1-8: Streamside management zone designation. The objective of Practice 1-8 is to designate a zone along riparian areas, streams and wetlands that will minimize potential for adverse effects from adjacent management activities. Field verifying all units for Riparian Reserves, excluding sensitive areas from proposed units and identifying those portions of Riparian Reserves where thinning activities could be accomplished without negatively impacting the soil and water resource, met the objectives of practice 1-8. Riparian Reserves occurring adjacent to units will be identified on sale area maps and the prescriptions for treating these Riparian Reserves will be included on the stand record cards.

1-9: Determining tractor loggable ground. The objective of Practice 1-9 is to minimize erosion and sedimentation resulting from ground disturbance of tractor logging systems. As a general guideline tractor logging should not occur on slopes greater than 35 percent. This objective was accomplished by ground verifying each unit for slope considerations during prescription development for the proposed action.

1-10: Tractor skidding design. The objective of Practice 1-10 is to design skidding patterns to best fit the terrain, the volume, velocity, concentration, and direction of runoff water in order to minimize erosion and sedimentation. As a general guideline the skid trail network cannot exceed 15% of the area in each treatment unit. The sale administrator will accomplish this practice by reviewing and approving by agreement the skid trail design as provided by the purchaser. No skid trails should be located within Riparian Reserves.

1-12: Log landing location. The objective of Practice 1-12 is to locate new landings in such a way as to avoid watershed impacts and associated water quality degradation. This objective will be accomplished by following guidelines for proper landing locations as described on page 35 of Water Quality Management for National Forest System Lands in California (2000). All landings will be either designated in advance or approved by the sale administrator by agreement based on the guidelines. No landings will be located within Riparian Reserves.

1-13: Erosion prevention and control measures during timber sale operations. The objective of Practice 1-13 is to ensure that the purchaser's operations will be conducted reasonably to minimize soil

[1] A limited operating period (LOP) is in effect for all portions of units located within ½ mile of nesting and roosting habitat for the Northern Goshawk. The LOP prohibits ground disturbing activities from February 1st through August 15th. In addition to benefiting wildlife the LOP will prevent timber harvest activities from occurring during spring snowmelt when soils are saturated, the ground is most sensitive to disturbance, and runoff is at its peak.

erosion. Drainage and erosion control work on temporary roads, skid trails, and permanent roads should be kept current during harvest activities. Equipment shall not be operated when ground conditions are such that excessive damage will result. The timber sale administrator will implement this practice through regular site visits and inspections.

1-16: Log landing erosion control. The objective of Practice 1-16 is to reduce the impacts of erosion and subsequent sedimentation associated with log landings by use of mitigating measures. The timber sale administrator will implement this practice through regular site visits and inspections. No landings will occur in Riparian Reserves in the Pilgrim Vegetation Management Project Area.

1-17: Erosion control on skid trails. The objective of Practice 1-17 is to protect water quality by minimizing erosion and sedimentation derived from skid trails. Skid trail erosion control work should be kept current during implementation. Erosion control and drainage of skid trails should be complete prior to shutting down operations due to wet weather. The timber sale administrator will implement this practice through regular site visits and inspections. No skid trails will occur within Riparian Reserves in the Pilgrim Vegetation Management Project Area.

1-19: Streamcourse and aquatic protection. The objective of Practice 1-19 is to control sediment and other pollutants entering streamcourses. Identifying all intermittent stream Riparian Reserves in the project area and excluding sensitive areas in Riparian Reserves from the proposed units meet the objectives of practice 1-19. A 20-foot skidding equipment exclusion zone extending from the inner gorge or channel bank is specified for units containing Riparian Reserves. Harvesting equipment will be allowed up to the bank and directional felling and minimizing turning of equipment will be required to minimize soil disturbance in the Riparian Reserves.

1-21: Acceptance of timber sale erosion control measures before sale closure. The objective of Practice 1-21 is to ensure adequacy of the required erosion control work on timber sales. The sale administrator will implement this practice. Prior to closure of the sale each unit will be inspected to ensure that skid trails and landings have water-bars in place and/or are properly drained.

Road and Building Site Construction BMPs

2-12: Servicing and refueling of equipment. The objective of Practice 2-12 is to prevent pollutants such as fuels, lubricants, bitumens and other harmful materials from being discharged into or near rivers, streams and impoundments, or into natural or man-made channels. Having the sale administrator designate the location, size and allowable uses of service and refueling areas will implement this practice. Due to the close proximity of the project area to McCloud it is not likely that any servicing or fueling areas will be required.

2-22: Maintenance of roads. The objective of Practice 2-22 is to maintain roads in a manner which provides for water quality protection by minimizing rutting, failures, sidecasting and blockage of drainage facilities all of which can cause erosion and sedimentation, and deteriorating watershed conditions. This practice will be accomplished by the purchaser, sale administrator and transportation planner.

2-23: Road surface treatment to prevent loss of materials. The objective of Practice 2-23 is to minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production from those areas. This objective will be accomplished by watering roads for dust abatement during dry periods and spot rocking portions of roads that could be degraded as a result of winter hauling. The transportation planner and/or sale administrator will identify road reaches that need to be stormproofed.

2-24: Traffic control during wet periods. The objective of Practice 2-22 is to reduce road surface disturbance and rutting of roads and to minimize sediment washing from disturbed road surfaces. The sale administrator in conjunction with Practices 1-5, 1-13, 1-16 and 1-17 will implement traffic control during wet periods. A soil scientist or hydrologist will assist in the determination of the need for wet weather restrictions as requested by the sale administrator.

2-26: Obliteration or Decommissioning of Roads. The objective of Practice 2-26 is to reduce sediment generated from temporary roads, unneeded system (classified) and non-system (unclassified) roads by obliterating or decommissioning them at the completion of intended use. This practice will be implemented by specifying in the Timber Sale Contract that all temporary roads will be completely obliterated (ripped and blocked) following the completion of their intended use. Sale area improvement dollars may also be used to complete obliteration of temporary roads.

Vegetative Manipulation BMPs

5-2: Slope limitation for mechanical equipment operation. The objective of Practice 5-2 is to decrease sediment production and stream turbidity while mechanically treating slopes. As a general guideline, tractors should not be used on slopes exceeding 35 percent.

5-6: Soil moisture limitations for mechanical equipment operations. The objective of Practice 5-6 is to prevent compaction, rutting, and gullying, with resultant sediment production and turbidity. The sale administrator will implement this practice by notifying the unit soil scientist if ground conditions appear too wet for operations. The soil scientist will ground verify soil moisture conditions in order to determine if operations can proceed.

Fire Suppression and Fuels Management BMPs

6-1: Fire suppression and fuels management activities. The objective of Practice 6-1 is to reduce public and private losses and environmental impacts that result from wildfires and/or subsequent flooding and erosion by reducing or managing the frequency, intensity and extent of wildfire. Handpiling of all fuels within 50 feet of all Riparian Reserves is planned for the Pilgrim Vegetation Management Project.

6-2: Consideration of water quality in formulating fire prescriptions. The objective of Practice 6-2 is to provide for water quality protection while achieving the management objectives through the use of prescribed fire. Prescribed burn plans should consider potential water quality impacts that may arise as a result of increased erosion due to increased soil water repellency and loss of vegetative cover. This practice was implemented by incorporating soil and hydrologic input into the prescriptions for each unit during planning for the Pilgrim Vegetation Management Project.

Appendix F: Past, Present, and Future Actions within the Pilgrim Cumulative Effects Boundary

Information was derived from GIS database and specialist knowledge. This table may not reflect small special uses or projects with limited or no ground disturbance or habitat alteration. Projects listed are within the 29,860 acres of 8th order watersheds cumulative effects boundary. Cumulative effects boundaries for the individual resources varied[1]. Approximately 8800 acres of this watershed are private lands.

Project, Timber Sale, or Activity Name (1996 to Present) and Implementation Year	Silvicultural Treatment[2]			Other
	Thin (ac)	Regeneration (ac)	Salvage (ac)	
Coonrod Visual Enhancement, 2005			20	
Elk Salvage, 2005			10	
Old Station Salvage,2005			213	
Edson Multiproduct, 2005	400			
Ash Creek Sink Salvage, 2004			199	
South Flats Multiproduct, 2001	1251	110		
Military, 2001	100			
Pilgrim Hazard Tree Removal, 2001	10			
North Flats, 1998	(557)	19		
East Flats, 1997	(1044)	51		
Shroom, 1997	74			
Flow Multiproduct, 1997	160			
Corral, 1997	(729)			

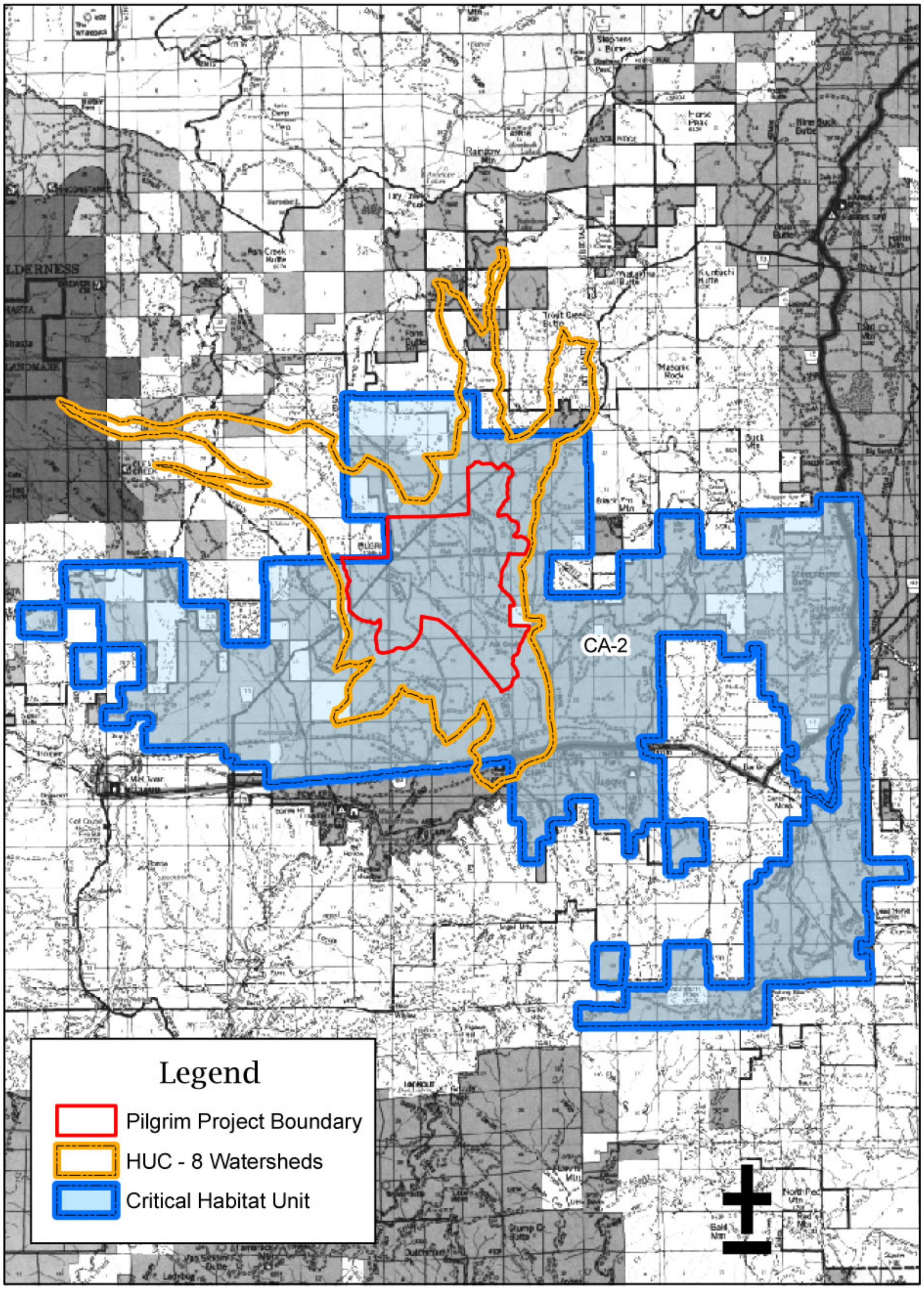
[1] Information was derived from GIS database and specialist knowledge. This table may not reflect small special uses or projects with limited or ground disturbance or habitat alteration. Past actions include timber sales, recorded fuels treatments, and other activities within the past decade. Future actions include those actions within the reasonably foreseeable future (3-5 years). This includes projects with signed decisions not yet implemented as well as proposals far enough along that we can reasonably estimate some environmental effects, even if generally. Relevant boundaries and types of projects assessed for cumulative effects vary by resource and by overlap of effects in time and space. The project files include maps that show harvest and fuels activities in the last decade and future actions, including proposed KV plantation thinning, underburning, and tentative future project units. Minor unaccomplished KV activities from past projects are within the project vicinity (such as short segments of road decommissioning) which are not included in this list, have generally non-measurable resource effects (e.g. sediment), and intended to improve the sale area for resource needs.

[2] Acres in parentheses are reentries into areas that were previously treated in a recent, earlier sale and are not included in the totals to avoid double-counting the same piece of ground.

Project, Timber Sale, or Activity Name (1996 to Present) and Implementation Year	**Silvicultural Treatment[2]**			**Other**
	Thin (ac)	**Regeneration (ac)**	**Salvage (ac)**	
North Flats Biomass, 1997	641	19		
Ash Biomass, 1996	1773			
Pilgrim Biomass, 1996	1136			
Private Timber Lands, 1996 to 2005*	2800	350	1050	
Total, timber harvest Treatments	8345	549	1492	
Pilgrim Groomer shed, 2003				1 acre construction
Pilgrim warming hut, 1999				0.5 acres construction
Cattle Camp Campground, 1999				5 acres construction
Underburning completed, approx. 200 acres per year				1590 acres
Underburning,planned, 2007 & 2008				200 acres
Slash Piling & Burning completed, approx. 100 acres pre year				1020 acres
Slash Piling & Burning planned, 2007, 2008 and 2009				700 acres
Precommercial Thinning planned, 2007, 2008				800 acres
Firewood cutting, annually April to December	Dispersed firewood cutting. (Removes snags under 15"DBH)			
Permitted cattle grazing	Bartle cattle grazing allotment:, 240 cow/calf pairs, June 1-Oct. 31. Satisfactory (meets grazing objectives).			
Mushroom gathering, annually April and May	Dispersed mushroom gathering; primarily boletus and morels.			
Road maintenance (USFS and private)	10-15 miles annually (primarily watering and grading earth surface roads)			
Dispersed camping, annually June to October	~5 acres of dispersed impacts			
Snow removal, annually November to April	~5 miles road snow plowing			

* From California Dept. of Forestry Timber Harvest Database

Pilgrim Vegetation Management Project
HUC-8 and Critical Habitat Unit



Appendix G: Aquatic Conservation Strategy Objectives

Aquatic Conservation Strategy Objectives for Action Alternatives

Objective 1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Effect: The proposed action would open the overstocked stands and allow sunlight to reach the forest floor promoting understory species vigor and diversity in composition including that within the riparian reserves. In addition, intervals of openings within the riparian corridor are preferred over a continuous canopy of diseased and dying conifer to reduce the risk of stand replacing fire. Multi-story vegetation components should result from treating diseased and dying conifer and thinning. These treatments will have a neutral to beneficial effect on the distribution, diversity, and complexity of watershed and landscape-scale features.

Objective 2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

Effect: All confluences among tributaries will be maintained. The proposed action would allow the processes that support a proper functioning condition over their current status of decline[1,2]. Sunlight is currently limited from reaching the forest floor by the dense conifer canopy. The shrub component of plant communities should improve on adjacent slopes as sunlight reaches the forest floor. Riparian vegetation is suppressed due to this lack of light as well as over-browsing by ungulates. Thinning activities adjacent to and within the riparian reserve, which preserve mature healthy conifer and open the canopy, will favor regeneration and establishment of riparian plant communities including willow. During high flows the contribution of nutrients, woody debris and sediment are redistributed within the watershed and plant communities have an opportunity to expand from in the downstream direction. Future management to reduce over-browsing would enhance these improved conditions.

In addition, reduction of stand density may have some beneficial effects on connectivity by reducing the risk of fire within the Riparian Reserves. This alternative will have a neutral to beneficial effect on spatial connectivity within and between the watersheds.

Objective 3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

[1] USDI Bureau of Land Management, *Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas*, Technical Reference 1737-11, 1994.
[2] Reid, L.M. and R.R. Ziemer, USDA Forest Service, Pacific Southwest Research Station. *Evaluating the Biological Significance of Intermittent Streams*, Summary of workshop held at the Humboldt Interagency Watershed Analysis Center May 4, 1994.

Effect: The proposed action will have a neutral effect and no negative effects on the physical integrity of the aquatic system. No skidding equipment will be allowed within 20 feet of the channels, so banks and stream features will be avoided and remain intact. With improved sunlight, the riparian vegetation is expected to improve bank strength. With sufficient improved vegetation along the banks, the channel should narrow and the channel bottom should sustain attributes that reflect a higher proper functioning condition[3].

Objective 4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Effect: The greatest potential for erosion commonly occurs during and immediately after the disturbance activity. The implementations of BMP's are designed to protect water quality even if stream flow is present at the time of proposed activities. Roads typically carry most of the sediment from a hillslope disturbance to the stream. With very little slope, sediment transport is limited by slope in the project area.

Objective 5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

Effect: The proposed action will have a beneficial effect on improving the riparian vegetation vigor and composition and thus on the sediment regime. Bank strength will increase due to increased soil strength from additional root strength from more vigorous riparian vegetation[4]. Slopes adjacent to the channel are generally less than 3 percent. There will be little to no opportunity for activities to affect sediment movement in the project area because of low slopes.

Objective 6. Maintain and restore instream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high and low flows must be protected.

Effect: The proposed action will have a neutral to slightly beneficial effect of short duration on maintenance of instream flows. Surface flow in the project area is primarily intermittent. A reduction in evapotranspiration may temporarily prolong and slightly increase seasonal runoff/base flows in the project area until the riparian vegetation becomes re-established. Studies indicate that forest openings retain snow longer compared to forested stands as sublimation occurs more rapidly on branch surfaces[5]. This would tend to have a beneficial effect on increasing the duration of snowmelt. Renewal of riparian vegetation will eventually lead to stream processes that reduce energy, detain sediment, build banks and discourage entrenchment. This is a beneficial effect for the surface and subsurface flow.

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[3] USDI Bureau of Land Management, *Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas,* Technical Reference 1737-11, 1994.
[4] Rosgen, D. 1996. *Applied River Morphology*, Ch.6. p.14.
[5] Pomeroy, J. W. and J. Parviainen, N. Hedstrom, D. M. Gray. *Coupled modeling of forest snow interception and sublimation. Hydrological Processes* Vol. 12, Issue 15, Date: December 1998, pps: 2317-2337; www.Interscience.Wiley.com.

Objective 7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Effect: The proposed action will have a beneficial effect on stream and floodplain interaction by encouraging under-story vegetation to establish and improving conditions for riparian vegetation from increased sunlight. Under-story vegetation on the floodplain and within the riparian reserves will increase the channel roughness and detain sediment, flow and reduce energy. Water tables are influenced by topographic lows; detention of sediment will lead to bank building processes, improved floodplain function and water table elevation.

Objective 8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Effect: Thinning activities will reduce the risk of stand-replacing fires in the Riparian Reserves and promote stand health. Near-stream conifer removal is likely to provide beneficial effects to willow regeneration by allowing full to partial sunlight conditions for willow while reducing conifer competition. This should incrementally improve habitat for the Willow Flycatcher. Habitat for the Willow Flycatcher in the McCloud Flats area, along the McCloud River outside of the project area, has been ground verified and mapped using landsat imagery by the California Department of Fish and Game, and Humboldt State University from data collected during 1997 and 1998[6]. For entrenched channels coarse woody debris will add channel roughness favorable for the channel building processes; for low-gradient channels, too much woody debris can have adverse impacts[7]. Entrenchment of streams may result in draw-down of alluvial aquifers responsible for sustenance of deep-rooted riparian communities[8]. The proposed action will have a beneficial effect on Objective 8.

Objective 9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

Effect: The proposed action will be beneficial in directing the species composition and structural diversity of plant communities to a more desirable state within the project area and thus will have a beneficial effect on populations of native plants, invertebrates and vertebrate riparian-dependent species within the project area. The intermittent nature of the streams creates dry to wet soil moisture conditions that limit the establishment of riparian species to those areas where conditions are favorable. The proposed action will have a neutral to beneficial effect for Objective 9.

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[6] Stermer, C. J., T. S. Burton, R. L. Callas, and Dr. Lawrence Fox III, 1998. *Habitat Predictability Model for Willow Flycatchers (Empidonax trailii) in Northern California, using Landsat Thematic Imagery*, Organization of Fish and Wildlife Information Managers In: 4th Microcomputer Applications in Fish & Wildlife Conference, Symposium 4,Technology in the Wildlife Profession: Research, Application, and Education.

[7] Rosgen, D. 1996. *Applied River Morphology*

[8] Minshall, G., S.E. Jensen, and W.S. Platts. 1989. *The Ecology of Stream and Riparian Habitats of the Great Basin Region: a Community Profile*. U.S. Fish and Wildlife Service Biological Report 85 (7.24) p. 44.

Pilgrim BA Final 12-8-05 revised.doc

United States Department of Agriculture
Forest Service – Pacific Southwest Region

Biological Assessment

Pilgrim Vegetation Management Project

Shasta McCloud Management Unit
Shasta-Trinity National Forest
Siskiyou County, California
June, 2005
Modified for errors and additional clarity in November and December, 2005
All but minor modifications are highlighted in yellow

Prepared By: Francis W. Mangels Date: Nov 16, 2005
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Final sent to FWS

Revised by: Date: Dec. 8, 2005
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Executive Summary

This Biological Assessment is used for consultation under the Endangered Species Act with the Fish and Wildlife Service and to aid in biological analysis for the project Environmental Impact Statement (EIS). This BA determines that the project may effect, but is not likely to adversely affect the northern spotted owl, and will affect designated critical habitat. The Project affects very low capability dispersal habitat for the northern spotted owl and occurs in Critical Habitat Unit CA-2.

Contact Person: Francis Mangels, phone #530-964-3765 District Wildlife Biologist

I. INTRODUCTION

This Biological Assessment presents the likely effects of actions to federally listed threatened, endangered or proposed species from the proposed action, the Pilgrim Vegetation Management Project (the Pilgrim Project or the Project). This document is prepared in accordance with current policy and follows standards established in Forest Service Manual direction (FSM 2670.32). Plants are covered in separate biological assessments.

The species considered in this document are:

Endangered:
- winter-run chinook salmon, Sacramento River, (*Oncorhynchus tshawytscha*)

Threatened
- Bald eagle (*Haliaeetus leucocephalus*)
- Northern spotted owl (*Strix occidentalis caurina*)
- Delta smelt (*Hypomesus transpacificus)*
- Central Valley steelhead (*Oncorhynchus mykiss)*
- Central Valley spring-run chinook salmon *(Oncorhynchus tshawytscha)*

Candidate Species

- Central Valley fall/late fall-run chinook salmon (*Oncorhynchus tshawytscha)*
- Western yellow-billed cuckoo (*Coccyzus americanus occidentalis)*
- Fisher *(Martes pennant)*

Critical Habitat
- Designated Critical Habitat for the Northern Spotted Owl

Context of the Assessment
This assessment bases discussions at three scales:
1) **The Net Project Area** includes only proposed units totaling 3,780 acres.
2) **Project area** or "the Project" includes the 1.5-mile buffer on each unit totaling about 7,700 acres.
3) **Watershed** includes Ash and Upper McCloud 5th field watersheds.

SPECIES DROPPED FROM FURTHER ANALYSIS
Long-term monitoring efforts indicate no **bald eagle** activity. The Project is over 10 miles from the nearest eagle habitat[1] at McCloud Reservoir[2]. Consequently, this species will not be further discussed except in the determinations section.

[1] Measured from National Forest map. Mangels, et.al.
[2] Bald Eagle Recovery Plan, p. 13.

There is no year-round aquatic habitat in the area. Ash creek is an intermittent stream that is unlikely to support fish consistently. However, in the Spring of 2005, Curt Babcock of California Fish and Game reported that a brown trout had been sampled from Trout Creek in Section 13, T. 41 N, R 1, just north of the project area. Dennis Caine, who works for Hancock Industries noted that he had seen Trout Creek wet almost every year up to the Coonrod Flat Road (40N12). Curt Babcock recommends that this be considered intermittent Redband Trout refugium habitat from the current designation/ford in section 12 to the Coonrod Flat Road and that they may want to further evaluate the habitat downstream of the Pilgrim Creek Road.

Although the Redband Trout is a species of concern to the U.S. Fish and Wildlife Sacramento office, and a sensitive species for the Shasta-Trinity National Forest, it is not currently a listed nor a candidate species. It will not be further considered in this document, but will be addressed more thoroughly in the Biological Evaluation. There are no other listed or candidate inland fish species in this area. All listed inland fish species are eliminated from further consideration.

Anadromous fish are unable to pass above the Shasta Dam. Therefore, anadromous fish such as the Central Valley steelhead (*Oncorhynchus mykiss),* the Central Valley spring-run chinook salmon *(Oncorhynchus tshawytscha)* or the Central Valley fall/late fall-run chinook salmon (*Oncorhynchus tshawytscha)* will not be found above the dam. Shasta Dam also effectively blocks any possible migration into the project area by the Delta Smelt (*Hypomesus transpacificus)* and blocks any possible downstream effects the project might initiate. The flat, dry terrain of the project area also makes sediment transport to the McCloud River highly unlikely. These species will not be discussed further in this document.

The Western yellow-billed cuckoo is only found in an isolated section of the northern Sacramento Valley. The project is outside of the current known range of this species, and will not be further considered in this document.

II. CONSULTATION TO DATE

Heidi Crowell, biologist, with the U.S. Fish and Wildlife Service (Red Bluff Field Office), visited the Project area in October 2004 and discussed the proposed actions with the team. Danielle Chi (USFWS, Red Bluff Office) was e-mailed a draft of this document on February 17, 2005; subsequent comments were incorporated into this document and are pertinent to species associated with late-successional conifer habitat. Danielle Chi observed and discussed it in the field with the team in October 2004. The Project was adopted by Crowell in 2005.

The biologist downloaded final updated species lists for the three 71/2 minute USGS quads covering the entire Project Area on June 20, 2005 from the Sacramento Fish and Wildlife Office website. Updated species lists may be accessed at http://sacramento.fws.gov/es/spp_list.htm on June 20, 2005. The species lists used in this document were last updated on May 27, 2005 and may be found in hard copy in the project file and appended to this document as Appendix A. These species lists are recorded as document numbers:

050620102902 Kinyon
050620120953 McCloud
050620121138 Rainbow Mtn.

III. CURRENT MANAGEMENT DIRECTION

The Shasta-Trinity National Forest (STNF) maintains full compliance with the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (ROD). The Regional Forester approved the STNF Land and Resource Management Plan (LRMP) April 28, 1995. The ROD was incorporated into the LRMP.

The LRMP adopts the recovery plan for the bald eagle (USDI 1986) and manages the spotted owl (as well as other species associated with older forest habitat) under the direction provided in the ROD. The STNF expects the network of areas withdrawn from active timber management (e.g., wilderness, LSRs, riparian reserves, and administratively withdrawn areas) and the protection of riparian reserves (including wet meadows) to provide habitat adequate to maintain viable, well-distributed populations (or potential habitat for colonization) of species. The LRMP establishes retention levels for snags, logs and hardwoods to maintain important habitat components across the landscape.

IV. DESCRIPTION OF THE PROPOSED ACTION

PROJECT ASSESSMENT AREA OVERVIEW

The Pilgrim Timber Sale proposes to manage approximately 3,780 acres of timber land and meadow in the McCloud Flats area of the Shasta-McCloud Management Unit of the Shasta Trinity National Forest. Timber harvest will occur on about 3,485 acres, leaving the remaining 295 acres for meadow restoration, and aspen release. As you will see later in the BA, the only anticipated effect will be to NSO dispersal and critical habitat. For your convenience, I have included in the table below the total actual and potential dispersal habitat acreage affected in each treatment category (Table 1 comparisons follow on page 6).

Table 1: Acreage Summary by Harvest Treatment

Vegetation Treatment	Approximate Acres	NSO Actual Dispersal Habitat: Acres Affected	Additional NSO Potential Dispersal Habitat: Acres Affected
Ponderosa Pine Dead Stand Harvest and Replant	375	0	317.87
Knobcone Dead Stand Harvest and Replant	10	0	10.2
Thinning, standard pine prescription to 40% canopy	1200	700.55	136.66
Thinning to 30-40% canopy for disease control	1075	672.50	240.46
Thinning, old tree release to 40% canopy	40	40.56	0.29
Older Plantation Biomass Thinning	785	48.55	481.11
Aspen Release	20	0	0
Dry Meadow Restoration	275	54.03	64.3
Approximate Totals	**3,780 Acres Treated**	**1,516.19 Actual dispersal acres affected**	**1,250.89 Potential dispersal acres affected**

McCloud Flats is known as the generally level area north of McCloud River Canyon, south of Fons/Trout Creek Butte, west of Black Fox Mountain/Kinyon Ridge, and east of Shasta Forest Subdivisions. The Project affects less than 6 square miles in the middle of 70 square miles of the flats.

The Project area has been harvested and grazed for over 100 years. Most trees on the flats are 55 to 110-year-old ponderosa pine, with remnant isolated older trees. Scattered black oaks occupy sloping sites and some rock outcrops. Scattered small stands of aspen are usually decadent due to conifer overgrowth.

All treatments are on level coarse-textured volcanic soil, so erosion hazards are low.

Ash Creek flows perennially in the LSR. The entire flow sinks in the Project and emerges at big springs on the McCloud River.[3] Surface runoff to the McCloud River

[3] Stream photo report, in Project files.

occurs only during exceptional runoff events, usually at 3 to 6 year intervals.[4] These peculiar "sandy ditch" streams yield almost no riparian vegetation or habitat.

All of the Project area has been designated as critical habitat for the northern spotted owl and is outside of adjacent Elk Flat LSR and distant from all other LSRs.

PROPOSED ACTION

The Project proposes to harvest green, dead and dying trees, and manage associated forest fuels on approximately 3,780 acres. This alternative is responsive to the proposed purpose and need for the action as documented in the Environmental Impact Statement.

Manage stand densities for forest health, timber growth and timber yield:

Ponderosa Pine Dead Stand Harvest and Replant: Harvest and re-plant approximately 375 acres of 95-110 year old pine stands suffering from root disease and bark beetle mortality. Diseased trees that have chlorotic foliage, ragged and fading crowns, poor needle retention and/or evidence of successful insect attacks will be removed. About 40% of the trees in these stands are already dead and have already lost their foliage. These trees are scattered throughout the stands and in small pockets. If available, retain up to 6-10 trees/acre of healthy and full crowned overstory trees. All species other than pine will be favored as leave trees as their long term viability will be greater. Retention areas should include the largest, oldest (where available) and healthiest live trees, decadent or leaning trees and hard snags occurring in the unit. Leave all healthy white fir, incense-cedar, sugar pine, Douglas-fir and black oak. Tractor pile and burn residual slash. Re-plant with mixed species in shaded areas, ponderosa pine in open areas.

Knobcone Dead Stand Harvest and Replant : Remove dead and dying knobcone pine on approximately 10 acres. Tractor pile and burn residual slash and re-plant with ponderosa pine.

Thinning, Standard Pine Prescription to 40% Canopy: On approximately 1200 acres of 75-95 year old pine stands, remove trees that are dead or dying from insects, root disease and/or drought. In remaining overstocked areas thin to a density of approximately 120-150 square feet of basal area. Regeneration needs due to past and present tree mortality will be evaluated post harvest and if necessary areas larger than 1 acre in size would be planted.

Thinning to 30-40% Canopy for Disease Control: On approximately 1075 acres of 75-110 year old pine stands which are currently experiencing more mortality than the "thinning" stands, remove trees that are dead or dying from insects, root disease and/or drought and then thin any remaining overstocked areas to approximately 100-120 square feet of basal area. Regeneration needs due to past and present tree mortality will be evaluated post harvest and if necessary areas larger than 1 acre in size would be planted.

[4] Hydrologist's Report, in Project Files

Thinning, Old Tree Release to 40% Canopy: On approximately 40 acres, thin two-storied mature stands to reduce understory ladder fuels and maintain older trees, especially pines.

Older Plantation Biomass Thinning: On approximately 785 acres of 25-45 year old pine stands, thin from below to a spacing of approximately 20 feet between trees. About 90% of these stands are older plantations. The resulting product will be primarily wood chips.

The thinning prescriptions include the removal of trees in the lower crown classes as well as diseased or dying trees. The objective is to concentrate growth on the residual trees in the stand with the best ability to respond to less competition. These trees have larger crowns and a greater capacity to photosynthesize and increase their crown size as more light reaches the full crown.

Aspen Release: Release aspen from conifer competition on approximately 20 acres by removing conifers within 100-150 feet of aspen.

Dry Meadow Restoration: On approximately 275 acres, adjacent to historic dry meadow areas, remove small diameter (< 14” dbh) conifers and thin remaining overstory trees to 80 sq ft/acre of basal area to restore the openness of these dry meadow areas.

Manage Forest Fuels: The thinning treatment stands will be examined post harvest and if necessary treatments will be prescribed to reduce excessive accumulations of down wood and deep needle slash by underburning on approximately 200 acres and/or tractor piling on approximately 700 acres.

Road Management: Following harvest and fuels treatments approximately 9 miles of existing roads will be closed with either guardrail barricades or earth berms. An additional 2.6 miles of existing roads will be decommissioned and removed from the forest road system. In addition, approximately .3 miles of new road construction will needed to reduce skidding distance in one harvest unit.9 (See Appendix _ for a list of specific road management actions).

The timber harvest outputs from the entire Project are anticipated to be approximately 40-50 thousand CCF (25-30 MMBF) of sawlog products, plus approximately 3,000 tons of biomass products.

The proposed action includes borax application on stumps to prevent the spread of *annosus* root disease, but does not include the use of herbicides or other pesticides.

The Project includes some use of existing unclassified roads in order to keep skidding distances under one quarter mile. The Project may include the construction of short lengths of low-standard road and the closure or decommissioning of other roads. A roads analysis will be completed prior to the draft EIS.

MITIGATING MEASURES INCORPORATED INTO THE PROJECT DESIGN

Snags and woody debris: The LMP requires viable populations of cavity-nesting species.[5] The standard is 1.5 standing dead trees and 6 down logs per acre.

Snags larger than 15 inches DBH which are not hazardous to operations[6] will be left standing at two per acre average[7] where possible. Snag marking recommendations from the biologist will be given to crews. Continual disease problems are expected to recruit more snags and deadwood.

Fuel hazard tonnage will not be exceeded, but LMP deadwood requirements will be met or have the prospect of existing snags meeting minimum log levels. Less than six logs per acre, with less than 1.5 standing snags per acre, does not meet standards. Where not met, one 10x10' minimum slash pile or equivalent 5-15 tons maximum large deadwood per acre will be left unburned where tractor piling is prescribed. Cull logs greater than 20 inches large end diameter will not be included as timber. Slash piles within 200' of a system road may be burned to reduce hazards or improve visual quality.

Hardwoods: The LMP directs that hardwoods be managed for sustainability.[8] Aspen trees and sprouts within the Project area will be favored by removing *all* competing conifers within 100-150'. Aspen groves will be fenced after harvest if cattle grazing limits tree growth. Oaks, which are relatively uncommon in the flat portions of the Project area, will be protected or released using contract provision B6.32. Pole-sized or larger oaks will be released from conifer competition to both crown and root.

Monitoring

Staff and ID team will review the preparation prior to advertisement. The administrator will conduct weekly inspections of harvest operations. The soil scientist, biologist, and/or hydrologist will be consulted if problems occur with management practices. ID team and staff will monitor during and after implementation. The range officer/biologist will monitor aspen/oak/prescribed burns and require fencing if overgrazing occurs.

[5] LMP p. 4-62.
[6] Snag Hazard Rating is based on Region 1 ID Team Guidance for Reserve Trees, in Project files. Type 1 and type two trees are generally retained. Since faller/buncher and skidder operators work within an enclosed cab, some type 3 trees may be retained on a case by case basis.
[7] Draft Snag Guidelines for the Shasta-Trinity National Forest, in Project files.
[8] LMP, p. 4-67

V. EXISTING ENVIRONMENT

PROJECT AREA, LAND ALLOCATIONS, AND CRITICAL HABITAT:

The Project area lies entirely within Matrix in Management Area 2 and spotted owl Critical Habitat Management Area CA-2. Late-Successional Reserve (LSR) Elk Flat (RC-360) is adjacent[9] to the northwest edge. The LRMP requires maintaining viable populations of species associated with late successional and old growth (LS/OG) forest ecosystems. The strategy provides for connectivity between large areas set aside for these species while maintaining over 15% of federal forestland in LS/OG conditions. Conditions between LS/OG areas must allow dispersal of associated species that must be able to move through these habitats.

Connectivity or Dispersal Habitat

Connectivity or dispersal habitat for northern spotted owls is usually defined as conifer stands meeting at least "50-11-40" conditions (i.e., an average overstory tree diameter of at least 11 inches DBH and at least 40 percent canopy closure over at least 50% of the landscape) (Thomas et al. 1990). Locally, owl calling crews report that owls seldom cross gaps over 200’ wide when approaching a caller[10]. This level of connectivity is not available in almost all of the Project area, and likely never existed due to soils and climate causing large natural openings of hundreds of acres such as Coonrod, Pilgrim, and Elk Flat. Overall, the two watersheds do not meet this standard. Although there are stands that have overstories meeting an 11-inch dbh and a 40% canopy closure, they do not cover 50% of the landscape. Appendix D notes the estimated coverage of dispersal habitat based on timber type approximations. Averaged over the two watersheds, stands that could contribute to suitable dispersal habitat covers about 17% of the two watersheds, and could potentially cover only about 26%.

The “50-11-40 rule” (50% coverage, 11” average dbh and 40% canopy coverage) is admittedly artificial. Spotted owls do not cease to disperse if canopy closure drops below 40%, nor do they move freely above 40% canopy.[11] The 50-11-40 rule was developed to provide foresters with a standard by which to manage matrix lands to facilitate the dispersal of juvenile owls. Density is a linear relationship; owls appear to progressively avoid more open areas and forage/disperse more readily in progressively more closed canopy (up to a certain point), primarily because they successfully catch prey there[12] or avoid predation. Individual owl behavior varies, but this pattern is distinctly true to the species. Therefore, preservation of an open forest structure to provide minimal connectivity is preferable to the loss of entire stands due to natural mortality from insect

[9] The Draft Recovery Plan for the Northern Spotted Owl proposed to drop this area from critical habitat, but this was never made final. Maps from Federal Register 1992 are in the GIS system.
[10] Mangels, also reported by S. Thomas and K. Piper, et.al., in over 20 years of local owl calling.
[11] Bart 1995 p. 943
[12] Ward 1998 p. 79.

and disease infestations. McCloud Flats presents this choice. Considerable numbers of green trees must be removed if the choice is to preserve minimal connectivity rather than passively allow epidemic levels of insect and pathogen infestation to eliminate forest cover in significant pockets on the flats.

Based upon habitat mapping, aerial photograph interpretation, and field reviews, owl connectivity through the Ash Creek and McCloud Flats 5th Field Watershed appears discontinuous[13]. "McCloud Flats," as used in this document, is the generally level area between the foot slopes of Mt. Shasta to Black Fox Mountain and north of the McCloud River Canyon. Natural openings, natural open forests, and old harvested areas limit owl dispersal. High-elevation open forests unsuitable for dispersal limit connectivity to or from further north[14]. Therefore, any connection with the marginal Klamath owl habitats is extremely unlikely to nonexistent.

Historically, spotted owls were not likely to have used the McCloud Flats for nesting, roosting, foraging or dispersal. Pioneer diaries of 1860-90 describe Ash Creek (McCloud Flats) as a desert six miles wide and/or without trees[15]. A 1911 photo from Black Fox shows the flats below as grassland with some brush and small trees[16]. The 1944 aerial photographs confirm it as open and unsuitable[17] for nesting, roosting, foraging or dispersal. While journals are anecdotal observations, they provide historical evidence that the flats and the Project area were historically unsuitable habitat for spotted owls. Large natural openings and discontinuities of tree cover persist to the present (see Appendix E for an example).

Blackstain and annosus root disease limits probability of dense, old growth forests occurring on the flats. Through creation of natural openings or salvage harvesting, the disease creates large open areas[18] that would limit owl dispersal westward through the flats[19]. **All attempts to maintain dense tree canopy in the flats have failed for fifty years, as diseases and bark beetles thrive under moderate to dense canopy conditions.[20]** The condition is well known and unfortunately widespread all over the flats. Therefore, any sustainable connectivity habitat is historically and pathologically very unlikely in the flats unless it is open canopy. Spotted owls disfavor such cover,[21] but juveniles may use it occasionally.[22]

Although Kinyon north to Black Fox and northwest on +20% slopes is likely to be the most viable long-term dispersal route northward around the flats, it is a very poor one. The better route west is undoubtedly through the McCloud River

[13] Aerial Photo files 1995-2003.
[14] USGS Topographic Quadrangle Maps: Kinyon, Rainbow Mountain, Ash Creek Butte.
[15] McCloud Flats Watershed Analysis page 57.
[16] District Archeology files.
[17] Aerial Photo files 1944. Report on Ecological Succession in McCloud Flats by Mangels on file.
[18] Personal communication from district foresters: Funk, Campbell, Steel, Fleming.
[19] Ibid Watershed analysis: 16, 17.
[20] Peter Angwin and Dave Schultz, forest pathologist and entomologist, in years of field trips to flats.
[21] Ward 1998 p.79.
[22] Bart 1995 p. 973

Canyon, four miles south of the Project and highway 89. This route can be followed on any STNF map ½" to the mile or larger scale that shows the McCloud River. The most likely route for owl dispersal around McCloud Flats is the direct southern route along the north slopes of McCloud River Canyon and west. The poorer northern route is north on Kinyon Ridge in the LSR, avoiding the Project area with its large plantations and natural openings, then north over Black Fox Mountain. From there, the route becomes progressively poorer west into the Elk Flat LSR and then possibly west over Snowman Summit. CA-4 about ten miles south is the best route of all.

Survey results indicate owls can enter Elk Flat LSR. A pair of owls were found on Black Fox in 2002. In 2003 an owl was located in Elk Flat LSR, and may have come from the west. In 2004 all owls were gone. These events may be explained by poor habitat conditions forcing owls to move on in search of adequate prey and habitat.[23] Elk Flat LSR habitat is low capability. The Project area is naturally considerably worse habitat.

In 1990 a tagged owl dispersed from upper McCloud River Canyon to near Mt. Shasta City, likely over Snowman Summit[24]. We know dispersal occurs, but not the route or success rate. The southern route (four miles south of the Project area) was most likely.

The Project has very little value for owl dispersal, yet is designated critical habitat. It may retain 30-40% canopy in larger ponderosa pine and fir where the site currently has over 40% canopy. Due to root disease, blackstain fungi, and bark beetle mortality, sustaining denser canopy cover has been impossible in the flats. Type 4N could be temporarily achieved in some small areas with unusual circumstances, but history indicates such canopy density has seldom existed on the flats due to fires, dry soils, insects, and disease. Consequently, the flats are naturally very low-capability dispersal habitat at its best. **Future management will likely be directed to maintaining very open pine forests, because chronic diseases have not allowed sustained development of canopies over 40% density.** This means that spotted owl dispersal can be sustained by management, but only at low levels.

Spotted owls typically forage on flying squirrels and wood rats. The district biologists and foresters have never seen wood rat nests or flying squirrels on the flats in over twenty years and the habitat appears unsuitable for these two primary prey species.[25] The CDF mammal narratives indicate the flats are not in the range of dusky-foot wood rats, but Simons[26] has found bushy-tailed wood rats in fair habitat outside the flats along Mud Creek. Flying squirrels do not inhabit such open dry park-like pine forests[27] and have never been found in the flats, though they occur at higher elevations around it.[28] This habitat is thus suspected to have a very poor prey base and thus be unattractive to raptors. Since owls often hunt where preferred prey is abundant,[29] it would be very unlikely for

[23] Ward 1998, Forsman 2000, Carey 1992,
[24] District biology TES files.
[25] Mangels, personal comm.
[26] Simons 1997
[27] CDF WHR Vol. 3 Mammal narratives.
[28] Mangels 2005.
[29] Ward 1998, pages 88,89.

owls to forage and hence, disperse in such poor habitat as the Project area in the center of the worst habitat of McCloud Fats.

Based on our general knowledge of spotted owl habitat preferences and observation of vegetative types, we can reasonably presume that dispersal is regionally important and practically limited on SMMU.

Between Mt. Shasta and Shasta Lake presumably lies the only dispersal route connecting coastal and Sierra spotted owls. To the north and south of SMMU is the unsuitable grassland/shrub habitat of Shasta Valley and Central Valley. Owls dispersing east-west from this Project area must use Snowman Summit at 4500' elevation below Mt. Shasta or stay further south away from the Project, in areas where opportunities are considerably better at lower elevations with less fragmentation. McCloud Flats and its wider connections to larger owl populations are thus marginal compared to southern areas.

While this paragraph exceeds the usual watershed level of analysis, it shows the uniqueness of SMMU for dispersal, and a general irrelevance or low priority of the Project area to population connectivity in northern California.

Late-Successional and Old-Growth Habitat (LS/OG):

DEFINITION

LS/OG habitat is defined as mature stands(having annual growth peaked) and /or old growth, usually 180-220 years old with moderate to high canopy closure; a multi-layered, multi-species canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags, heavy accumulations of wood, including large logs on the ground[30].

The *McCloud Flats Ecosystem Analysis 5th Field Watershed* presents a limited analysis of current forest conditions related to LS/OG habitat. The Assessment Area does not include quality LS/OG and the Project is consistent with the recommendations for LS/OG retention. The analysis recommends increasing the growth of immature stands by all practical means, preserving forests for dispersal, enhancing diversity, and saving the largest trees available.

Determining Northern Spotted Owl Suitable Habitat

The Modoc Plateau, which includes the McCloud Flats, Goosenest and other areas, is a unique region for the northern spotted owl and presents some issues in developing reasonable appraisals of suitable habitat. Biologists generally predict spotted owl occurrence and define suitable spotted owl habitat in any one or a combination of four approaches:

1) documented presence of owls;

[30] Thomas et al. 1990

2) categorical inclusion of selected vegetation types from vegetation data, e.g. any class five Douglas fir type would be considered suitable nesting and roosting;
3) habitat capability models such as those developed as part of the California Wildlife Habitat Relations (WHR) System[31] that allow for more site specific definitions such as dead and down woody debris, distance to water, etc., and
4) application of a validated model that predicts species occurrence based on a tested relationship between habitat variables, e.g. the spotted owl baseline model.

Although owl survey work is the most reliable method of defining suitable habitat or predicting owl occurrence, it may take several years, is costly and is not necessarily infallible. Categorical inclusion, or the determination of suitable habitat based on a simple delineation of vegetation types, is the simplest and frequently the only available approach, particularly in large scale analyses.

Use of habitat capability models is only possible where biologists are able to survey site-specific habitat variables and evaluate their weighted importance. Specific validated models such as the northern spotted owl baseline are generally the most accurate over a large landscape, but are limited to the specific analytical boundaries of the validity testing. The McCloud and Goosenest areas are very different from the rest of the province and their unique nature excluded them from the strong relationship the baseline found between the best model and the probability of owl occurrence.[32]

In other words, the Northern Spotted Owl Baseline Analysis was not a good predictor of owl occurrence in much of the McCloud or Goosenest areas. It tends to make errors of occurrence by predicting owls based on structural features (distribution of vegetation types and structures) in areas where surveys had consistently found no owls. In some areas, the baseline model predicts more suitable habitat in the area than owl occurrence would indicate, and in other areas, predicts fewer owls (much of the Goosenest).

Because of the addition of more variables to evaluate and the ability to factor in local experience in owl surveys, owl habitat capability models may be our best means of predicting owl occurrence without additional extensive survey work in the McCloud area.

The best habitat capability models currently available for the northern spotted owl in California are those created by the California Department of Fish and Game. These models were widely adapted for use by the Shasta Trinity National Forest in California in the 1995 Forest Land and Resource Management Plan and provide an objective description of habitat use as identified by a highly experienced group of wildlife biologists (Appendix G in the Shasta-Trinity Land and Resource Management Plan). This model adapts and addresses the special situations of the high elevation dry climate habitats in mixed conifer pine forests.

[31] Laymon, Stephen A. and Reginald H. Barrett, 1982; California Department of Fish and Game, 2002; California Department of Fish and Game and California Interagency Wildlife Task Group. 2000.
[32] Personal communications, Kelly Wolcott, Owl Baseline Team member and Lynn Roberts, Owl Baseline Team Leader, and Jeff Dunk, Principal Researcher on the NSO Baseline Project.

Although these models are old by current standards, and recent work has developed superior modeling in other areas[33], these are the best available for site-specific analysis in SMMU. Recent models deal with much lower elevations and wetter climates predominated by Douglas fir, a tree uncommon in high and dry McCloud habitats.

Habitat capability is defined in Appendix G of the Shasta-Trinity National Forest Land and Resource Management Plan (LRMP) (Appendix B). Twelve habitat factors are divided into high (preferred), moderate (minimum requirements for nesting), and low (marginal for occupancy, used for dispersal/foraging) capability. These factors are:

- vegetation types,
- seral stages,
- nest stand structure,
- nest stand size,
- home range suitable habitat acreage,
- home range total,
- snag density/size,
- distance to water from nest,
- slope %,
- slope aspect,
- dead/down material,
- food requirement, and
- disturbance.

The habitat capability models include these factors and allow the site specifics to determine their individual weight. Accordingly, the habitat capability model in Appendix G indicates that water or slope limitations may indicate an area is low capability or unsuitable for spotted owls.

Almost all factors must be met to some degree under each capability category to qualify, or it drops to a lower rating. Some interpretation is at the discretion of the local biologist, as some factors may be more important than others in some areas. In fact, some factors are limiting, creating unsuitable habitat no matter how ‘suitable’ forest structure may be.

For example, an area may have high capability in relation to vegetation type (old growth), stand structure, snags, and size, but have low capability or be unsuitable due to a lack of nearby surface water, a prey base, and its location on flat ground. These latter factors are more important in the McCloud area than what is typical in other areas of owl range.[34]

Although unsuitable habitat is not listed in the model, when conditions for low capability are not fully met, the condition drops to unsuitable.[35] To be unsuitable, an area usually

[33] Raphael, et. al. 2002
[34] Simons, 1997 p. 1-20
[35] STNF-LRMP Appendix G

has canopy under 40%, below minimum snags, inadequate stand size, water (riparian) over a mile away, poor prey base, or excessive disturbance as the biologist interprets.

Distribution of Habitat in the Project area:

The following table compares Vegetation Typing acreages and Habitat Capability Model acreages and helps to explain low capability in the Project area. Using the habitat capability models presented in Appendix G of the LRMP, 1516 acres of timber classified as 3N, 4N or 4G (usually considered nesting, roosting and foraging habitat based on vegetation type) within the Project area are actually unsuitable under the habitat capability model. This is supported by more than 20 years of survey work in this area. Although these stands have been classified as 3N, 3G, 4N and 4G, they are not comparable to similarly classified stands found in moister areas of the forest. In addition, 216.62 acres of dead ponderosa pine stands are still classified as 3N, despite an average of 40% of the trees being already dead and devoid of cover foliage.

Table 2: Vegetation Database labeling Compared to Habitat Capability Modeling

	Nesting and Roosting	Nesting and Roosting	Foraging (sometimes nesting and roosting)	Dispersal (sometimes considered Foraging)	Total Current Dispersal Habitat Acres
Total Acres Treated (According to Vegetation Typing)	14.35 4G acres	0.01 4N Acres	0 3G Acres	1706.86 3N Acres	1721.22
Total Acres Treated (according to Habitat Capability Model)	0	0	0	1516.19 Dispersal only	1516.19

Discrepancy in 3N typing and stand characteristics are common in this area. In units on the flats, the tree distribution is very clumpy and non-uniform, often with under-one-acre patches of dense trees surrounded by non-forest. When these areas were originally typed for the LRMP database, a judgment call was made to average it all together as 3N. This focused foresters on commercial possibilities and stewardship responsibilities of the scattered large trees in the area, without accounting for the large gaps between the clusters. The final figures (1516 acres) also do not include the dead ponderosa pine that currently does not provide cover for dispersal (see Appendices B and C).

Species and Habitat Account:

NORTHERN SPOTTED OWL

Ash Creek and Upper McCloud Watersheds:

The spotted owl is associated with late-successional and old growth conifer forest[36]. From a forest vegetation type or **structural** standpoint, the two watersheds include approximately 3,208 acres of 4N and 4G timber types, and 10,740 acres of 3G timber types for a total of 13,948 acres of 3G, 4N and 4G timber types. The watersheds also include 29,914 acres of 3N timber types that in other locations would likely be classified as foraging habitat. This acreage is based only on forest structure, and not on any other important requirements for suitable habitat.

As the foregoing paragraph shows, the watershed has very limited 4G and 4N forest types. Ash Creek Watershed has only about 18% of the watershed in suitable dispersal habitat and is only capable of maintaining about 27% of the watershed in capable dispersal habitat. Upper McCloud Watershed has only about 16% suitable dispersal and is only capable of maintaining about 25% in suitable dispersal habitat. Both of these figures are well below the 50% coverage that we have used as a guideline in the past (see Appendix D).

The project affects less than 1% of the available 4N and 4G timber types in the watersheds, 0% of the available 3G and about 5 % of the available 3N stands in the two watersheds. These are very small fractions of the watersheds.

However, as stated and argued above, the actual Project **contains no suitable nesting, roosting or foraging habitat** from a habitat capability perspective. Approximately 1502 acres of low-quality 3N timber type stands would be considered foraging habitat in other areas, and about 14 acres of the 4N and 4G timber types would be considered nesting and roosting, but they are so limited by the conditions of the flats, that we do not consider them as suitable northern spotted owl nesting, roosting or foraging habitat.

While multiple observations or sightings of owl pairs or singles define activity centers in this general area, many similar sites are now or usually vacant. Examples are Sugar Pine (in Elk Flats LSR) #215, Fons Butte #221, Cold Creek #214, Harris Mountain #218, Toad Mountain #223, Buck Mountain #224, and Lookout Point #222. These nearby examples are similarly limited in suitable acreage, are dry or semi-dry, and most are non-nesting activity centers. Only Lookout Point has had a reproductive year in the last five, most likely because it has an intermittent spring and the owls reproduced in a very wet year. All of these sites are outside of the project boundary and located on higher site areas, usually small mountains located in parts of the flats.

Surveys and Activity Centers:

[36] Ibid in 32.

Owl surveys over 20 years note similarities among activity centers in this watershed. The habitat is always limited and occupancy is very irregular[37]. These sites are seldom reproductive, and usually vacant. Recent surveys in 2004, like all other surveys for 20 years, show no spotted owls within 1.3 miles of the Project area. None were ever expected due to the unsuitable and very low capability habitat, nor are owls expected in future surveys.

Black Fox Mountain and Elk Flat centers, and the owls that occasionally reside there are well over 1.3 miles outside the net Project area and will not be affected by the proposed Project. These centers are irregularly and seldom occupied and contain low to moderate capability habitat (the best in the watershed). The probability of owls in the more marginal, unsuitable, and very low-capability habitat (the worst in the watershed) of the Project area is very low.[38] This is not expected to change.

A single female appeared in 2003 in the long-vacant Elk Flat LSR activity center. Conditions for viable dispersal may therefore occasionally occur in this area. The female found at Black Fox in 2002 may have moved west into Elk Flat, but all owls disappeared in 2004. Similar records of occasional singles, disappearances, and no reproduction are typical of centers in this watershed. This appears primarily due to naturally poor habitat and extensive timber harvest associated with private industrial forest on checkerboard ownership patterns. Limited habitat tends to cause abnormal behavior patterns like nomadic wandering in spotted owls,[39] a classic case of avoidance of poor habitat.

Net Project Area:
The Project is on the central flats in historically unsuitable or marginal dispersal habitat. The tree distribution is clumpy and non-uniform, often with one-acre patches of dense trees surrounded by non-forest. Clumpy areas were averaged and mapped to 3N or 3P to consider the scattered large trees, but fragmentation is actually more severe than the database indicates. Limited riparian vegetation, flat ground, dry open meadows, and excessive fragmentation from logging and disease also contribute to unsuitability.

We may assume that owls occasionally disperse through the north area (including private land), but are unlikely to stay, even for a short time. The route further north through private land with more slope and at least limited water is more probable, but also low capability and heavily logged. This large expanse of low-capability habitat may explain total owl disappearances in 2004. Severe tree mortality in 2003-2004 contributed to it.

In summary, the best available habitat within and around the Project area has severe limitations that make this area unsuitable for nesting, roosting, and foraging. The conditions would also appear to make it poor dispersal habitat. The nearest activity centers are too far away, over highly fragmented and very low-capability habitat, and therefore the Project is unsuitable for foraging from usually unoccupied low-capability activity centers.

[37] District Biologist observations for 20 years of watching these sites.
[38] STNF-LRMP Appendix G, p. G-12 table, USGS Maps, Air Photos 1995.
[39] Carey, p. 240, 243

Goshawk predators occasionally nest in the LSR and on Black Fox Mountain. Since beetles destroyed the nesting trees of one marginal territory in the flats, neither remaining territory is near enough to affect any owl use in the Project. They may have some very slight effect on juvenile owls that would rarely risk dispersing through the Project.

VI. EFFECTS OF THE PROPOSED ACTION

DIRECT EFFECTS:

These are effects on owls that occur at implementation of the project. Surveys indicate owls once in Black Fox Mountain and Elk Flat LSR were non-breeding or single individuals. The Project area habitat is marginal, low capability and/or unsuitable for nesting and roosting based on Habitat Capability Models and field surveys for 20 years. Mobile, non-breeding owls are likely to avoid harvest operations in poor habitat and thereby not significantly modify their essential foraging, thermal regulation and other typical behaviors. Spotted owls are rarely present on Black Fox Mountain or Elk Flat. These centers are well over 1.3 miles away and will not be affected by the Project. Unoccupied moderate to low capability activity centers are very unlikely to generate owl activity in even lower capability or unsuitable habitat in a Project area outside a normal foraging radius from a center.

The Project area lies in unsuitable nesting, roosting and foraging habitat and very low capability dispersal habitat. This area is very highly fragmented, flat, appears to have no reasonable prey base, is heavily roaded with 4 miles per section, has limited or no water, and has no riparian vegetation. According to Habitat Capability Models, this area is unsuitable or very marginal low capability. Owls are therefore highly unlikely to occur.

Based on the above, it is highly unlikely that the habitat is currently occupied by nesting or roosting owls, and is unlikely to harbor foraging owls. The operation will not have any direct effects on individual northern spotted owls.

There are no interdependent or interrelated actions which would potentially affect a northern spotted owl.

INDIRECT EFFECTS :

Indirect effects are those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur. This can include effects on habitat that may affect owls at a latter time. Unlike the evaluation of effects on designated critical habitat, however, indirect effects document those effects that occur to individual owls likely to use the area at some point later in time. For this portion of the analysis, the absolute effect on habitat has no relevance outside of the potential effect it may have on individual owls.

Because the area is unsuitable for nesting, roosting and foraging for northern spotted owls, owls are not likely to occupy the area for nesting, roosting or foraging at the time of the operation. Because the operation will not modify the limiting factors making the area unsuitable (availability of open water, slope, etc.), it is still highly unlikely that owls would occupy the area post-project. Although the operation modifies forest structure in the thinning and sanitation operations, slope, water and soil limitations maintain unsuitable nesting, roosting and foraging habitat conditions throughout the Project Area.

Although forest conditions will be significantly affected by the project, the lack of actual northern spotted owl use will prevent any indirect effects on the owl from occurring.

Effects to Forest Conditions:

Forest pathogenic conditions are currently severe. Because the limiting factors for this area (dryness, almost no riparian habitat, limited prey base, and no slope) are not affected by this Project, the habitat will remain unsuitable for nesting, roosting, and foraging. The canopy cover is already so low and fragmented from natural causes, pathogens, salvage logging, and existing grasslands that only juvenile dispersing owls are likely to use it now or in the next few decades.[40] Even this use may meet with poor success. The existing fragmentation and limited prey base will not be significantly changed in the area and thus should not reasonably affect dispersing owls. The pathogenic activity itself has created unsuitable or very low-quality habitat and harvesting will not change the capability. By not changing the general condition and low capability of the habitat, no barriers to dispersal will be created in areas where natural vegetation would otherwise be adequate. No change in essential behaviors of individual owls is likely.

The proposed **ponderosa pine and knobcone pine harvest and replant prescriptions** have almost no effect on owl habitat. Disease and insects have killed about 90% of the trees in these areas with about 40% already ‘red dead’, meaning that they have already lost their foliage. The resulting stands are now unsuitable for NSO nesting, roosting and foraging habitat and soon will be unsuitable for dispersal habitat, and in fact present significant fire hazards. In most of these units, the 15% retention within a sale boundary will not be met because so few live older ponderosa pine remain.

The proposed **thinning prescriptions** are designed to maintain some degree of poor dispersal habitat where it currently exists. The 3N has intermixed clumps of up to five acres of 3G that will be thinned from below to 3N leaving 30-40% canopy. These isolated clumps provide poor cover for spotted owls and are not likely to harbor them. The prescriptions are designed to sustain a forest canopy, but leave the stands open enough so they may survive the endemic pathogens of the flats. Survival for pathogen

[40] Bart 1995, p. 943.

tolerance may be less than 40% canopy and mortality after thinning may occur. Forgoing stand density management creates very high risk to habitat in pure pine stands. Treatment in these stands is likely to reduce the risk of total stand loss, thereby helping to maintain some low capability dispersal habitat for the northern spotted owl.

After thinning, the average tree diameter will be larger due to the removal of smaller, suppressed trees. Although this would appear on paper as better habitat structure for owls, poor water and/or canopy cover remain limiting. Canopy closure will eventually recover. Treated stands would be more resistant to stand replacing crown fires or pathogens and would include more large-diameter conifers with fuller crowns and larger lateral branches than untreated stands. However, pathogens would likely prevail as the canopy closed.

In the short-term, vertical structure would be somewhat simplified by removal of smaller diameter commercial conifers along with other understory vegetation. Fire would thin out most of the trees and brush that will be removed and also simplify structure.

Since 1975, smaller conifers have grown into size class 3 (i.e., greater than 13 foot crown diameter). These stands remain classified as unsuitable habitat, and this classification will not change after thinning.

Scattered **hardwoods** greater than 8 inches diameter and new reproduction will increase vertical structural complexity. It will provide diverse cover and prey habitat diversity for an improved food supply. Habitat is limited by external factors in this area, but an improved diverse food supply may provide some slight future benefit to dispersing owls.

Aspen will have all conifer competition removed to improve aspen growth and survival and provide for greater habitat diversity. Oaks and aspen are not harvested, which improves raptor habitat by improving prey diversity (different vegetation provides a niche for different animals). Larger conifers will be removed on 20 acres of aspen, but these trees are not old growth. Removal of larger conifers is regarded as a beneficial trade-off compared to the value of saving the few remaining aspen. Deciduous tree contributions to forest diversity and a diverse prey base would therefore benefit raptors using the area, but on very limited acreage.

Large **snags and logs** would remain at two per acre average where available except for instances where large snags must be felled for safety and left on site as large logs. General district policy is to leave over three snags per acre, but in the flats continued pathogen mortality creates excess snags and logs. Hence, if salvage removes more than the local minimum snags, but leaves more than the forest minimum of 1.5 per acre, then we may expect persistent pathogens to overproduce snags (which become logs). Markers are instructed to preserve snap-top, deformed, or non-leaning snags that are more likely to stand for extended periods. This enables salvage of new snags, and promotes likely formation of uncommon “soft” snags needed by some species, promoting snag diversity.

Preserving **snag habitat** provides cover for prey and may promote greater species diversity within the limitations of the site. General growth would enable the possibility of larger and more useable snags necessary to sustain dispersal habitat and provide for general diversity in the flats. Increasing vegetative or cover diversity increases the prey base and thus helps raptors. This effect remains limited by poor habitat.

Dead and down material is set by LMP at 6 logs per acre, or about 5 tons in matrix lands. Due to extensive mortality in the flats, this is accomplished by maintaining snags. Snags fall in random years, and *maintaining proper snag density generally creates excessive deadwood beyond the prescribed minimum.* Thus, deadwood is not limited.

Prescribed burning would help protect nearby owl habitat from catastrophic fire losses and stimulate prey diversity on the forest floor, providing a more reliable food supply. It would affect about 200 acres of 3N habitat by somewhat simplifying vertical structure through the removal of small diameter (<8” dbh) suppressed understory trees and shrubs. Overall canopy closure may have a slight decrease followed by an increase due to ash fertilization increasing canopy growth. Increasing vegetative diversity increases the prey base and thus helps raptors, but the effect is slight in the Project.

Prescribed burning areas are very open because of mortality from insects and disease. Prescribed burning would have little effect on larger snags and logs because most will occur after burning. In all prescribed burns a small risk occurs that fire could have a larger or smaller impact than proposed. Effects are speculative and can’t be analyzed.

Tractor piling would have similar effects to prescribed burning, but would churn up the soils surface and disrupt the fungi and mushroom habitat for several years. This is mitigated by using a tractor brush rake, and done only where fuels are excessive and to prepare sites for planting. This “raking” effect is less natural than burning, but has been done before with satisfactory recovery in less than five years. For practical purposes, it is less desirable than fire, takes more time to recover, and the piles leave a heavier scorched soil area. Effects are speculative and can’t be analyzed, but have the corresponding favorable effect of reducing fuel hazards.

Effects to Nesting or Roosting Habitat:

There is no suitable nesting or roosting habitat in the Project area.

Effects to Foraging Habitat:

According to the Habitat Capability Model (appendix G, LRMP), there is no suitable foraging habitat and the Project is unlikely to affect foraging owls.

Effects to Existing Dispersal Habitat:

According to vegetation typing, the proposed actions would affect about 1516 acres of low capability dispersal habitat (3N, 4N and 4G) as determined solely by forest structure and database labeling. As stated previously, on a landscape scale, this area does not meet minimum dispersal habitat standards (“50-11-40”). However, we also know that owls will sporadically colonize upland areas in the Flats and that dispersal may happen to some minimal degree in this area. We will analyze loss of dispersal habitat under the assumption that some low level of dispersal may happen sporadically through this area, although preferred routes around the Flats probably exist.

While some short-term degradation occurs, the immediate and long-term improvements mitigate the effects to some degree. By maintaining canopy cover 30-40% where possible (less in severe salvage areas), the result is likely to produce no immediate measurable effect on northern spotted owls or their habitat in low-capability areas.[41]

If owls used these areas, the above discussed changes in already naturally marginal highly fragmented habitat are not likely to affect the essential behaviors of owls that might enter the area. Limiting factors such as water, poor prey base, and level ground remain after the operation and are likely to limit owl use of the area. Habitat that is historically unsuitable or marginally suitable in the flats will remain unsuitable or marginally suitable.

Effects to Capable (Potential) Habitat:

Plantation thinning would initially decrease canopy cover and thereby reduce the quality of dispersal habitat. However, thinning would also accelerate the development of better dispersal habitat conditions and increase the probability of retaining stands at 40% canopy cover in approximately 25 years. The proposed actions would affect approximately 1,251 acres of potential habitat and improve growth toward higher quality dispersal habitat.

Effects to Connectivity or Dispersal Habitat:
The proposed thinning and low intensity prescribed burning may eventually help create better connectivity habitat. McCloud River Canyon is unaffected and is more viable as a likely dispersal route.

Harvesting disease centers will not reduce connectivity habitat, and may preserve dispersal in the long term by reducing total fragmentation from mortality. Disease and associated beetle mortality will continue to cause severe fragmentation in the flats.

All units are marginal, if not unsuitable, habitat. While a spotted owl could enter some dry, sparsely forested units, it would find a poor prey base and poor foraging opportunities. Effective dispersal is limited because open-canopy units are in more highly fragmented areas with larger natural openings. Owls avoid these areas and thus dispersal is relatively unaffected. Benefits may occur because owls would likely seek better corridors near the McCloud River Canyon.

[41] Solis, 1990

CUMULATIVE EFFECTS

Cumulative effects include those effects of future State or private activities, not involving Federal activities, which are reasonably certain to occur within the action area. Past effects are assumed to be within the baseline of the analysis and future Federal activities will be consulted upon separately. Relative to the northern spotted owl, the action area includes any area within 1.3 miles (the radius of a typical NSO home range) of a harvest or restoration unit. Cumulative affects are derived from those actions which might simultaneously or within a reasonable length of time, affect the same owls that have been affected by this project. Because this project will not significantly affect any owls, there will be no cumulative effects for analysis under the ESA. .

State Actions:

There are no State actions currently planned for the Project area.

Private Actions:

Early-mature conifers dominate federal forest , and a variety of early seral stages occupy private forest. The *McCloud Flats Ecosystem Analysis 1995* presents an analysis of forest conditions and incorporates past actions and events that led to those conditions. This document is incorporated by reference and is available at the McCloud District office of the Shasta-Trinity National Forest.

Private conifer stands within the watershed are intensely managed for timber, and larger trees are continuously removed. No immediate private logging has been proposed within 1.3 miles of the assessment area, as almost all private forestland has been recently cut. These open, intensely managed lands are unsuitable for nesting, roosting or foraging, but some of it remains low-capability dispersal habitat. Hardwood, shrub, or grass habitats would likely have limited management or become plantations[42]. Before 1989, non-forested areas were generally converted into pine plantations.

Proposed actions would reduce ladder fuels and thus potential for stand replacing crown fires. Severe fires could remove owl habitat within and adjacent to the Project area.

Range grazing seldom exceeds proper use in the Project. If ground-level vegetative components are not excessively removed, habitat for a prey base likely continues[43] at its usual very low levels. Historical grazing was severe, and many dry meadow areas are apparently still recovering. With it, prey populations will very slowly recover.

Fire prevention has caused unnatural fuel buildups in some areas. This policy increases the probability that catastrophic fire may immediately remove large areas of owl habitat. Contrastingly, roads provide a network of fuel breaks. Fire prevention has caused other

[42] District biologist field observations, policy of John Hancock Inc. Lands, et.al..
[43] McCloud Flats Watershed Analysis, p. 61-65

ecological effects inadequately understood. Coupled with grazing, it likely may explain why trees have invaded the flats[44].

CRITICAL HABITAT:

Critical habitat, as defined by section 3 of the Endangered Species Act, is "1) the specific areas within the geographic area occupied by the species…on which are found those physical and biological features (i) essential to the conservation of the species, and (ii) that may require special management considerations or protection; and (iii) specific areas outside the geographical area occupied by a species at the time it is listed…" Critical habitat is formally designated by the FWS through publication in the Federal Register. According to the critical habitat rule, "Specific management recommendations for critical habitat are more appropriately addressed in recovery plans, management plans, and through section 7 consultation."[45]

The Biological Opinion (BO) for the Northwest Forest Plan acknowledged that LSR networks enlarged on Critical Habitat areas by about 8.6% (7.5 million acres in the LSR network, but only 6.9 million acres in the Critical Habitat Unit Network). This greater commitment to a conservation network for the owl reduced the risk that management for wood products in the matrix critical habitat would jeopardize the species.

Under the Northwest Forest Plan, the designation of critical habitat does not proscribe specific management actions. The Record of Decision (ROD) for the Northwest Forest Plan stated that "any site specific considerations of critical habitat in the matrix are considered minimal and will be evaluated through watershed analysis and addressed in area-specific plans, as appropriate."[46] It also states that the "…30% of CHU acreage in the matrix and in AMA's which may be important for dispersal...will be addressed in watershed analysis and subsequent planning efforts."[47]

The Pilgrim Project takes place entirely within CA-2. The Project takes place in portions of the critical habitat unit outside of the Elk Flat LSR. The McCloud Flats Watershed Assessment states, "critical habitat was established to provide dispersal habitat. With the ROD allocation network, this area is no longer required for late successional species viability." The Northwest Forest Plan made apparent its intention that, for the most part, the LSR network was intended to provide for the purposes of critical habitat and substantially delegated critical habitat concerns to larger level analyses such as Watershed Analysis.

Nevertheless, designated critical habitat is a legal entity under the Endangered Species Act apart from the Forest Plan. Critical habitat must be analyzed thoroughly relative to

[44] McCloud Flats Watershed Analysis, p. 61-65
[45] US Dept. of the Interior, USFWS, Critical Habitat for the Northern Spotted Owl, Mulder, Barry S, Et. Al., p. 27.
[46] Final Supplemental EIS for Management of Habitat for Late-successional and Old Growth Dependent Species Within the Range of the Northern Spotted Owl, Vol. 2, Appendix G, p. 22
[47] Ibid, p. 41

any specific action and independent from any conservation value provided by the overlapping LSRs or other conservation commitments of the Northwest Forest Plan. The following analyzes effects to NSO critical habitat independent of the LSR network.

Primary Constituent Elements:

The Fish and Wildlife Service (FWS) is required to designate primary physical and biological constituent elements that are essential to the conservation of the species. Primary constituent elements may include, but are not limited to: roost sites, nesting areas, feeding areas, and vegetation types.

In the January 15, 1992 final critical habitat rule for the northern spotted owl, the FWS designated "forested lands that are used or potentially used by the northern spotted owl for nesting, roosting, foraging, or dispersing" as the primary constituent elements for the owl[48]. This broad definition relies on a presumption that primary constituent elements may be defined by the owl's use of an area or its potential use.

If it is used or potentially used, the forest may be considered the 'primary constituent element.' One beneficial effect of this utilitarian definition is that it allows for development and refinement in our understanding of the complexities of owl habitat use.

Also, it is apparent that the primary constituent elements are an integration of individual habitat components such as tree and stand structure, prey base, nesting structures, cover, slope, aspect, water availability, etc. These elements holistically comprise the primary constituent elements of northern spotted owl critical habitat.

Franklin[49] documented a range of reproductive strategies. He found owls that selected more classical old growth habitat with more continuous cover appeared to dine more extensively on flying squirrels and had a lower fecundity and lower mortality. However, owls that lived in more fragmented, mixed habitat, appeared to forage more frequently on wood rats and had higher fecundity and higher mortality. In other words, owl habitat selection varied with reproductive variables and prey (as well as other variables).

This indicates that stand structural characteristics alone are likely to be faulty indicators of the more complex variables that affect the owl's responses. These complex, interactive variables such as prey density, understory cover, availability of water, predator density, and so on, may be difficult for us to evaluate, but we must acknowledge the role they may play in bounding what is suitable for an owl and what is not. Due to the impossibility of monitoring closely these complex, interacting variables, stand structural characteristics will usually be our best indicators of potential owl habitat and potential owl use of an area. However, due to the unusual nature of the McCloud Flats relative to well-researched owl habitat, structural features alone are likely to be a misleading indicator of actual or potential owl use of an area.

[48] USDI FWS, 1992
[49] Franklin, 1997; Alan Franklin, personal communications

Based on this argument, and the argument laid out in the **Determining Northern Spotted Owl Suitable Habitat** section above, it is evident that the forest on McCloud Flats cannot be considered suitable nesting, roosting or foraging habitat for the northern spotted owl. We have seen that water, slope, and aspect appear to severely limit prey populations, which in turn appear to limit owl populations. Given the Federal Register's definition of Primary Constituent Elements, the non-existent or very limited use or potential use of these forest lands by owls forces us to conclude that relative to nesting, roosting and foraging habitat, there are no primary constituent elements in the project area to affect. However, the area may be used as dispersal habitat and therefore contains primary constituent elements relative to the area's use as dispersal habitat.

Treatment Specific Analysis

Commercial harvest units in the Pilgrim Project include plantation treatments in unsuitable (young) habitat, sanitation cuts in unsuitable habitat, regeneration cuts in disease infested stands, and thinnings in variable stands.

Ponderosa Pine Dead Stand Harvest and Replant: About 375 acres are covered in heavy tree mortality due to disease and insects. All healthy trees will remain, but planting may be necessary where mortality has been most severe. Density dependent mortality in these stands has already eliminated all possible current nesting, roosting or foraging opportunities. The area has limited dispersal potential due to endemic pathogens and limiting conditions. The proposed harvest could potentially benefit owl dispersal by promoting the development of more sustainable stands in the long term. This in itself , however, may be self-limiting. Sustainable stands in this area may not resemble the denser, moister Douglas fir stands so commonly associated with northern spotted owls. Drier conditions may promote both forest pathogens and frequent fires, limiting the potential to sustain stands with a minimum of 40% crown cover. Fire suppression and active forest management in this area may have artificially promoted denser stands in this area suitable for limited spotted owl use, but only sustainable through a continuous investment of management dollars and efforts. Depending on future management policies, regrowth in this area may more closely resemble typical, widely spaced, east-side "yellow-pine forests" rather than the current dense growth that allows some limited owl use but is so susceptible to catastrophic loss from both fire and pathogens.

About 40% of the existing trees in these ponderosa pine stands are currently dead and provide virtually no cover for dispersing spotted owls. Although Their harvest and replant will, however, increase the probability of maintaining and decrease the growing time of about 318 acres of potential dispersal habitat.

Knobcone Dead Stand Harvest and Replant: About 10 acres are in knob cone unit 407. This area is typically clumpy with occasional ponderosa pine dominating the dense clumps of pine. Knobcone pine typically forms 'dog-hair thickets' in this area that are highly susceptible to fire[50]. These thick stands will frequently carry the fire into the crowns of the larger ponderosa pine. The knob cone pine is too dense to permit foraging

[50] Burns, 1990

in the understory and the ponderosa pine is too widely spaced (well below a 40% cover alone) to provide foraging. If treated similarly to the plantation thinnings above, the potential to provide habitat remains limited by water and slope. Implementation may provide some marginal benefits to dispersing owls:

- Removal of knobcone pine promotes faster development of large-conifer cover.
- Greater fire resistance may help to protect known owl activity centers located on nearby mountain.
- Greater pest and disease resistance promotes mature timber with better cover.

The knobcone pine currently provides no cover for dispersing spotted owls. Harvest and replanting may help provide about 10 acres of potential spotted owl dispersal habitat in the future.

Thinning Prescriptions and Dry Meadow Restoration: The three thinning units and the dry meadow restoration project are all characterized by small aggregations of trees surrounded by frequent, very open grassy areas with small, widely spaced individual trees. These operations will affect about 795 acres of spotted owl dispersal habitat. The small aggregations of trees provide small, island 'refugia' in a sea of open forestland that may provide some measure of protection for any owls dispersing through the area. Although thinning will open up each of these aggregations, the overall pattern of their occurrence on the flats will remain the same after implementation. Each of these islands will still act as island refugia, but the more open canopy and structure may reduce the protection they may offer dispersing owls. Although this area does not have the kind of continuous coverage thought to be most beneficial to dispersing owls, the overall pattern of refugia will continue to offer some benefits. The removal of competitive trees in each of these aggregations will reduce to some extent the cover they provide. The more vulnerable and limiting open areas between these clusters will remain the same. The operation will not, however, affect the primary limiting factors:

- Lack of open water and deep porous soils that prevent even temporary pooling of water severely limit development of a useable prey base.
- Lack of slope limits the "north slope protection effect" seen in this area that helps maintain moister, more suitable habitat.

These operations may be able to increase the probability of developing about 201 acres of potentially suitable spotted owl dispersal habitat in the future.

Thinning will reduce the crown canopy in small aggregations to less than 40% on as much as 1075 acres in order to reduce the hazard of pathogens. This operation will affect approximately 673 acres of suitable spotted owl dispersal habitat. The reduction in crown cover may impact the current or potential use of the area by dispersing owls by:

- Forcing dispersing owls to avoid the area;
- Increasing potential mortality from predators in the area;

This area may be able to increase the probability of developing about 240 acres of potentially suitable spotted owl habitat in the future.

<u>Older Plantation Biomass Thinning:</u> About 785 acres of older plantations are still too young and small to be considered suitable habitat. These stands currently contain about 49 acres of marginally suitable spotted owl dispersal habitat. However, these stands are unlikely to ever produce suitable nesting, roosting or foraging habitat. They are severely limited in water and on flat slopes. Similar to the logic provided in the Determining Suitable Spotted Owl Habitat section previously, these units may some day produce large trees with reasonable cover, but are unlikely to support a prey base sufficient for any but transitory owls. Thinning has marginal beneficial effects in the flats:

- Faster development of larger tree canopy cover may benefit dispersing owls.
- Greater fire resistance may help to protect an activity center in Elk Flat LSR.
- Greater pest and disease resistance assures that some dispersal habitat will exist.

This area may be able to produce as much as 481 acres of potentially suitable spotted owl dispersal habitat.

<u>Aspen Restoration:</u> About 20 acres (Unit 902 and some small aggregations) are aspen restoration units. These units have variable pine cover and generally resemble nearby units except for an understory of aspen. Aspen counts as canopy cover and if given a chance, growth can be very rapid. Aspen is not considered significant dispersal habitat for these reasons:

- Fragmented habitat limits access to foraging areas in aspen
- Lack of water limits the prey base.
- Lack of slope limits the “north slope protection effect” seen in this area that helps maintain moister, more suitable habitat.
- Aspen is a small tree, and the few mature trees are decadent and dying.
- Stands often occupy less than one acre (one is 11 acres), too small to be useful.

In summary, the critical habitat area affected by the Pilgrim Project is entirely unsuitable nesting, roosting or foraging habitat and has no current or potential use by owls for nesting, roosting and foraging for the following reasons:

1. About 20 years of owl surveys by the District biologists and wildlife crew have consistently failed to find owls on the McCloud Flats. Although individual, non-breeding and apparently transitory owls have been found on the periphery, and owls may disperse over portions of the flats, it becomes widely discountable that owls may be found nesting, roosting or foraging on the flats.
2. Owls, like many other species, are consistently drawn to areas with a healthy prey base[51]. How much this factor weighs against other more discernable variables such as stand structure, we cannot say, but it factors strongly in habitat selection. Limited water in the McCloud Flats area severely limits the prey base[52] and results in an area that may appear structurally marginally suitable, but lacks necessary elements to maintain an owl population. These same “dryness” factors likely place SMMU on the eastern edge of spotted owl range.

[51] Franklin, 1997; Ward, 1998; Carey, 1992

[52] CA Wildlife Habitat Relations Database, 2000; Simons, L. personal communications, Thesis, U.C Davis, 1997 also on file at the College of the Siskiyous;

3. Lack of slope creates even more harsh conditions. Without gradient, the Flats cannot benefit from the 'northern exposure protection factor.' Again, these harsh conditions, coupled with porous volcanic soils that poorly retain water have created an area with low mammalian prey density.
4. California State habitat capability models used to supplement habitat type definitions of suitable owl habitat include availability of water, slope, aspect and dead and down as important factors to use in evaluating habitat. These factors appear to be limiting in the Flats and reduce the suitability and the potential suitability of the site.

Primary constituent elements were defined for the northern spotted owl critical habitat as "forested lands that are used or potentially used by the northern spotted owl for nesting, roosting, foraging, or dispersing." The operational areas are unlikely to be used for nesting, roosting or foraging *but may be used for dispersal, as may almost all portions of the landscape*. Dispersal by young owls appears to be somewhat random and is characterized by a willingness to disperse over unsuitable habitat that is uncharacteristic of older owls.

Although no immediate evidence is found for northern spotted owls, owls like other avian dispersers may make a series of 'micro' decisions whose cumulative result appears random[53]. The operational measures in this Project affect a heavily fragmented and little-used marginal habitat area and are unlikely to affect mortality or survivorship in a very few wandering individual juveniles. Adults would normally avoid the flats.

The operation may have some immediate and eventual **beneficial effects to critical habitat**. The Project is likely to reduce the probability of total loss of dispersal habitat through catastrophic fires or insect and disease damage. Again, these effects are extremely minimal over the dispersal landscape, but may have some cumulative benefits over years of treatments.

The Project area has marginal, low-quality and low-capability dispersal habitat at best. The area remains highly fragmented by plantations and natural openings, and naturally limited riparian habitat. Although the Project is not likely to be used by adult owls, juveniles may test this area with poor chances of successful dispersion. The removal of green tree elements will occur in this Project, with none of it in habitat most owls would normally approach except for random dispersal of juvenile owls. The removal of a considerable number of green trees will degrade the current low-capability dispersal habitat in the project area, but will not completely remove it in most of the project. The 375 acres of Ponderosa Pine removal will affect only stands that are currently dead and dying from pathogens and would, in any case, not be available for dispersal cover. Therefore, the proposed actions are unlikely to downgrade marginally suitable dispersal habitat to unsuitable, but will degrade that same habitat

[53] Brooker, et. Al. 1999.; Sutherland, et.al.. 2000; Forsman, Eric D. and others, draft paper "Natal and Post-Natal Dispersal of Northern Spotted Owls." (2000):2000; Johnson, et. al. 1990"

VII. DETERMINATIONS

- **NORTHERN SPOTTED OWL**

It is my determination that the proposed action and all alternatives **may affect but would not likely adversely affect** the northern spotted owl based upon the following rationale:

1. The owls in the watershed are non-breeding pairs or single owls and are well over 1.3 miles outside the disturbance and direct effect range of this Project. These centers are usually unoccupied. Direct effects on individual owls are thus insignificant or nonexistent.
2. It is discountable or highly unlikely that owls would forage extensively here.
    a. The flats are highly fragmented, providing frequent gaps well above the 200-feet barrier commonly experienced. Natural openings include hundreds of acres of natural dry open grassland. Plantations are numerous and extensive, most of them younger age classes.
    b. The flats have dry porous soils. Lack of water makes poor forage that in turn limits prey populations. Prey density appears to be a major site selection factor for owls and the flats are unlikely to offer it[54].
3. Northern spotted owl concerns are addressed in the design criteria in the EIS and incorporated into the basic Project design. All LSR lands are excluded, and oak/aspen diversity will be enhanced to increase the prey base. This will be slight because of few oak/aspen acres and naturally poor site quality. Thinning enhances growth and size of conifers, and discounts losses.
4. Dispersing owls are unlikely to be affected by the operations. Dispersing owls are highly mobile, highly selective to better habitat, and thus likely to avoid such poor habitat areas as the Project. They are far more likely to choose much better alternatives far south of the Project.
5. In summary, the Project is unlikely to cause any measurable or observable change in essential northern spotted owl behavior in this area.

- **NORTHERN SPOTTED OWL CRITICAL HABITAT**

It is my determination that proposed actions will **affect** northern spotted owl dispersal habitat in CA-2 for the following reasons:

Using forest vegetation typing, green tree thinning will **degrade** about **741 acres** of very low-capability, relatively open, dispersal habitat (3n acreages in the "thinning, old tree release to 40% canopy" and the "Thinning, standard pine prescription to 40% canopy"), will **degrade** about **49 acres** of 3n, 4g and 4n dispersal habitat in the biomass thinnings, and will **degrade** about **54 acres** of scattered 3n and 4g dispersal habitat in the dry meadow restoration. About **217 acres** of formerly classified 3n dead and dying ponderosa pine will be removed, but the existing 90% mortality in this stand indicates that the removal **should not affect dispersal capability**. About **673 acres** of 3n and 4g habitat in the Thinning to 30-40% for disease control areas **will be either degraded (no 40%**

[54] Carey, et.al. 1992

threshold for dispersal quality) or downgraded (40% threshold for dispersal) depending on the FWS interpretation (see table following on page 32).

Table 3: Acreage Summary of Critical Habitat effects by Harvest Treatment

Vegetation Treatment	Approximate Acres	Acres of current dispersal habitat affected	How affected
Ponderosa Pine Dead Stand Harvest and Replant	375	0	No effect
Knobcone Dead Stand Harvest and Replant	10	0	No effect
Thinning, standard pine prescription to 40% canopy	1200	701	degraded
Thinning to 30-40% canopy for disease control	1075	673	Degraded or downgraded
Thinning, old tree release to 40% canopy	40	41	degraded
Older Plantation Biomass Thinning	785	49	degraded
Aspen Release	20	0	No effect
Dry Meadow Restoration	275	54	degraded
Approx. Total degraded	**3780**	**1518**	**Degraded (673 acres possibly downgraded)**

1. Although these operations are within habitat unlikely to be used for dispersal, and unsuitable for nesting, roosting and foraging, the removal of an important habitat component, green trees, on over 1500 acres may be significant. Without additional information on threshold effects for dispersal for northern spotted owls in the dry, eastside habitats, it behooves us to select the more conservative choice and consider the operation to likely affect dispersing owls within this critical habitat unit.
2. Dispersal conditions in the rest of the project would remain poor or unsuitable, maintaining unsuitable and low-quality dispersal habitat on the flats. Marginal improvement of dispersal conditions is likely to occur in about 25 years as thinned sites mature and treatments reduce heavy fragmentation from insects and disease. Given the high degree of natural fragmentation and naturally limiting site factors already found on the flats, low quality dispersal habitat will remain low-quality dispersal habitat. However, due to inescapable natural pathogenic conditions in this area, this temporary degradation may persist. Restoration of natural fire regimes on the flat would precipitate a reversion to original, historically open pine grasslands over much of the area. Although limiting for the owl, a restoration of more open, large tree, natural stand conditions in this area may be preferable for ecological reasons beyond the scope of this document.

3. In some of the aspen stands, some larger healthy conifers potentially useful to owls will definitely be removed. These aspen stands will provide some small portion (<1%) of unique forage diversity in a huge area of low-capability dispersal habitat. Since only 20 acres in small isolated patches are involved, the actual beneficial effect in poor dispersal habitat is so slight as to be unobservable for owls.

- **BALD EAGLE**
  It is my determination that the proposed actions would have **no effect** on the bald eagle because the habitat is unsuitable in and near the watershed.

VIII. MANAGEMENT RECOMMENDATIONS

Management recommendations were incorporated into the EIS.

IX. CONTRIBUTORS

- Debbie Fleming, Silviculturist, SMMU, Shasta-Trinity National Forest.
- Steve Funk, LRMP Planner, SMMU, STNF (retired).
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- Steve Bachmann, Hydrologist, SMMU, Shasta-Trinity National Forest.
- Mike Rothenberger, Fuels Specialist, SMMU, Shasta-Trinity National Forest.
- Donna Sager, Fuels Specialist, SMMU, Shasta-Trinity National Forest.

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Appendix A: Federal T & E Species Lists for Kinyon, McCloud and Rainbow Mtn Quads

Federal Endangered and Threatened Species that Occur in or May Be Affected by Projects in the Kinyon (697C) U.S.G.S. 7 1/2 Minute Quad

Database Last Updated: May 27, 2005
Document Number: 050620102902

Listed Species

Fish

Hypomesus transpacificus - delta smelt (T)

Oncorhynchus mykiss - Central Valley steelhead (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Strix occidentalis caurina - Critical habitat, northern spotted owl (X)

Strix occidentalis caurina - northern spotted owl (T)

Species of Concern

Invertebrates

Nebria gebleri siskiyouensis - Siskiyou ground beetle (SC)

Nebria sahlbergii triad - Trinity Alps ground beetle (SC)

Fish

Oncorhynchus (=Salmo) mykiss ssp. - McCloud River redband trout (SC)

Pogonichthys macrolepidotus - Sacramento splittail (SC)

Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Ascaphus truei - tailed frog (SC)

Rana cascadae - Cascades frog (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)

Birds

Accipiter gentilis - northern goshawk (SC)

Agelaius tricolor - tricolored blackbird (SC)

Baeolophus inornatus - oak titmouse (SLC)

Buteo regalis - ferruginous hawk (SC)

Chaetura vauxi - Vaux's swift (SC)

Cinclus mexicanus - American dipper (SLC)

Cypseloides niger - black swift (SC)

Empidonax traillii brewsteri - little willow flycatcher (CA)

Falco peregrinus anatum - American peregrine falcon (D)

Melanerpes lewis - Lewis' woodpecker (SC)

Numenius americanus - long-billed curlew (SC)

Otus flammeolus - flammulated owl (SC)

Selasphorus rufus - rufous hummingbird (SC)

Mammals

Corynorhinus (=Plecotus) townsendii pallescens - pale Townsend's big-eared bat (SC)

Euderma maculatum - spotted bat (SC)

Gulo gulo luteus - California wolverine (CA)

Myotis ciliolabrum - small-footed myotis bat (SC)

Myotis evotis - long-eared myotis bat (SC)

Myotis thysanodes - fringed myotis bat (SC)

Myotis volans - long-legged myotis bat (SC)

Myotis yumanensis - Yuma myotis bat (SC)

Vulpes vulpes necator - Sierra Nevada red fox (CA)

Key:

- (E) *Endangered* - Listed (in the Federal Register) as being in danger of extinction.
- (T) *Threatened* - Listed as likely to become endangered within the foreseeable future.
- (P) *Proposed* - Officially proposed (in the Federal Register) for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the National Marine Fisheries Service. Consult with them directly about these species.
- *Critical Habitat* - Area essential to the conservation of a species.
- (PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.
- (C) *Candidate* - Candidate to become a proposed species.
- (CA) Listed by the State of California but not by the Fish & Wildlife Service.
- (D) *Delisted* - Species will be monitored for 5 years.
- (SC) *Species of Concern*/(SLC) Species of Local Concern - Other species of concern to the Sacramento Fish & Wildlife Office.
- (X) *Critical Habitat* designated for this species

FEDERAL ENDANGERED AND THREATENED SPECIES THAT OCCUR IN OR MAY BE AFFECTED BY PROJECTS IN THE MCCLOUD (698C) U.S.G.S. 7 1/2 MINUTE QUAD

Database Last Updated: May 27, 2005

Document Number: 050620120953

Listed Species

Fish

Hypomesus transpacificus - delta smelt (T)

Oncorhynchus mykiss - Central Valley steelhead (T)

Oncorhynchus tshawytscha - Central Valley spring-run chinook salmon (T)

Oncorhynchus tshawytscha - winter-run chinook salmon, Sacramento River (E)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Strix occidentalis caurina - Critical habitat, northern spotted owl (X)

Strix occidentalis caurina - northern spotted owl (T)

Candidate Species

Fish

Oncorhynchus tshawytscha - Central Valley fall/late fall-run chinook salmon (C)

Birds

Coccyzus americanus occidentalis - Western yellow-billed cuckoo (C)

Mammals

Martes pennanti - fisher (C)

Species of Concern

Invertebrates

Nebria gebleri siskiyouensis - Siskiyou ground beetle (SC)

Nebria sahlbergii triad - Trinity Alps ground beetle (SC)

Fish

Lampetra ayresi - river lamprey (SC)

Oncorhynchus (=Salmo) mykiss ssp. - McCloud River redband trout (SC)

Pogonichthys macrolepidotus - Sacramento splittail (SC)

Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Ascaphus truei - tailed frog (SC)

Rana boylii - foothill yellow-legged frog (SC)

Rana cascadae - Cascades frog (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)

Birds

Accipiter gentilis - northern goshawk (SC)

Baeolophus inornatus - oak titmouse (SLC)

Chaetura vauxi - Vaux's swift (SC)

Cinclus mexicanus - American dipper (SLC)

Cypseloides niger - black swift (SC)

Empidonax traillii brewsteri - little willow flycatcher (CA)

Falco peregrinus anatum - American peregrine falcon (D)

Melanerpes lewis - Lewis' woodpecker (SC)

Numenius americanus - long-billed curlew (SC)

Otus flammeolus - flammulated owl (SC)

Selasphorus rufus - rufous hummingbird (SC)

Mammals

Corynorhinus (=Plecotus) townsendii pallescens - pale Townsend's big-eared bat (SC)

Euderma maculatum - spotted bat (SC)

Gulo gulo luteus - California wolverine (CA)

Myotis ciliolabrum - small-footed myotis bat (SC)

Myotis evotis - long-eared myotis bat (SC)

Myotis thysanodes - fringed myotis bat (SC)

Myotis volans - long-legged myotis bat (SC)

Myotis yumanensis - Yuma myotis bat (SC)

Vulpes vulpes necator - Sierra Nevada red fox (CA)

Plants

Campanula wilkinsiana - Wilkin's harebell (SC)

Key:

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- (SC) *Species of Concern*/(SLC) Species of Local Concern - Other species of concern to the Sacramento Fish & Wildlife Office.
- (X) *Critical Habitat* designated for this species

FEDERAL ENDANGERED AND THREATENED SPECIES THAT OCCUR IN OR MAY BE AFFECTED BY PROJECTS IN THE RAINBOW MTN. (697B) U.S.G.S. 7 1/2 MINUTE QUAD

Database Last Updated: May 27, 2005

Document Number: 050620121138

Listed Species

Fish

Hypomesus transpacificus - delta smelt (T)

Oncorhynchus mykiss - Central Valley steelhead (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Strix occidentalis caurina - Critical habitat, northern spotted owl (X)

Strix occidentalis caurina - northern spotted owl (T)

Species of Concern

Invertebrates

Nebria gebleri siskiyouensis - Siskiyou ground beetle (SC)

Nebria sahlbergii triad - Trinity Alps ground beetle (SC)

Fish

Oncorhynchus (=Salmo) mykiss ssp. - McCloud River redband trout (SC)

Oncorhynchus mykiss - Klamath Mts. Province steelhead (SC)

Pogonichthys macrolepidotus - Sacramento splittail (SC)

Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Rana cascadae - Cascades frog (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)

Birds

Accipiter gentilis - northern goshawk (SC)

Agelaius tricolor - tricolored blackbird (SC)

Baeolophus inornatus - oak titmouse (SLC)

Buteo regalis - ferruginous hawk (SC)

Chaetura vauxi - Vaux's swift (SC)

Cinclus mexicanus - American dipper (SLC)

Cypseloides niger - black swift (SC)

Empidonax traillii brewsteri - little willow flycatcher (CA)

Falco peregrinus anatum - American peregrine falcon (D)

Melanerpes lewis - Lewis' woodpecker (SC)

Numenius americanus - long-billed curlew (SC)

Otus flammeolus - flammulated owl (SC)

Selasphorus rufus - rufous hummingbird (SC)

Mammals

Corynorhinus (=Plecotus) townsendii pallescens - pale Townsend's big-eared bat (SC)

Euderma maculatum - spotted bat (SC)

Gulo gulo luteus - California wolverine (CA)

Myotis ciliolabrum - small-footed myotis bat (SC)

Myotis evotis - long-eared myotis bat (SC)

Myotis thysanodes - fringed myotis bat (SC)

Myotis volans - long-legged myotis bat (SC)

Myotis yumanensis - Yuma myotis bat (SC)

Vulpes vulpes necator - Sierra Nevada red fox (CA)

Key:

- (E) *Endangered* - Listed (in the Federal Register) as being in danger of extinction.
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- *Critical Habitat* - Area essential to the conservation of a species.
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- (SC) *Species of Concern*/(SLC) Species of Local Concern - Other species of concern to the Sacramento Fish & Wildlife Office.
- (X) *Critical Habitat* designated for this species

IMPORTANT INFORMATION ABOUT YOUR SPECIES LIST

HOW WE MAKE SPECIES LISTS

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, or may be affected by Projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.

- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.

- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regard-less of whether they appear on a quad list.

PLANTS

Any plants on your list are ones that have actually been observed in the quad or quads covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the nine surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

SURVEYING

Some of the species on your list may not be affected by your Project. A trained biologist or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your Project. We recommend that your surveys include any proposed and candidate species on your list.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your Project.

STATE-LISTED SPECIES

If a species has been listed as threatened or endangered by the State of California, but not by us nor by the National Marine Fisheries Service, it will appear on your list as a Species of Concern. However you should contact the California Department of Fish and Game Wildlife and Habitat Data Analysis Branch for official information about these species.

YOUR RESPONSIBILITIES UNDER THE ENDANGERED SPECIES ACT

All plants and animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

TAKE INCIDENTAL TO AN OTHERWISE LAWFUL ACTIVITY MAY BE AUTHORIZED BY ONE OF TWO PROCEDURES:

- If a Federal agency is involved with the permitting, funding, or carrying out of a Project that may result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the Project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the Project, and federally listed species may be taken as part of the Project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your Project.

  Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the Project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the Project's direct and indirect impacts to listed species and compen-sates for Project-related loss of habitat. You should include the plan in any environmental documents you file.

CRITICAL HABITAT

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our critical habitat page for maps.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your Project.

Species of Concern

Your list may contain a section called Species of Concern. This is an informal term that refers to those species that the Sacramento Fish and Wildlife Office believes might be in need of concentrated conservation actions. Such conservation actions vary depending on the health of the populations and degree and types of threats. At one extreme, there may only need to be periodic monitoring of populations and threats to the species and its habitat. At the other extreme, a species may need to be listed as a Federal threatened or endangered species. Species of concern receive no legal protection and the use of the term does not necessarily mean that the species will eventually be proposed for listing as a threatened or endangered species.

Wetlands

If your Project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed, candidate and special concern species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be September 18, 2005.

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Appendix B: Timber Type Distribution Equated to Actual (Current) Owl Dispersal Habitat: Pilgrim Timber Project

Treatment	Veg Size	Veg Type	Acres	NSO Dispersal Habitat	Totals NSO Dispersal Habitat	
AR	2	n	1.98			Aspen Regeneration (not considered suitable)
AR	3	n	8.79			
				Totals	**0**	
BIO	0		6.12			Biomass
BIO	1		343.98			
BIO	1	n	130.8			
BIO	2	g	0.21			
BIO	3	n	48.41	48.41		
BIO	3	p	18.58			
BIO	3	s	205.5			
BIO	4	g	0.13	0.13		
BIO	4	n	0.01	0.01		
BIO	4	p	0.76			
BIO	4	s	27.2			
				Totals	**48.55**	
DUR	0		59.82			Dry Meadow Restoration
DUR	1		4.48			
DUR	3	n	44.56	44.56		
DUR	3	p	29.75			
DUR	3	s	53.96			
DUR	4	g	9.47	9.47		
DUR	4	p	23.49			
DUR	4	s	49.76			
				Totals	**54.03**	
HR	0		1.84			Ponderosa Pine Dead Stand Removal (**note:** the ponderosa pine stands are known to be about 40% 'red' dead. The already dead trees have lost their foliage and are currently not providing cover. This drops the cover below 40% and reduces the potential for providing dispersal cover.
HR	1		1.06			
HR	2	n	91.55			
HR	3	n	125.29			
HR	3	p	17.38			
HR	3	s	3.17			
HR	4	p	12.91			
HR15	0		4.01			
HR15	1		2.79			
HR15	3	n	91.33			
HR15	3	p	8.43			
HR15	4	p	0.49			
HR15	4	s	11.59			
				Totals	**0**	
KPG	1		0.09			Knobcone Pine
KPG	3		10.11		**0**	

Treatment	Veg Size	Veg Type	Acres	NSO Dispersal Habitat	Totals NSO Dispersal Habitat	
MUT	1		0.26			Thinning old tree release to 40% canopy cover
MUT	3	n	28.97	28.97		
				Totals	**28.97**	
OGT	0		0.001			Thinning old tree release to 40% canopy cover
OGT	1		0.03			
OGT	3	n	11.59	11.59		
				Totals	**11.59**	
THN	0		25.77			Thinning, Standard Pine Prescription to 40% canopy
THN	1		72.08			
THN	1	n	3.01			
THN	2		6.73			
THN	2	g	12.45			
THN	2	n	16.62			
THN	2	s	1.98			
THN	3	n	700.55	700.55		
THN	3	p	111.05			
THN	3	s	243.67			
THN	4	p	4.6			
THN	4	s	2.82			
				Totals	**700.55**	
THS	0		24.64			Thinning to 30-40% Canopy for Disease Control
THS	1		11.6			
THS	1	n	10.14			
THS	2	g	35.47			
THS	2	n	158.61			
THS	3	n	667.75	667.75		
THS	3	p	125			
THS	3	s	19.54			
THS	4	g	4.75	4.75		
THS	4	p	17.81			
THS	4	s	0.04			
				Totals	**672.5**	

Highlighted rows usually considered NSO nesting & roosting or foraging habitat	
Total NSO Dispersal (Usually nesting, roosting, foraging and dispersal habitat if not for limiting factors of water, slope, aspect)	**1516.19**
3N foraging type habitat	**1501.83**
4N type Nesting, Roosting & Foraging	**0.01**
4G Type Nesting, Roosting & Foraging	**14.35**

Key to Codes in Table

BIO = Biomass Thinning
AR = Aspen Release
DUR = Dry meadow restoration
HR and HR15 = Ponderosa pine dead stand removal, harvest and replant
KPG = Knobcone Pine dead stand harvest and replant

Treatment	Veg Size	Veg Type	Acres	NSO Dispersal Habitat	Totals NSO Dispersal Habitat

MUT & OGT = Thinning old tree release to 50%
THN = Thinning, Standard Pine Prescription to 40% canopy
THS = Thinning to 30-40% Canopy

Appendix C: Timber Type Distribution Equated to Potential Owl Dispersal Habitat: Pilgrim Timber Project

Treatment	Veg Size	Veg Type	Acres	NSO Potential Dispersal Habitat	Totals NSO Potential Dispersal Habitat	
AR	2	n	1.98	1.98		Aspen Regeneration (not considered suitable)
AR	3	n	8.79	8.79		
				Totals	**0**	
BIO	0		6.12	6.12		Biomass
BIO	1		343.98	343.98		
BIO	1	n	130.8	130.8		
BIO	2	g	0.21	0.21		
BIO	3	n	48.41	48.41		
BIO	3	p	18.58			
BIO	3	s	205.5			
BIO	4	g	0.13	0.13		
BIO	4	n	0.01	0.01		
BIO	4	p	0.76			
BIO	4	s	27.2			
				Totals	**481.11**	
DUR	0		59.82	59.82		Dry Meadow Restoration
DUR	1		4.48	4.48		
DUR	3	n	44.56	44.56		
DUR	3	p	29.75			
DUR	3	s	53.96			
DUR	4	g	9.47	9.47		
DUR	4	p	23.49			
DUR	4	s	49.76			
				Totals	**64.3**	
HR	0		1.84	1.84		Ponderosa Pine Dead Stand Removal 3N stands are included in this calculation because of the high mortality (90%) in these stands. They are not currently supporting live timber and so may be considered **potential** habitat.
HR	1		1.06	1.06		
HR	2	n	91.55	91.55		
HR	3	n	125.29	125.29		
HR	3	p	17.38			
HR	3	s	3.17			
HR	4	p	12.91			
HR15	0		4.01	4.01		
HR15	1		2.79	2.79		
HR15	3	n	91.33	91.33		
HR15	3	p	8.43			
HR15	4	p	0.49			
HR15	4	s	11.59			
				Totals	**317.87**	
KPG	1		0.09	0.09		Knobcone Pine

Treatment	Veg Size	Veg Type	Acres	NSO Potential Dispersal Habitat	Totals NSO Potential Dispersal Habitat	
KPG	3		10.11	10.11		
					10.20	
MUT	1		0.26	0.26		Thinning old tree release to 40% canopy
MUT	3	n	28.97	28.97		
				Totals	**0.26**	
OGT	0		0.001	0.001		Thinning old tree release to 40% canopy
OGT	1		0.03	0.03		
OGT	3	n	11.59	11.59		
				Totals	**0.03**	
THN	0		25.77	25.77		Thinning,Standard Pine Prescription to 40% canopy
THN	1		72.08	72.08		
THN	1	n	3.01	3.01		
THN	2		6.73	6.73		
THN	2	g	12.45	12.45		
THN	2	n	16.62	16.62		
THN	2	s	1.98			
THN	3	n	700.55	700.55		
THN	3	p	111.05			
THN	3	s	243.67			
THN	4	p	4.6			
THN	4	s	2.82			
				Totals	**136.66**	
THS	0		24.64	24.64		Thinning to 30-40% Canopy for Disease Control
THS	1		11.6	11.6		
THS	1	n	10.14	10.14		
THS	2	g	35.47	35.47		
THS	2	n	158.61	158.61		
THS	3	n	667.75	667.75		
THS	3	p	125			
THS	3	s	19.54			
THS	4	g	4.75	4.75		
THS	4	p	17.81			
THS	4	s	0.04			
				Totals	**240.46**	

Total NSO Potential Dispersal Habitat: Timber Types 1n, 1g, 2n, and 2g.

Types 0 and 1 may or may not be capable of growing dispersal habitat, but are included to conservatively allow for an overestimate rather than underestimate of potential dispersal habitat. Density or Cover types P and S are not included. These densities usually indicate a limiting factor in the area and are unlikely to ever be able grow denser habitat.	**1250.89**
Total NSO Actual Dispersal Habitat from Appendix B:	
3N foraging type habitat	**1501.83**
4N type Nesting, Roosting & Foraging	**0.01**
4G Type Nesting, Roosting & Foraging	**14.35**

Treatment	Veg Size	Veg Type	Acres	NSO Potential Dispersal Habitat	Totals NSO Potential Dispersal Habitat
Total Actual (Current) NSO Dispersal Habitat					**1516.19**

Key to Codes in Table

BIO = Biomass Thinning
AR = Aspen Release
DUR = Dry meadow restoration
HR and HR15 = Ponderosa pine dead stand removal, harvest and replant
KPG = Knobcone Pine dead stand harvest and replant
MUT & OGT = Thinning old tree release to 50%
THN = Thinning, Standard Pine Prescription to 40% canopy
THS = Thinning to 30-40% Canopy

Appendix D: Late Successional Data for the Ash Creek and Upper McCloud Watersheds

Actual and Capable Acres	Ash Creek	Upper McCloud	Totals for both watersheds
3N	11,712	15,192	26,904
3G	3,009	6,723	9,732
4N/4G	1,898	786	2,684
Totals	**16,619**	**22,701**	**39,320**
Actual but Incapable Acres			
3N	2,617	393	3,010
3G	776	232	1,008
4N/4G	372	152	524
Totals	**3,765**	**777**	**4,542**
Total in Watersheds Acres			
3N	14,329	15,585	29,914
3G	3,785	6,955	10,740
4N/4G	2,270	938	3,208
Totals	**20,384**	**23,478**	**43,862**
Potential Acres			
Capable	10,680	13,708	24,388
Total Acreage in Watersheds	113,866	146,263	260,129
Total Capable Acres	31,064	37,186	68,250
Percentage of Watershed in stands suitable for Dispersal Habitat	18%	16%	17%
Percentage of Watershed capable of producing stands contibuting to dispersal	27%	25%	26%

Capable = Capable of producing and maintaining late successional forest under typical harvest and/or disturbance regimes.

Appendix E: Forest Development in fire-excluded Ponderosa Pine stands in the Bitterroot National Forest.

The following three photos show typical ponderosa pine development under fire exclusion. Although these photos come from the Bitterroot National Forest (Graham, 2004) they are strikingly similar to the conditions we find on the McCloud Flats. Fire exclusion has allowed denser stands to develop, and on the Flats, experience and District records indicate that density-dependent insect and disease problems episodically thin out or eliminate these denser stands (Speight, 1989). The denser stands have allowed better dispersal by owls to moister and richer upland habitat dotted throughout the Flats, but is ecologically unsustainable due to fire, insect and disease limitations. Management may be able to reduce the large fluctuations of conditions by maintaining more open stands, thinning out disease and insect mortality and reintroducing fire. Reintroducing fire gradually by first reducing fuels through thinning and mechanical treatments will help avoid catastrophic fires or epidemic-level disease or insect infestations that may eliminate the stands entirely. More frequent ground fires can then help maintain a healthier stand with a greater degree of ecological integrity (Pimentel, et.al. 2000). Although our ability to maintain these stands at the higher densities more optimal for owl dispersal is doubtful, management is able to reduce the loss to maintain minimal cover.

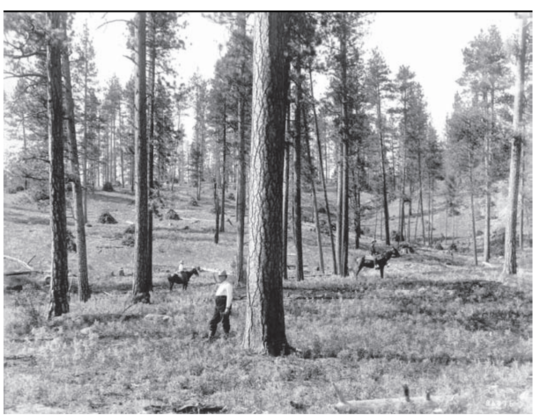

Figure 1: 1909

Figure 2: 1948

Figure 3: 1989

Appendix I: Biological Opinion

US Fish and Wildlife Service

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Red Bluff Fish & Wildlife Office
10950 Tyler Road, Red Bluff, California 96080
(530) 527-3043, FAX (530) 529-0292

TAKE PRIDE IN AMERICA

JAN 18 2006

In Reply Refer To: 1-12-2005-F-24R

S. Kelly Wolcott
Forest Biologist
Shasta-Trinity National Forest
3644 Avtech Parkway
Redding, CA 96002

Subject: Formal Endangered Species Consultation for the Pilgrim Timber Sale, Shasta-McCloud Management Unit, Shasta-Trinity National Forest

Dear Mr. Wolcott:

This correspondence is in reply to your letter, dated November 8, 2005, and received by this office on November 9, 2005, describing corrections and clarifications to the Pilgrim Timber Sale (proposed action) Biological Assessment, Shasta-McCloud Management Unit, Shasta-Trinity National Forest. The attached document transmits the U.S. Fish and Wildlife Service's Biological Opinion based on our review of the proposed action and its effects on designated critical habitat for the federally threatened northern spotted owl (*Strix occidentalis caurina*) in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 et seq.). The biological opinion outlines effects of the proposed action, including our determination that *the proposed action is not likely to destroy or adversely modify designated critical habitat for the northern spotted owl.* Additionally, we concur with your determination that the proposed action *may affect but is not likely to adversely affect the northern spotted owl.* We have based this determination on the following: (1) no northern spotted owls or activity centers are known to occur within 1.3 miles of the proposed action based on recent surveys; and (2) foraging activity by potential dispersing northern spotted owls is highly unlikely and discountable due to habitat fragmentation, poor habitat conditions (i.e., extensive amount of diseased trees), lack of water supply, and associated low prey density.

If you have any questions regarding this letter or the attached biological opinion which addresses effects of the proposed action on northern spotted owl critical habitat, please contact Jennifer Ballard or Heidi E.D. Crowell of my staff at 530-527-3043.

Sincerely,

James G. Smith
Project Leader

cc: Francis Mangels, District Wildlife Biologist
Shasta-McCloud Management Unit, Shasta-Trinity National Forest
2019 Forest Road, McCloud, CA 96057

Formal Consultation for the Pilgrim Timber Sale (1-12-2005-F-24R)

Shasta-McCloud Management Unit
Shasta-Trinity National Forest

BIOLOGICAL OPINION

Introduction

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) based on our review of the proposed action and its effects on designated critical habitat for the northern spotted owl (*Strix occidentalis caurina*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

This BO is based on information provided by the following: the Biological Assessment for the Pilgrim Vegetation Management Project (BA) (USDA Forest Service 2005); and telephone and electronic mail correspondence. Additionally, this BO references information contained in the Record of Decision for Amendments to Forest Service and Bureau of Land Management (BLM) Planning documents within the Range of the Northern Spotted Owl (USDA Forest Service and USDI Bureau of Land Management 1994a), A Range-wide Baseline Summary and Evaluation of Data Collected Through Section 7 Consultation for the Northern Spotted Owl and its Critical Habitat: 1994-2001 (USDI Fish and Wildlife Service 2001), and updates to this report conducted as needed by the Service.

Consultation History

<u>Northwest Forest Plan</u>
On October 8, 1993, the Secretaries of Agriculture and Interior (Secretaries) initiated formal consultation on the preferred alternative (Alternative 9) in the Final Supplemental Environmental Impact Statement on Management for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (FSEIS) (USDA Forest Service and USDI Bureau of Land Management 1994b). On February 10, 1994, the Service issued a BO determining that implementation of the preferred alternative was not likely to jeopardize the continued existence or adversely modify critical habitat of any listed species. The Service rendered the BO on Alternative 9 based on the assumption that all proposed projects would be consistent with the Record of Decision (ROD), and noted that all proposed projects conducted pursuant to the FSEIS, that may affect listed species, would be submitted to the Service for section 7 consultation (USDI Fish and Wildlife Service 1994). On April 14, 1994, the Secretaries signed the ROD adopting an amended Alternative 9. The Service subsequently determined that because changes in the amended version of Alternative 9 - herein referred to as the Northwest Forest Plan (NWFP) - were relatively minor, re-initiation of consultation on the ROD was not required. However, the NWFP is programmatic in nature and did not address site-specific activities and their effects on listed species or their designated critical habitats. These specific assessments were deferred to future consultations in which more specific information on baseline conditions and proposed project actions could be incorporated.

<u>Shasta-Trinity National Forest (STNF) Land and Resource Management Plan</u>
The Service followed up the NWFP range-wide consultation with a consultation addressing the Shasta-Trinity National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 1995). The LRMP was prepared to guide natural resource management activities and establish management standards and guidelines for the STNF. On April 26, 1995, the Service issued a BO determining that implementation of the LRMP was not likely to jeopardize the continued existence of the northern spotted owl (USDI Fish and Wildlife Service 1995).

Level-One Coordination on the Pilgrim Timber Sale

Informal consultation with the Service was initiated on April 26, 2004. Project activities and effects were discussed with Ms. Heidi Crowell (Red Bluff Fish and Wildlife Office (RBFWO) Biologist) during an ID Team Meeting and project site visit with Mr. Francis Mangels (Shasta-McCloud Management Unit Wildlife Biologist). Verbal and electronic mail correspondence regarding project development and effects of the proposed action continued through September, 2004. Ms. Crowell attended an additional ID Team meeting on September 22, 2004, followed by Ms. Danielle Chi (RBFWO Biologist) attending a meeting and project site visit on November 29 and December 6, 2004. Further discussions occurred between Ms. Chi and Mr. Mangels through March, 2005, regarding potential effects determinations with regard to designated critical habitat. Comments on the draft BA were provided by Ms. Chi on February 25, 2005, and by Ms. Crowell on June 30, 2005. Kelly Wolcott (Forest Biologist) informed Jennifer Ballard (RBFWO Biologist) of several errors in the Biological Assessment on October 21, 2005, and a corrected version was provided November 22; a final version was provided by electronic mail on December 8, 2005. A subsequent clarification occurred by telephone.

The STNF is using a species list obtained from the Sacramento Fish and Wildlife Service website (http://sacramento.fws.gov/es/spp_list.htm) on June 20, 2005 (see Appendix A of the BA).

A complete administrative record of this consultation is available and on file at the Service's Red Bluff Fish and Wildlife Office in Red Bluff, California.

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1 Description of the Proposed Action

1.1 Project Description

The Pilgrim Timber Sale is located within the McCloud Flats area north of McCloud River Canyon, south of Fons/Trout Creek Butte, west of Black Fox Mountain/Kinyon Ridge, and east of Shasta Forest Subdivisions (Figure 1). This area occurs within the Ash and Upper McCloud 5th Field Watersheds and the California Klamath physiographic province – Eastern Klamath ecozone. The analysis area includes a 1.5 mile buffer around the project units, totaling 7,700 acres of land. The project area encompasses 3,780 acres of both timber land and meadow in the McCloud Flats area. Timber harvest would occur on approximately 3,485 acres, with the remaining 295 acres for meadow restoration and aspen release. Timber harvest outputs are expected to total a maximum of 30 million board feet (MMBF) of sawlog products and approximately 3,000 tons of biomass products. The STNF is proposing to conduct the Pilgrim Timber Sale for purposes of directly or indirectly helping to maintain a productive forest through treating areas that are facing high levels of mortality due to bark beetle infestation and root disease. Proposed treatments include the following:

1.1.1 Ponderosa Pine Dead Stand Harvest and Replant (a.k.a. green tree retention (GTR))

Approximately 375 acres of predominantly 95- to 110-year-old ponderosa pine stands would be harvested and re-planted due to problems associated with root disease and bark beetle infestation. Diseased trees with chlorotic foliage, poor crown condition, poor needle retention and/or evidence of successful insect attacks would be removed. Approximately 40% of the trees in these stands are already dead and have already lost their foliage. These trees are scattered throughout the stand and in small pockets. Where available, 6 to 10 healthy, full-crowned trees per acre would be retained. All tree species (i.e., white fir, incense-cedar, sugar pine, Douglas-fir, and black oak) other than ponderosa pine would remain in place. Retention areas would include the largest, oldest, and healthiest live trees (if available), decadent trees, and hard snags. Residual slash would be tractor piled and burned. Areas would be re-planted with mixed species in shaded locations and ponderosa pine in open locations.

1.1.2 Knobcone Dead Stand Harvest and Replant

Approximately 10 acres of dead and dying knobcone pine would be harvested and re-planted. Residual slash would be tractor piled and burned, and areas would be replanted with ponderosa pine.

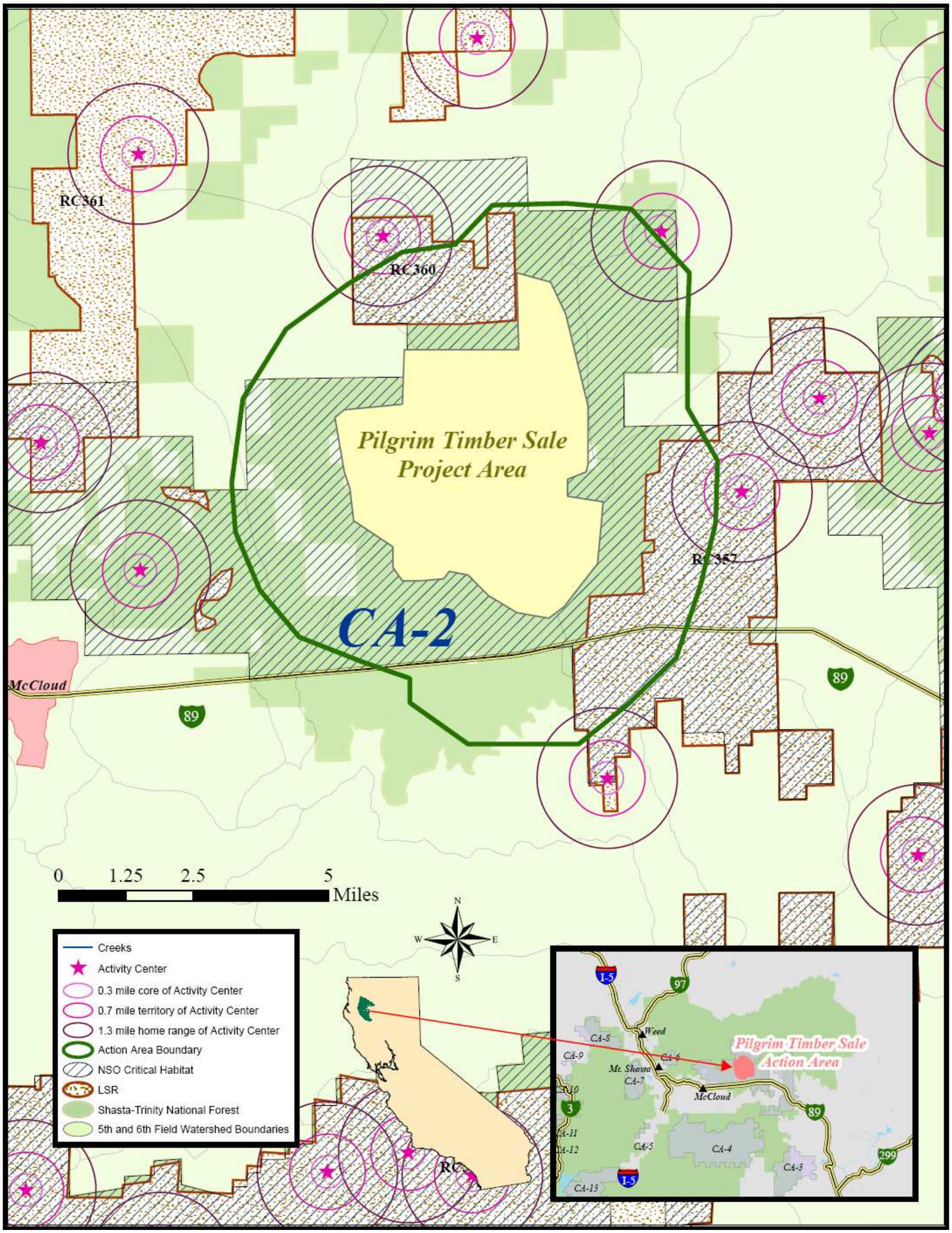
1.1.3 Thinning[1] - Standard Pine Prescription to 40 Percent Canopy

Approximately 1,200 acres of 75- to 95-year-old ponderosa pine stands that are dead or dying from insects, root disease, or drought would be thinned to 40 percent canopy. In remaining overstocked areas, STNF proposes to thin to a density of approximately 120 to 150 square feet of basal area. Additionally, areas larger than 1-acre in size would be planted if post-harvest evaluation determines that regeneration is needed due to past and present tree mortality.

---

[1] All thinning prescriptions (i.e., sections 1.1.3 – 1.1.6) include the removal of trees in the lower crown classes in addition to diseased or dying trees. The Forest Service's objective is to concentrate growth on the residual trees in the stands that would have the best ability to respond to a decrease in competition. These types of trees generally have larger crowns with a greater capacity to photosynthesize.

Figure 1. Project area for the Pilgrim Timber Sale Project, Shasta-McCloud Management Unit, Shasta-Trinity National Forest.



1.1.4 Thinning - Disease Control Prescription to 30 - 40 Percent Canopy

Approximately 1,075 acres of 75- to 110-year-old ponderosa pine stands are currently experiencing greater mortality than those stands to be treated with the standard thinning. These stands prescribed for disease control would be thinned to 30 to 40 percent canopy closure. Trees that are dead or dying from insects, root disease, or drought would be removed, followed by thinning any remaining overstocked areas to approximately 100 to 120 square feet of basal area. Areas larger than 1 acre in size would be planted if post-harvest evaluation determines that regeneration is needed due to past and present tree mortality.

1.1.5 Thinning - Old Tree Release to 40 Percent Canopy

Approximately 40 acres of two-storied mature stands would be thinned to 40 percent canopy to reduce understory ladder fuels and maintain older trees, especially pines.

1.1.6 Thinning - Older Plantation Biomass

Approximately 785 acres of 25- to 45-year-old ponderosa pine stands would be thinned from below to a spacing of approximately 20 feet. Approximately 90 percent of these stands are older plantations. After thinning is conducted, the fuel product would be converted primarily to wood chips.

1.1.7 Aspen Release

Approximately 20 acres of lands would be treated to release aspen trees from conifer competition. Therefore, all conifers within 100 to 150 feet of aspen would be removed.

1.1.8 Dry Meadow Restoration

Approximately 275 acres of historically dry meadow area would be treated to remove small diameter (i.e., less than 14 inches DBH) conifers and thin remaining overstory conifers to 80 square feet of basal area per acre. This treatment would restore the area to its original, open meadow condition.

1.1.9 Manage Forest Fuels

All stands that would receive thinning treatments (i.e., sections 1.1.3 – 1.1.6, totaling 2,100 acres) would be examined after harvest and (if necessary) be underburned and/or tractor piled to reduce excessive accumulations of downed wood and deep needle slash. The Forest Service estimates underburning would occur on approximately 200 acres (i.e., 9.5 percent of thinned areas) and tractor piling would occur on 700 acres (i.e., 33 percent of thinned areas).

1.1.10 Road Management

Approximately 9 miles of existing roads would be permanently closed following harvest and fuel treatment activities. Additionally, approximately 2.6 miles of existing roads would be decommissioned and removed from the forest road system. Approximately 0.3 mile of new temporary road would need to be constructed in unit #9 prior to harvest and fuel treatment activities to reduce skidding distance.

1.1.11 Proposed Conservation Measures
Proposed conservation measures include the following:

- Borax would be applied on stumps following tree removal to prevent the spread of *annosus* root disease. The use of all other herbicides or pesticides would be prohibited.
- All snags[2] larger than 15 inches DBH which are not hazardous to operations would be left in place at an average of 2 per acre.
- Deadwood requirements as outlined in the Forest's LRMP would be met (i.e., at least 6 logs and 1.5 standing snags per acre). In areas where this cannot be met with existing conditions, one 10-by-10 foot minimum slash pile or equivalent 5 to 15 tons maximum large deadwood per acre would be left unburned where tractor piling is prescribed. Cull logs greater than 20-inches at the large end would not be included in the timber sale. However, slash piles within 200 feet of a system road may be burned to reduce hazards and improve visual quality.
- Hardwoods would be maintained and managed for sustainability, by removing all competing conifers within 100 to 150 feet. If needed, aspen stands would be protected by installing fencing following harvest to prevent cattle grazing and enhance tree growth. Oaks, uncommon in the project area, would be protected and released.
- A Forest Service administrator would conduct weekly inspections of harvest operations to ensure compliance, and the range officer/biologist would monitor aspen/oak/prescribed burn areas and require installation of additional fencing if overgrazing occurs.

1.2 Definition of the Action Area
The action area is defined as all areas to be affected directly or indirectly by the Federal action, including interrelated and interdependent actions, and not merely the immediate area involved in the action (50 CFR §402.02). The action area for the Pilgrim Timber Sale includes all lands within a 1.5-mile radius of the project site (i.e., 7,700 total acres), while the project area totals 3,780 acres of Forest Service property. The action area lies entirely within Matrix in Management Area 2 and northern spotted owl critical habitat unit (CHU) CA-2. Late-successional reserve RC-260 (Elk Flat) is adjacent to the northwest edge of the project area.

2 Status of the Species/Northern Spotted Owl Critical Habitat

This Biological Opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Rather, we are relying on the statute and the August 6, 2004, Ninth circuit court of Appeals decision in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service* (No. 03-35279) to complete the following analysis with respect to critical habitat.

2.1 Legal Status

On January 15, 1992, the Service designated critical habitat for the northern spotted owl within 190 CHUs which encompass nearly 6.9 million acres across Washington (2.2 million acres), Oregon (3.3 million acres), and California (1.4 million acres) (USDI Fish and Wildlife Service 1992). The northern spotted owl critical habitat final rule states: "Section 7 analysis of activities affecting owl critical habitat should consider provinces, subprovinces, and individual CHUs, as

[2] The Forest Service expects recruitment of additional snags would occur due to continual disease problems within the stands.

well as the entire range of the subspecies (page 1823)." The rule goes on to assert the basis for an adverse modification opinion should be evaluated at the provincial scale (page 1823).

2.2 Description of Critical Habitat

2.2.1 Primary Constituent Elements

Primary constituent elements (PCEs) are the physical and biological features of critical habitat essential to a species' conservation. The PCEs identified in the northern spotted owl critical habitat final rule include those physical and biological features that support nesting, roosting, foraging, and dispersal (57 *Federal Register* 1796). Features that support nesting and roosting habitat typically include a moderate to high canopy (60 to 90 percent); a multi-layered, multi-species canopy with large [> 30 inches diameter at breast height] overstory trees; a high incidence of large trees with various deformities (e.g., large cavities, broken tops, mistletoe infections, and other evidence of decadence); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for owls to fly (Thomas et al. 1990). Foraging habitat generally consists of attributes similar to those in nesting and roosting (57 *Federal Register* 1796). Dispersal habitat, at minimum, consists of stands with adequate tree size and canopy closure to provide protection from avian predators and at least minimal foraging opportunities: there may be variations over the owl's range (e.g., drier sites in the east Cascades or northern California) (57 *Federal Register* 1796).

2.3 Conservation Role

Northern spotted owl critical habitat was designated based on the identification of large blocks of suitable habitat that are well distributed across the range of the spotted owl. Critical habitat units were intended to identify a network of habitats that provided the functions considered important to maintaining a stable, self-sustaining, and interconnected populations over the range of the northern spotted owl, with each CHU having a local, provincial, and a range-wide role in northern spotted owl conservation. Most CHUs were expected to provide suitable habitat for population support, some were designated primarily for connectivity, and others were designated to provide for both population support and connectivity.

The NWFP was developed using conservation principles similar to those used to designate critical habitat and is considered the Federal contribution to the conservation of northern spotted owls and its habitat in the United States. Specifically, LSRs were created under the NWFP to provide large blocks of suitable habitat capable of supporting multiple pairs of northern spotted owls. Standards and Guidelines of the NWFP establish that LSRs will be managed to protect and enhance late-successional and old-growth forests ecosystems. Riparian Reserves and other NWFP land use allocations provide for connectivity between reserves. Approximately 70 percent of suitable habitat in CHUs overlaps with NWFP LSRs on a range-wide basis and will therefore be managed to protect and enhance suitable habitat characteristics.

2.4 Current Condition of Northern Spotted Owl Critical Habitat

2.4.1 Current Range-wide Condition

In 1994, the FSEIS for the NWFP established that 3,141,987 acres of suitable habitat existed within spotted owl CHUs on Federal lands (USDA Forest Service and USDI Bureau of Land Management 1994). To assess changes to the baseline condition since implementation of the NWFP, the Service relied on information in section 7 consultations and available information on natural events. Hereafter, suitable habitat refers to habitat that provides for nesting, roosting, and foraging, and critical habitat and effects to critical habitat refer to suitable habitat within spotted owl critical habitat.

Between 1994 and July 19, 2005, the Service has consulted on the removal or downgrading of 45,118 acres (1.43 percent) of critical habitat due to management-related activities (Appendix A). The majority of these consulted-on effects, over 34,000 acres, have been concentrated in the Oregon Cascades West and Oregon Klamath Mountains Provinces. Natural events, including fire and insect outbreaks, have resulted in the removal or downgrading of approximately 42,679 acres (1.39 percent) of critical habitat extant in 1994 (Table 1). In general, fires have had more of an impact to critical habitat in the interior provinces of Washington and California and the southern and interior provinces of Oregon than the coastal provinces. Over 50 percent of the critical habitat removed or downgraded from fire can be attributed to the 1999 Megram Fire that burned in north-central California and the 2002 Biscuit Fire that burned in southwest Oregon and northern California.

Although most provinces within the range of the spotted owl have experienced some degree of habitat loss since 1994, total effects have been disproportionately distributed. The majority of effects to critical habitat (approximately 98 percent) have been concentrated in just six physiographic provinces (Washington East Cascades, Washington West Cascades, Oregon Klamath Mountains, Oregon Cascades East, Oregon Cascades West, and California Klamath) (Table 1). Of the remaining six provinces, one (Oregon Willamette Valley) had no designated critical habitat, one (Washington Western Lowlands) had no suitable habitat within critical habitat, and four provinces (Olympic Peninsula, Oregon Coast Range, California Coast Range, California Cascades) had less than one percent of their critical habitat removed or downgraded since 1994.

2.4.2 Current Province-by-Province Condition

Washington East Cascades: This province, which contains 18 CHUs, is located east of the Cascade Crest and provides the easterly extension of the northern spotted owl in Washington. Approximately 8,492 acres of critical habitat, or 2.6 percent of its provincial baseline, have been removed or downgraded since 1994. The majority of effects have been concentrated in the northern half of the province and resulted primarily from the Tyee, Needles, North 25 Mile, and Maple Fires. The largest of these fires, the Tyee, removed or downgraded approximately 3,600 acres of suitable habitat from WA-06, WA-09, and WA-11. The Maple Fire removed or downgraded an additional 300 acres of suitable habitat from to WA-06. The Needles and North 25 Mile Fires removed or downgraded approximately 2,500 acres (23 percent) and 474 acres (28 percent) of suitable habitat from WA-02 and WA-04, respectively. Collectively, the units impacted by these fires are important for the range-wide distribution of the northern spotted owl as they occur on the eastern and northeastern edge of the species range (USDI Fish and Wildlife Service 1991). Additionally, these CHUs provide essential habitat for intra-provincial connectivity (USDI Fish and Wildlife Service 1991).

Washington West Cascades: This province, which contains 23 CHUs and the most critical habitat of the Washington provinces, is located west of the Cascade Crest. It is characterized by significant differences in topography and distribution of habitat between its northern and southern portions. Approximately 4,994 acres of critical habitat, or one percent of its provincial baseline, has been consulted on for removal or downgrading from 6 CHUs since 1994. Although impacts to 5 of these units have been relatively minor (less than 2.5 percent of their baseline) WA-39 has had 1,776 acres of suitable habitat (46 percent) consulted-on for removal or downgrading. The WA-39 CHU is expected to provide connectivity between the Western Cascades and Western Lowlands Provinces and improve the distribution of owls and habitat in the portion of the province impacted by the 1980 Mount Saint Helens eruption (USDI Fish and Wildlife Service 1991). Fire has not resulted in measurable impacts to critical habitat in this province.

Oregon Klamath Mountains: The Oregon Klamath Mountains Province contains 16 CHUs and provides the link between the Oregon Cascades West and Oregon Coast Range Province south into California. Since 1994, this province has had more critical habitat removed or downgraded than any other province (i.e., 31,365 acres or 10.01 percent). In general, effects to critical habitat have been evenly distributed between those consulted upon (13,912 acres) and those attributable to fire (17,453 acres) effects. Although consulted-on effects were distributed across 11 CHUs, approximately 36 percent of consulted-on effects have occurred in two adjacent units (i.e., OR-74 and OR-75). Together, these units provide an east-west linkage in the southern portion of the Klamath Mountains Province and provide essential nesting, roosting, foraging, and dispersal habitat in a highly fragmented area (USDI Fish and Wildlife Service 1991). The majority of fire effects in this province can be attributed to the Biscuit Fire. This fire removed or downgraded approximately 23, 46, and 37 percent of the suitable habitat within OR-68, OR-69, and OR-70, respectively. These units were identified for their important contributions to inter- and intra-provincial connectivity and to provide essential nesting, roosting, foraging, and dispersal habitat in areas where habitat is lacking (USDI Fish and Wildlife Service 1991).

Oregon Cascades West: This province is located in the geographic center of the northern spotted owl range and contains more critical habitat (over 894,000 acres) than any other province. It provides links with the Washington Cascades, Oregon Coast Range, and Klamath Mountains Provinces. Since 1994, approximately 22,219 acres (2.48 percent) of its provincial baseline have been removed or downgraded. Consulted-on effects have been widely dispersed, occurring in 26 of the 29 CHUs in this province. In general, this has resulted in relatively small impacts to individual units. However, two adjacent units (i.e., OR-23 and OR-24) have experienced relatively concentrated effects, having 215 acres (14.3 percent) and 946 acres (48.8 percent) removed or downgraded, respectively. Together these units were identified as being important inter-provincial links between the Coast Ranges and the Oregon Cascades West Provinces (USDI Fish and Wildlife Service 1991). Fire has had limited effects to critical habitat in this province removing or downgrading only 1,216 acres or less than 0.5 percent of the provincial baseline.

Oregon Cascades East: The Oregon Cascades East Province provides the easterly extension of the northern spotted owl in Oregon and contains all or portions of 10 CHUs. Since 1994, 8,584 acres (6.18 percent) of its provincial baseline has been removed or downgraded. The majority of these acres (i.e., approximately 6,878 acres) are a result of several fires during 2002 and 2003. Impacts of these fires were concentrated in the central portion of this province where approximately 20 percent of the extant suitable habitat in OR-3 and OR-4 and over 36 percent of the suitable habitat in OR-7 were removed or downgraded. Critical habitat units OR-3 and OR-4 were designated to maintain suitable habitat and support dispersal along the eastern slope of the Oregon Cascades (USDI Fish and Wildlife Service 1991). Critical habitat unit OR-7 provides a north-south link within the province and an inter-provincial link with the Oregon Cascades West Province. Consulted-on effects have been evenly distributed, occurring in 8 of 10 CHUs and resulting in less than a five percent reduction (through removal or downgrading) of suitable habitat within any individual CHU.

California Klamath: The California Klamath Province contains all or portions of 36 CHUs and over 85 percent of the critical habitat in California. Approximately 10,483 acres of critical habitat (i.e., 3 percent of the provincial baseline) has been removed or downgraded from 14 CHUs within this province since 1994. The majority of these acres can be attributed to the Megram Fire. This fire removed or downgraded 9,390 acres (22 percent) of the suitable habitat within CA-30. This CHU is located in the west/central portion of this province and links the interior subprovinces with the coastal provinces and is expected to provide for up to 24 northern spotted owl pairs overtime (USDI Fish and Wildlife Service 1991). Two other small CHUs, CA-10 (9,637 acres) and CA-35 (12,470 acres), have had approximately 20 percent of their suitable habitat removed or downgraded from consulted-on actions. The primary function of these CHUs is to provide intra-provincial connectivity in the eastern and southcentral portion of this province, respectively (USDI Fish and Wildlife Service 1991).

2.5 Conservation Efforts on Non-Federal Lands

FEMAT noted that limited Federal ownership in some areas constrained the ability to form an extensive reserve network to meet conservation needs of the northern spotted owl. Thus, non-Federal lands were an important contribution to the range-wide goal of achieving conservation and recovery of the northern spotted owl. The Service's primary expectations for private lands are for their contributions to demographic support (pair or cluster protection) to and/or connectivity with NWFP lands. Additionally, timber harvest within each state is governed by rules that may provide protection of northern spotted owls and/or their habitat to varying degrees.

- *Washington*: In 1993, the State Forest Practices Board adopted rules (Forest Practices Board 1996) that would "contribute to conserving the northern spotted owl and its habitat on non-Federal lands" based on recommendations from a Science Advisory Group which identified important non-Federal lands and recommended roles for those lands in spotted owl conservation (Hanson et al. 1993, Buchanan et al. 1994). Spotted owl-related Habitat Conservation Plans (HCPs) in Washington generally provide both demographic and connectivity support as recommended in these reports and the draft recovery plan (USDI Fish and Wildlife Service 1992).

- *Oregon*: The Oregon Forest Practices Act provides for protection of 70-acre core areas around known northern spotted owl nest sites, but it does not provide for protection of northern spotted owl habitat beyond these areas (ODF 2000). In general, no large-scale northern spotted owl habitat protection strategy or mechanism currently exists for non-Federal lands in Oregon. The four northern spotted owl-related HCPs currently in effect address relatively few acres of land. However, they will provide some nesting habitat and connectivity over the next few decades.

- *California*: In 1990, State Forest Practice Rules (FPRs), which govern timber harvest on private lands, were amended to require surveys for northern spotted owls in suitable habitat and to provide protection around activity centers (CDF 2001). Under the FPRs, no timber harvest plan (THP) can be approved if it is likely to result in incidental take of Federally-listed species, unless authorized by a Federal HCP. The California Department of Fish and Game initially reviewed all THPs to ensure that take was not likely to occur; the Service took over that review function in 2000. Several large industrial owners operate under Spotted Owl Management Plans that have been reviewed by the Service; the plans specify basic measures for northern spotted owl protection. Three HCPs, authorizing take of northern spotted owls, have been approved. Implementation of these plans will provide for northern spotted owl demographic and connectivity support to NWFP lands.

2.6 New Threats

Two new threats identified to the species (i.e., wildfire and sudden oak death) after the time of listing have the potential to affect habitat components of the PCEs that the northern spotted owl rely upon. Therefore, these threats are included as discussion below.

Wildfire

There was recognition that catastrophic wildfire posed a threat to the northern spotted owl at the time of listing (USDI Fish and Wildlife Service 1990). However, new information suggests fire may be more of a threat than previously thought. In particular, the rate of habitat loss in the relatively dry East Cascades and Klamath provinces has been greater than expected (see Section 3.2.1 Habitat Trends). Furthermore, we now recognize that our ability to protect spotted owl habitat and viable populations of spotted owls from these large fires through risk-reduction endeavors is largely uncertain (Courtney et al. 2004).
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In 1994, the Hatchery Complex wildfires burned 17,603 ha in the Wenatchee National Forest, eastern Cascades, Washington, affecting six northern spotted owl activity centers (Gaines et al. 1997). Spotted owl habitat within a 2.9 km radii of the activity centers was reduced by 8 to 45 percent (mean = 31%) due to direct effects of the fire and by 10 to 85 percent (mean = 55%) due to delayed mortality of fire-damaged trees and insect caused tree mortality. Spotted owl habitat loss was greater on mid to upper slopes (especially south-facing) than within riparian areas or on benches (Gaines et al. 1997). Direct mortality of spotted owls was assumed to have occurred at one site. Data were too sparse for reliable comparisons of site occupancy or reproductive output between sites affected by the fires and other sites on the Wenatchee National Forest.

Two wildfires burned in the Yakama Indian Reservation, eastern Cascades, Washington, in 1994, affecting home ranges of two radio-tagged spotted owls (King et al. 1997). Although the amount of home ranges burned was not quantified, spotted owls were observed using areas that received low and medium intensity burning. No direct mortality of spotted owls was observed even though thick smoke covered several spotted owl site centers for a week.

Sudden Oak Death

Sudden oak death was recently identified as a potential threat to the spotted owl (Courtney et al. 2004). This disease is caused by the fungus-like pathogen, *Phytopthora ramorum*, that was recently introduced from Europe and is rapidly spreading. At the present time, sudden oak death is found in natural stands from Monterey to Humboldt Counties, California, and has reached epidemic proportions in oak (*Quercus* spp.) and tanoak (*Lithocarpus densiflorus*) forests along approximately 300 km of the central and northern California coast (Rizzo et al. 2002). It has also been found near Brookings, Oregon, killing tanoak and causing dieback of closely associated wild rhododendron (*Rhododendron* spp.) and evergreen huckleberry (*Vaccinium ovatum*) (Goheen et al. 2002). It has been found in several different forest types and at elevations from sea level to over 800 m. It poses a threat of uncertain proportion because of its potential impact on forest dynamics and alteration of key habitat components (i.e., hardwood trees); especially in the southern portion of the spotted owl's range (Courtney et al. 2004).

2.7 Consulted-Upon Effects to Designated Critical Habitat

Prior to 2001, rangewide habitat information and classification were not consistently collected by Forest Service/BLM administrative units, nor did Service offices consistently track habitat effects. In response to litigation (i.e., *Gifford Pinchot Task Force vs. U.S. Fish and Wildlife Service*), the Service formalized a rangewide process in 2001 to define, classify, and quantify habitat and effects to northern spotted owl habitat. The disparate approaches to classifying and quantifying habitat information forced the Service to select common denominators to provide comparable and meaningful measures for creditable rangewide analyses. Because information on dispersal habitat, a primary constituent element of critical habitat, was not consistently collected rangewide, this analysis is conducted at the provincial or administrative unit scale.

Since 1994, approximately 1.5 percent (46,994 acres) of extant critical habitat was consulted upon for removal or downgrading[3]. Removal refers to habitat that provides for nesting, roosting, or foraging before an effect, but no longer provides any habitat function after an effect. Downgrading refers to habitat that was suitable before an effect but has reduced function after an effect, e.g., habitat suitable for nesting/roosting prior to an action, functions only as foraging or as dispersal habitat after an effect. Degrading refers to a decrease in habitat quality, but not function.

Effects to critical habitat have not been evenly distributed throughout the range of the northern spotted owl and the majority of effects (i.e., approximately 99 percent) occurred in NWFP allocations intended to provide only connectivity among reserves (Matrix and Adaptive Management Areas). Reserves (including LSRs), which were intended to provide large blocks of habitat to support clusters of breeding pairs, remain relatively unaltered by management activities.

The Klamath Province has experienced only a small amount of the consulted-upon effects to critical habitat range-wide (Appendix B). Critical habitat that has been consulted upon for downgrading or removal has occurred on 808 acres within the Klamath Province. Most (approximately 70 percent totaling 32,915 acres) of consulted-on effects to critical habitat range-wide occurred in the Oregon Klamath Mountains and Western Oregon Cascades Provinces. These provinces provide large blocks of suitable habitat to support population cluster and intra-provincial connectivity. The Oregon Klamath Mountains Province provides a link between the Oregon Coast Range and Western Oregon Cascades Provinces and south into the northern California provinces. The northern portion of the Western Oregon Cascades Province provides the link to the Washington Cascades across the Columbia Gorge area of concern while the southern portion of this province shares the three linkage areas within the Interstate 5 area of concern which connect this province with the Oregon Coast Range and Oregon Klamath Mountains Provinces (USDA Forest Service 2001).

Outside the Klamath Province, 45,897 acres of suitable habitat were consulted-on for removal or downgrading from designated critical habitat on a range-wide basis. Most (nearly 99 percent or 45,481 acres) of these effects occurred outside of reserves, generally on matrix lands. These effects were dispersed over 11 physiographic provinces and less than 2 percent of existing

[3] The percent of consulted-upon critical habitat acres is based on a search of records in the NSO Consultation Effects Tracking Database on January 5, 2006.

suitable critical habitat was removed from any individual province, with the exception of the Oregon Klamath Mountains Province (4.1% removed/downgraded) and the Western Oregon Cascades (2.2% removed/downgraded).

The removal or downgrading of suitable critical habitat occurred to varying degrees across the northern spotted owls range. However, since 1994, only 1.5 percent (46,705 acres) of extant suitable critical habitat range-wide was removed or downgraded. Nearly 99 percent occurred in Matrix and CHUs in all provinces appear to be functional. Therefore, the Service concludes that consulted-on effects to critical habitat have not impaired its ability to provide for northern spotted owl conservation across the species range.

2.8 Summary of Effects to Range-wide Critical Habitat

This range-wide evaluation of critical habitat indicates that effects (consulted-on and fire effects) to date have impaired, to varying degrees, the ability of individual CHUs to fulfill their intended functions. However, these effects have not precluded the CHU network from providing for northern spotted owl conservation across the species range. This conclusion is based on the following: (1) only 1.5 percent of designated critical habitat has been affected by consulted-on actions range-wide; (2) although the majority of consulted-on effects occurred in the Oregon Klamath Mountains and Western Oregon Cascades Provinces, the Service believes the CHU network within these provinces continues to function; (3) the majority of consulted-on effects occurred in non-reserves, primarily in Matrix, consistent with the expectations of the NWFP; (4) although natural disturbances have resulted in the removal and degradation of large blocks of suitable habitat and reduced the resilience of the individual CHUs to future effects, they have not precluded the CHU network from functioning within any province or rangewide; and (5) the approximately 73 percent overlap between LSRs and CHUs augments the ability of CHUs to provide suitable habitat for population support through LSR standards and guidelines designed to protect and enhance late-successional and old-growth forests.

3 Environmental Baseline for the Pilgrim Timber Sale

The environmental baseline is an account of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem within the action area (USDI Fish and Wildlife Service and USDC National Marine Fisheries Service 1998). The environmental baseline represents a “snapshot” in time of the current condition, and provides the context for the analysis of potential effects of the proposed action on the species. As stated in Section 1.2, the action area for the proposed action consists of approximately 7,700 acres.

3.1 Conservation Needs of Northern Spotted Owl Critical Habitat in the Action Area

The Pilgrim Timber Sale project area (3,780 acres) lies entirely within CHU CA-2, forming 4.2 percent of the 89,028 acres that constitute CHU CA-2. The proposed actions would remove approximately 673 acres of low-capability, relatively open dispersal habitat and 1,251 acres of capable/potential habitat due to plantation thinning, dead stand replacement, and restoration activities in CHU CA-2. The 673 acres of dispersal habitat was originally classified as 3N foraging habitat (659 acres) and 4G nesting-roosting habitat (14 acres; see section 3.2.1 below). However, the habitat is actually unsuitable for foraging, nesting, or roosting, due to the tree distribution and based on field reviews conducted by Forest biologists. The distribution of trees in the project area is very clumpy and non-uniform; these areas are often less than 1-acre patches of dense trees surrounded by non-forest. Critical habitat unit CA-2 was designated to provide easterly distribution of the subspecies and to provide an opportunity to designate an area that may eventually support contiguous nesting habitat for up to 15 northern spotted owl pairs. Additionally, the Shasta-McCloud area has been repeatedly recognized as an area of concern due to checkerboard land ownership, an extensive logging history, and dry climate conditions that result in a dominance of ponderosa pine with relatively open canopies. The area supports low northern spotted owl densities, resulting in concern over restricted genetic interchange with the California spotted owl subspecies.

3.2 <u>Current condition – Habitat and Population Trends in the Action Area</u>

3.2.1 Habitat Trends

For the purposes of this BO, the following habitat definitions apply (see Appendix C): high quality nesting/roosting (N/R) habitat includes those stands that are classified as 4G and 4N; moderate quality N/R refers to 3G stands; foraging (F) habitat refers to 3N stands; and dispersal-only habitat includes 4P/S stands.

As stated in section 3.1 above, the 89,028-acre CHU CA-2 protects an area that supports genetic interchange between the northern spotted owl and California spotted owl subspecies. The majority of this CHU is managed by STNF. The action area is highly fragmented, and characterized by natural openings and open forest, as well as old harvested areas. Stands of ponderosa pine and fir may achieve canopy cover greater than 40 percent, but are subject to damage and mortality due to root disease, blackstain fungus, and bark beetles, increasing the habitat fragmentation within the area. The limited water, slope, and aspect characteristic of the McCloud Flats are less preferred by prey species of the northern spotted owl (USDA Forest Service 2005). As a result, the Forest Service anticipates that these factors are preventing the use of the McCloud Flats area by northern spotted owls for nesting, roosting, or foraging, and limiting its use for dispersing. Only 17 percent of the Ash Creek and Upper McCloud watersheds contains dispersal habitat, and only 26 percent of the watersheds is capable of producing dispersal habitat (USDA Forest Service 2005). However, the small groups of trees present appear to provide areas of protection for owls dispersing through the McCloud Flats.

Private lands within the Ash and Upper McCloud 5th field watersheds where the Pilgrim Timber Sale Project is proposed are intensely managed for timber, with the larger trees continuously removed (USDA Forest Service 2005). These areas are currently unsuitable for N/R or F habitat, although some areas remain suitable as low-capability dispersal habitat.

3.2.2 Spotted Owl Numbers, Distribution, and Reproduction Trends

Multiple observations or sightings of northern spotted owls have occurred in the action area according to historical records. Activity centers that fall within the analysis area include #215, #223, and the very extreme western edge of the home range of #203. These activity centers also harbor habitat characteristics similar to those described in section 3.2.1 above. Only one activity center (i.e., #222 which is located on the eastern edge of the action area) has had reproductive activity in the last 5 years according to recent survey efforts. Surveys found activity center #215 was occupied by a single female in 2003, indicating suitable habitat conditions (at least for dispersal opportunities at minimum) are present. No observations have been documented in the action area since this single female occurrence.

3.3 Factors affecting the Species Environment/Critical Habitat in the Action Area

This section of the biological opinion describes the factors affecting the environment of the species and/or critical habitat in the action area. These include all Federal, state, tribal, local, and private actions already affecting the species and/or critical habitat or that will occur contemporaneously with the proposed action.

3.3.2 Consulted-Upon Effects

Implementation of Forest Service projects in CHU CA-2 have focused primarily on removal of dead or dying trees infected by insects and disease or hazard tree removal activities. The following table lists all consulted-upon activities over the past 5 years within CHU CA-2.

Table 1. Consulted-Upon Activities in Critical Habitat Unit CA-2, Shasta-McCloud Management Unit, Shasta-Trinity National Forest.

Year	Consultation #	Project Name	Activity/Effects
2005	1-12-2005-I-3	Elk Flats Salvage Project	Salvage 100 acres of dead or dying trees.
	1-12-2005-I-2	Cattle Camp Vegetation Management Project	Thin 48 acres of fragmented forested area.
2004	1-12-2004-I-18	Kinyon Vegetation Management Project	Remove 150 acres of dead or dying trees.
	1-12-2004-I-13	Edson Management Project	Thin and remove in plantations and fragmented dispersal habitat areas.
2003	NONE		
2002	1-12-2002-I-22	Mountain Thin and Fuels Project	Thin 24 acres of fragmented forested area.
	1-12-2002-I-16	Sugar Roadside Hazard Tree Project	Remove 102 acres of hazard trees.
	1-12-2002-I-9	Intake Springs Water System and Tank Improvement Project	Remove 17 hazard trees.
	1-12-2002-I-8	Davis Vegetation and Road Management Project	Degrade 111 acres of foraging habitat.
2001	1-12-2001-I-16	Pilgrim Creek Snowmobile Park	On-going maintenance of grooming and hazard tree removal (pre-existing conditions included loss of 254 acres N/R and 1,874 acres of F habitat prior to critical habitat designation)

3.3.3 Natural Disturbances

An analysis of fire history in the area reveals that only one intensive fire occurred in the general area in 1928. However, only the northeast corner of CA-2 may have been affected by this fire (F. Mangels, STNF Wildlife Biologist, pers. comm. 2005).

3.3.4 Summary

The Service concludes that consulted-upon effects and natural disturbances have had a minor impact to CHU CA-2 since its designation in 1992. Additionally, the greater extent of vegetation management projects that have occurred over the past 5 years have benefited CHU CA-2 through removal of trees infected by disease and beetle infestation. These areas harbored predominantly dead or dying trees which were infecting live, healthy trees and causing continual degradation of the remaining higher quality habitat. As a result, we believe the Forest’s actions have benefited CHU CA-2 in helping maintain and improve habitat conditions for the northern spotted owl. Therefore, we believe that this CHU continues to function in the manner for which it was designated.

4 Effects of the Pilgrim Timber Sale

This section presents an analysis of the direct and indirect effects of the proposed action, including interrelated and interdependent actions, on northern spotted owl critical habitat. Implementation of the project as proposed will involve GTR treatments, commercial thinning, aspen release, dry meadow restoration activities, and road management. The degree to which these activities affect northern spotted owl critical habitat is presented with respect to destruction or adverse modification of critical habitat. Additionally, these effects are then discussed with respect to the conservation needs of the northern spotted owl within the action area and within the larger conservation strategy established for the owl by the NFWP: 1) protection of large blocks of habitat to provide for clusters of breeding pairs of northern spotted owls; 2) distribution of protected areas across a variety of ecological conditions; and 3) provision of suitable connectivity habitat within the intervening matrix to support survival and movement across the landscape between reserves.

The proposed project activities have the potential to result in adverse effects to critical habitat of the northern spotted owl. Critical habitat units contain the following types of habitat: (1) suitable habitat, which supports the physical and biological features necessary for northern spotted owl nesting, roosting, and foraging; (2) dispersal habitat, which supports the physical and biological features necessary for northern spotted owl dispersal; (3) capable habitat, which is currently not suitable but could develop into suitable or dispersal habitat; and (4) non-owl habitat, where the physical properties of a site make it incapable of ever becoming owl habitat. Suitable and dispersal habitat can be removed, downgraded, or degraded as described in section 4.1.1.2. Capable habitat can be retarded or precluded from developing the primary constituent elements of critical habitat.

4.1 <u>Habitat Modification</u>

Forest management activities can modify suitable northern spotted owl habitat to varying degrees, leading to direct and indirect effects on spotted owls or their habitat at both site-specific and more landscape-level scales as discussed below.

4.1.1 Scientific Basis for Effects

4.1.1.1 Site-Specific Effects. Forest management activities, whether intended to address silvicultural needs or to facilitate other actions (e.g., mining, recreation) have the potential to reduce availability of northern spotted owl nest and roost sites. Northern spotted owls do not construct their own nests, but depend upon existing structures such as cavities and broken tree tops, characteristics associated with stands in later seral stages of development. Silvicultural prescriptions (e.g., GTR prescriptions) or management activities that specifically target the oldest, most decadent trees in the stand for economic purposes, or require removal of hazard trees and snags to address human safety concerns, are likely to result in loss of nesting opportunities for spotted owls by removing the trees that contain those structures (Blakesley et al. 1992). Further, treatments designed to reduce or remove ladder fuels or release co-dominant individuals can simplify vertical structure in the forest understory, where spotted owls perch for hunting or roosting (Forsman et al. 1984).

Activities such as intermediate timber harvest, fuels reduction, thinning, or hazardous tree removal can contribute to changes in structure, diversity, and habitat microclimate by reducing overall canopy closure within a stand. Northern spotted owls prefer to nest and roost in older forests (55 *Federal Register* 26114, Blakesley et al.1992) presumably because they provide protection under most weather conditions (Forsman et al. 1984, North et al. 2000). During periods of rain, snow, or cold, Forsman et al. (1984) found northern spotted owls roosting significantly higher in the forest overstory than during hot weather, when northern spotted owls were commonly found roosting low in the forest understory. Weathers et al. (2001) documents physiological limitations that corroborate results of laboratory work and field studies which determined low heat tolerance of spotted owls compared to typical birds.

Various forestry activities that remove large trees, snags, and downed wood can affect prey composition and/or availability by altering characteristics of the habitat upon which prey species depend. Because the number of snags and amount of down material present on the forest floor are positively correlated with densities of some northern spotted owl prey species, removing these materials or temporarily disturbing material on the forest floor may contribute to declines in northern spotted owl prey, at least on a localized, short-term basis (Williams et al. 1992, Bevis et al. 1997). It may also be possible for prey species to be adversely affected by incidental loss of hardwoods, hazard trees, or snags during harvest. Because availability of large prey species, particularly dusky-footed woodrat and northern flying squirrels, has been shown to be important for northern spotted owl reproductive success (Barrows 1985, Zabel et al. 1995), activities that reduce prey populations could lower spotted owl recruitment and individual fitness.

4.1.1.2 Landscape-Scale Effects. Any individual or suite of site-specific effects discussed above could change the habitat function that a forested stand provides for owls. For the purpose of the following discussion, the degree of change to habitat function has been categorized using the following terms: removal, downgrade, and degrade. The term *removal* represents a complete loss of habitat function following an effect (i.e., an area that functioned as N/R, F, or dispersal habitat for northern spotted owls before the effect, no longer provides any habitat function for spotted owls after the effect). *Downgrade* refers to a reduction in the function of habitat (e.g., an area that functioned as nesting/roosting habitat before an effect, provides only dispersal habitat following the effect). *Degrade*, to be distinguished from *downgrade*, indicates a reduction in habitat quality, but not habitat function following the effect (e.g., an area that functioned as foraging habitat prior to the effect, still provides such function after the effect, but perhaps is more limited due to a temporary reduction in prey base).

Landscape-level changes in habitat availability, distribution, and configuration have implications to individual northern spotted owl survival and productivity, as well as to northern spotted owl population dynamics. For example, removal or downgrading of habitat within home ranges, and especially close to the nest site, can be expected to have negative effects on northern spotted owls. Bart (1995) reported a linear reduction in northern spotted owl productivity and survivorship as the amount of suitable habitat within a spotted owl home range declined. In northwestern California, Franklin et al. (2000) found that survivorship of adult owls was greater where greater amounts of older forest were present around the activity center, but also found increased reproductive success where the amount of edge between older and younger forest was relatively high. Based on analysis of radio-telemetry data, Bingham and Noon (1997) reported that a sample of spotted owls in northern California focused their activities in heavily-used "core areas" that ranged in size from about 167 to 454 acres, with a mean of about 409 acres. These core areas, which included 60 to 70 percent of the owl telemetry locations during the breeding season, typically comprised only 20 percent of the area of the wider home range. These studies suggest that habitat removal within core areas could have disproportionately important effects on northern spotted owls. Other research has demonstrated that spotted owl abundance and productivity significantly decrease when the proportion of suitable habitat within 0.7 miles of an activity center falls below 500 acres (50 percent of the total 1,000 acres within 0.7 miles) (O'Halloran 1989, Simon-Jackson 1989, Thomas et al. 1990).

Timber harvest that produces relatively open stands (less than 40 percent canopy closure) or patch clear-cuts can fragment forest stands, creating more forest edge, and reducing the area of interior old forest habitat (Lehmkuhl and Ruggiero 1991). Habitat fragmentation has the potential to isolate individual northern spotted owls or populations of owls by increasing distances between suitable habitat patches and reducing habitat connectivity. Such isolation decreases the likelihood of successful dispersal of juvenile owls (Miller 1989), which in turn could reduce opportunities for genetic exchange between owl populations (Barrowclough and Coats 1985).

Currently there is little empirical data confirming that habitat fragmentation contributes to increased levels of predation on northern spotted owls. However, great horned owls (*Bubo virginianus*), an effective predator on spotted owls, are known to be closely associated with fragmented forest habitats (Johnson 1992). As mature forests are harvested, it is possible that great horned owls could colonize the fragmented forest and possibly increase northern spotted owl vulnerability to predation events.

4.1.2 Habitat Modification Related Effects of the Pilgrim Timber Sale

Proposed actions for the Pilgrim Timber Sale would remove approximately 673 acres of low-capability, relatively open dispersal habitat and affect 1,251 acres of capable/potential habitat due to plantation thinning, dead stand replacement, and restoration activities in CHU CA-2. The removal of the 673 acres of dispersal habitat accounts for approximately 1.5 percent of the suitable dispersal habitat within the Ash and Upper McCloud watersheds.

Overall, short-term effects to northern spotted owl critical habitat would occur through a reduction of overall canopy closure, removal of dispersal habitat, simplification in vertical structure from thinning prescriptions and prescribed burning, a reduction in snags and logs, and an increase in fragmentation of existing suitable dispersal habitat by creating areas that would be below connectivity habitat conditions. However, the removal of the majority of the trees in the project area is beneficial to the CHU due to currently severe forest pathogenic conditions. Additionally, the Forest anticipates they would not be able to maintain 15 percent retention in some areas (i.e., ponderosa pine and knobcone pine harvest and replant prescriptions, see sections 1.1.1 and 1.1.2) due to the extremely limited number of live, older ponderosa pine trees remaining.

A significant amount of suitable dispersal habitat would remain intact within the watershed and critical habitat boundary. The effects of the proposed project do constitute an adverse effect to the critical habitat because the function of the primary constituent elements (i.e., dispersal habitat) has been adversely affected. The Forest Service anticipates that canopy closure in thinned areas would recover to pre-harvest levels in approximately 25 years and that dispersal/connectivity habitat conditions would remain adequate through CHU CA-2 and the surrounding vicinity. However, due to the limited amount of dispersal habitat to be affected in the action area (i.e., 673 acres), the Service does not expect that this adverse effect will impede the ability of the action area to provide for the intended conservation needs of the northern spotted owl.

5 Cumulative Effects of the Pilgrim Timber Sale

Cumulative effects are those impacts of future State and private actions that are reasonably certain to occur within the area of the action subject to consultation. Future Federal actions will be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed action.

Private lands harbouring conifer stands within the Ash and Upper McCloud Creek watersheds are intensely managed for timber. However, no immediate private logging has been proposed within 1.3 miles of the assessment area, partly due to the recent removal of trees in this area. These lands remain unsuitable for northern spotted owl nesting, roosting, and foraging, although some lands remain suitable as low-capability dispersal habitat. There are currently no future Federal state actions planned within the action area. However, any future actions would be evaluated at a later date should they be proposed. Consequently, cumulative effects of the Proposed Action on northern spotted owl critical habitat are anticipated to be discountable.

6 Conclusion

The Service has reviewed the current, rangewide status of designated critical habitat for the northern spotted owl, the environmental baseline, the effects of the Pilgrim Timber Sale, and the cumulative effects. Based on this review, it is the Service's biological opinion that these actions are not likely to "destroy or adversely modify" designated critical habitat for the northern spotted owl. The Service has reached this conclusion based on following factors:

1. The change in the rangewide status of critical habitat due to consulted-upon effects is minor. Only approximately 1.5 percent of the amount of existing critical habitat has been consulted-on for removal or downgrading, and this habitat has been well distributed across the range of the northern spotted owl.

2. Natural events (e.g., wildland fire, insect, and disease disturbances) have impacted individual CHUs, but rangewide, the critical habitat network continues to function as designated within and among provinces.

3. Consulted-upon effects in the Klamath Physiographic Province have been minor. Overall, CHUs in this province continue to function as designated.

4. The effects of tree removal and/or degradation for the proposed action are limited to the removal of 673 acres of dispersal/connectivity habitat. No northern spotted owl nesting/roosting or foraging habitat would be affected. Although adverse, these effects to dispersal/connectivity habitat will not prevent CHU CA-2 to continue to function in maintaining these habitat conditions for the area.

The critical habitat network appears to function as designated at all scales of analysis. CHU CA-2 is anticipated to continue to function in the manner for which it was designated. Therefore, when considering the status of the rangewide and provincial CHU networks, the effects of the action, and the cumulative effects, the Pilgrim Timber Sale Project will not result in "destruction or adverse modification" of designated critical habitat for the northern spotted owl.

INCIDENTAL TAKE STATEMENT

1 Introduction

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the taking of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined (50 CFR 17.3) by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service (50 CFR 17.3) as actions that create the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

2 Amount or Extent of Take

The Service does not issue incidental take for adverse effects to designated critical habitat. The implementing regulations regarding incidental take (50 CFR. 402.14) apply to individuals of a listed species, not designated critical habitat. Therefore, the Pilgrim Timber Sale will not result in any incidental take.

3 Effect of the Take

The Service does not issue incidental take for adverse effects to designated critical habitat.

4 Reasonable and Prudent Measures

Pursuant to 50 CFR 402.14 (I) (ii), reasonable and prudent measures are those the Service considers necessary to minimize the impact of the incidental taking. Since no incidental take is authorized, no reasonable and prudent measures are necessary.

5 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of ESA, the Forest Service must comply with terms and conditions which implement any reasonable and prudent measures. However, no terms and conditions are necessary because no incidental take is authorized.

6 Monitoring Requirements

In order to monitor the impacts of incidental take, the Federal agency or any applicant **MUST** report the progress of the action and its impacts on the species to the Service as specified in the incidental take statement. However, reporting requirements are not necessary because no incidental take is authorized.

CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species and the ecosystems upon which they depend. Regulations in 50 CFR S.402.02 define conservation recommendations as Service suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, or regarding development of information.

The Service offers to the STNF the following conservation recommendations:

1) Design future forest management activities to reduce incidental take of spotted owls and impacts to other listed species and their habitat through continued interagency cooperation and planning with the Service.

2) Monitor the habitat utilization and occupancy rates of barred owls in the area to aid in assessing the threat of competition on northern spotted owl survival and recovery.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects, or benefiting listed species or their habitats, the Service requests notification of the implementation of these conservation recommendations.

RE-INITIATION - CLOSING STATEMENT

This concludes formal consultation on this action. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required when discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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APPENDIX A. Change in Northern Spotted Owl Critical Habitat[4] from 1994 to December 10, 2004, Resulting from Federal Management Actions and Natural Events by Physiographic Province.

Physiographic Province	1994 FSEIS Provincial Critical Habitat Baseline	Critical Habitat (acres) Removed/Downgraded, 1994-2004				% 1994 FSEIS Provincial Critical Habitat Baseline	% of all Rangewide Habitat Effects
		Management	Fire	Insect/Disease	Total		
WA							
Olympic Peninsula	197,009	71	0	0	71	0.04	0.08
East Cascades	326,592	1,035	6,925[5,6]	532	8,492	2.60	9.67
West Cascades	514,578	4,994	0	0	4,994	0.97	5.69
Western Lowlands	0	0	0	0	0	0.00	0.00
OR							
Coast Range	348,717	1,224	0	0	1,224	0.35	1.39
Klamath Mountains	313,269	13,912	17,453	0	31,365	10.01	35.72
Cascades East	138,684	1,706	6,878[3]	0	8,584	6.18	9.78
Cascades West	894,134	21,003	1,216	0	22,219	2.48	25.31
Willamette Valley	0	0	0	0	0	0.00	0.00
CA							
Coast Range	2,616	0	0	0	0	0.00	0.00
Cascades	50,687	365	0	0	365	0.72	0.41
Klamath	355,701	808	9,675	0	10,483	2.95	11.95
Total	3,141,987	45,118	42,147	532	87,797	2.79	100.00

[4] Critical habitat in this table refers to suitable habitat within spotted owl critical habitat.
[5] Habitat effects from some 1994 fires were included in the 2001 update, and thus, appear as consulted-on effects in the NSO Consultation Effects Tracking Database. For the purpose of this critical habitat update, habitat effects associated with those fires are included in the fire effects column.
[6] Includes fires in 2003.

APPENDIX B. Aggregate Results of All Adjusted, Critical Habitat (NRF[7]) Acres Affected by Section 7 Consultation for the Northern Spotted Owl; Baseline Summary of Effects By State, Physiographic Province and Land Use Function from 1994 to January 5, 2006.

	Physiographic Province[8]	Evaluation Baseline[9]			Habitat Removed/Downgraded[10]			% Provincial Baseline Affected	% Range-wide Affected
		Reserves[11]	Non-Reserves[12]	Total	Reserves[13]	Non-Reserves[14]	Total		
WA	Olympic Province	193081	3928	197009	-12	-59	-71	-0.04	0.15
	Eastern Cascades	225855	100737	326592	-87	-4549	-4636	-1.42	9.93
	Western Cascades	424273	90305	514578	-3	-5040	-5043	-0.98	10.80
	Western Lowlands	0	0	0	0	0	0	0.00	0.00
OR	Coast Range	332562	16155	348717	-50	-1200	-1250	-0.36	2.68
	Klamath Mountains	228112	85157	313269	-4	-12830	-12834	-4.10	27.48
	Cascades East	86882	51802	138684	-138	-1372	-1510	-1.09	3.23
	Cascades West	532571	361563	894134	-122	-19959	-20081	-2.25	43.00
	Willamette Valley	0	0	0	0	0	0	0.00	0.00
CA	Coast	2589	27	2616	0	0	0	0.00	0.00
	Cascades	47947	2740	50687	0	-472	-472	-0.93	1.01
	Klamath	322372	33329	355701	0	-808	-808	-0.23	1.73
Total		**2396244**	**745743**	**3141987**	**-416**	**-46333**	**-46705**	**-1.49**	**100.00**

[7] Nesting, roosting, foraging (NRF) habitat. In California, suitable habitat is divided into two components; nesting – roosting (NR) habitat, and foraging (F) habitat. The NR component most closely resembles NRF habitat in Oregon and Washington. Due to differences in reporting methods, effects to suitable habitat compiled in this, and all subsequent tables include effects for nesting, roosting, and foraging (NRF) for 1994 – 6/26/2001. After 6/26/2001 suitable habitat includes NRF for Washington and Oregon but only nesting and roosting (NR) for California.

[8] Defined by the Northwest Forest Plan as the twelve physiographic provinces, as presented in Figure 3&4-1 on page 3&4-16 of the FSEIS.

[9] 1994 FSEIS baseline (USDA and USDI 1994).

[10] Includes both effects reported in USFWS 2001 and subsequent effects reported in the Northern Spotted Owl Consultation Effects Tracking System (web application and database).

[11] Land-use allocations intended to provide large blocks of habitat to support clusters of breeding pairs.

[12] Land-use allocations intended to provide habitat to support movement of spotted owls among reserves.

APPENDIX C. Shasta-Trinity Timber and Successional Strata Definitions[13].

Table 1. Timber strata definitions used in reference to northern spotted owl habitat determinations. DBH refers to 'diameter at breast height'.

Size Class Definitions		**Density class Definitions**	
1	1 to 5.9 inches dbh.	S	10 to 19% canopy closure
2	6 to 12.9 inches dbh	P	20 to 39% canopy closure
3	13 to 24.9 inches dbh	N	40 to 69% canopy closure
4	25 to 40.0 inches dbh	G	> or equal to 70% canopy closure
5	> 40 inches dbh	6	two-storied stands

Table 2. Successional stage stratification based upon forest timber type.

Type	**Description**
Late-successional/Dense	4N, 4G, 5N, 5G: primarily commercial conifer forest. Includes 4P and 5P stands if they contain conifers as a primary component and conifers or black oak as a secondary component.
Late-successional/open	4S, 4P (except as noted above), 5S, 5P (except as noted above): primarily commercial conifer forest.
Mid-successional/dense	3N, 3G, 6 stands: primarily commercial conifer forest. Includes 3P stands if they contain conifers as a primary component and conifers or black oak as a secondary component.
Mid-successional/open	3S, 3P (excepted as noted above): primarily commercial conifer forest.
Early-successional/poles and saplings	2N, 2G and plantations older than 20 yrs: primarily commercial conifer forest. Includes 2S and 2P stands if they contain conifers as a primary and secondary component.
Early-successional/seedlings	1N, 1G and plantations younger than 20 yrs: primarily commercial conifer forest. Includes 1S and 1P stands if they contain conifers as a primary and secondary component.
Other	Includes hardwood stands, non-commercial conifer stands, early-successional S and P stands with conifers as a primary component and hardwoods as a secondary component with shrubs and grasses.

[13] Source: Forest-wide LSR Assessment, Shasta-Trinity National Forest, 1999.

Appendix J: Borax Report for Pilgrim Project

United States
Department of Agriculture

Forest Service

Shasta-Trinity National Forest
Shasta McCloud Management Unit

McCloud Ranger Station

P.O. Box 1620
McCloud, CA 96057
(530) 964-2184
(530) 964-2692 – TDD
www.fs.fed.us/r5/shastatrinity

File Code: 1950/2409 **Date:** March 27, 2006
Route To:

Subject: Borax Report for Pilgrim Project

To: Dennis Poehlmann, IDT Leader

I. Introduction

The presence of root disease within the project area is described in the EIS and includes both blackstain and Annosus root disease areas which are quite common in pine stands within the McCloud Flats where the project is located. The presence of root disease has had a long history in the project area with blackstain root disease infection centers being recognized in densely stocked ponderosa pine stands in the early 1970's and annosus root disease centers identified in 1980[1].

Annosum root disease is caused by the fungus, *Heterobasidion annosum*, which infects cut conifer stumps following thinning or cutting operations. Overland infection in regards to annosum root disease is through spores produced by the fungus which occupy freshly cut stump surfaces. The disease colonizes the stump and major lateral roots where it may remain up to 50 years depending on site conditions. The potential increase in annosum infection as a result of harvest activities is limited through the use of Borax applied on stump surfaces $\geq$ 14" diameter during harvest operation. Borax is toxic to annosus spores and therefore prevents infection[2].

Borax ($Na_2 B_4 O_7 10H_2O$ sodium tetraborate decahydrate) is used as a registered pesticide (fungicide) EPA Reg. No. 2935-501, EPA Est. No. 66196-CA-01 **(**WILBUR-ELLIS SPORAX®).

For prevention of *Heterobasidion annosum* (annosus) root disease, borax is applied to freshly-cut stump surfaces at a rate of one pound per 50 square feet of stump surface within four hours of creation. This is equivalent to one pound of borax on 36 sixteen-inch stumps (Sporax label, Wilbur-Ellis Company). Borax applications will follow all State and Federal rules and regulations as they apply to pesticides. It is estimated that approximately 1 pound of Borax/acre would be applied in thinning prescription stands and 1-2 pounds of borax per acre in harvest and replant stands based on borax application history in the area.

The Sporax label and material safety data sheet are displayed below:

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[1] Freeman, Wilfred , *Biological Evaluation of Tree Mortality on McCloud Flats*, Forest Insect and Disease Management, May, 1977
[2] Kliejunas, John and Bill Woodruff, *Pine Stump Diameter and Sporax Treatment in Eastside Pine Stands, Report* No R04-01, June 2004

WILBUR-ELLIS

IDEAS TO GROW WITH®

WILBUR-ELLIS

SPORAX

A BORAX FUNGICIDE
FOR CONTROL OF ANNOSUS ROOT DISEASE

ACTIVE INGREDIENT
SODIUM TETRABORATE DECAHYDRATE
($Na_2B_4O_7 \cdot 10H_2O$) 100%
Boric Oxide (B_2O_3) equivalent 37.50%

EPA Reg. No. 2935-501 EPA Est. No. 2935-CA-01

KEEP OUT OF REACH OF CHILDREN
DANGER

FIRST AID

If in eyes:	Hold eyelids open and rinse slowly and gently with water for 15-20 minutes.Remove contact lenses, if present, after first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.
If swallowed:	Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor.
If on skin or clothing:	Remove contaminated clothing and wash skin with soap and water. Rinse skin with plenty of water for 15-20 minutes. Call poison control center or doctor for treatment advice.
If inhaled:	Move person to fresh air. If person is not breathing, call 911 or ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.
You may also contact: (800) 424-9300 CHEMTREC (transportation & spills);
(800) 900-4044 Poison Control Center (human health);
(800) 345-4735 ASPCA (animal health)

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS

DANGER

Corrosive. Causes irreversible eye damage. Harmful if swallowed. Do not get in eyes or on clothing. Wear goggles or face shield. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash clothing before reuse. Do not leave container where children or animals may gain access.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applicators and other handlers must wear: Long-sleeved shirt and long pants, shoes, socks and waterproof gloves.

ENVIRONMENTAL HAZARDS

Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high-water mark. Do not contaminate water when disposing of equipment washwaters or rinsate. Borax carelessly spilled or applied to cropland or growing plants - including trees or shrubs - may kill or seriously retard plant growth.

IN CASE OF EMERGENCY, CALL CHEMTREC: (800) 424-9300

NET CONTENTS: 25 POUNDS

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

USE FOR CONTROL OF ANNOSUS ROOT DISEASE IN CONIFER STANDS: It has been established that the fungus, Heterobasidion annosum, often infects cut conifer stumps following thinning or cutting operations, and that the disease can spread from infected stumps to residual trees in the stand.

Several chemical agents have been used to limit the development of annosus root disease. Research has shown that Borax prevents establishment and growth of annosus in cut stumps of conifer tree species not already infected.

Before using the WILBUR-ELLIS SPORAX for stump treatment control of annosus infection, contact Local, State or Federal Forestry or plant pathology specialists to verify the most economical and efficient methods and materials for your situation.

Use of WILBUR-ELLIS SPORAX for this purpose includes all conifer tree species occurring in the stand being treated. WILBUR-ELLIS SPORAX should be applied to stump surface of the cut tree as soon after felling as practical. For most efficient use, apply immediately after cutting, but avoid delaying treatment more than one day.

The best method of application is to sprinkle the material "salt-shaker" style on the freshly cut stump surface. Complete coverage, including exposed side areas and any splinters, is necessary. Also level rather than sloping stump surfaces are preferred, especially in areas of high rainfall. "Shaker-top" applicators are available in most farm and garden shops in one or two pound sizes.

Apply enough WILBUR-ELLIS SPORAX to lightly cover entire stump surface. At proper rates of application, one pound of this product will adequately cover 50 square feet of stump surfaces; that is, 260 six-inch stumps, 158 eight-inch stumps, 80 ten-inch stumps, or 60 twelve-inch stumps.

When dry method is used, moisture in the exposed wood from freshly cut stumps, dew or rain, will dissolve the product and leach it into the wood.

STORAGE AND DISPOSAL

PROHIBITIONS: Do not contaminate water, food or feed by storage or disposal. Do not store where children or animals may gain access. Open burning and dumping prohibited. Do not reuse empty container.
PESTICIDE DISPOSAL: Pesticide, spray mixture or rinsate that cannot be used or chemically reprocessed should be disposed of according to procedures approved by Federal, State or Local disposal authorities.
CONTAINER DISPOSAL: Consult Federal, State or Local disposal authorities for approved procedures.

WARRANTY STATEMENT

WILBUR-ELLIS COMPANY warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for purposes stated on such label only when used in accordance with directions under normal use conditions. It is impossible to eliminate all risks inherently associated with use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials or the manner of use or application, all of which are beyond the control of WILBUR-ELLIS COMPANY. In no case shall WILBUR-ELLIS COMPANY be liable for consequential, special or indirect damages resulting from the use or handling of this product. All such risks shall be assumed by the Buyer. The exclusive remedy of any buyer or user of this product for any and all losses, injuries, or damages resulting from or in any way arising from the use, handling or application of this product, whether in contract, warranty, tort, negligence, strict liability or otherwise, shall not exceed the purchase price paid for this product or at WILBUR-ELLIS COMPANY'S election, the replacement of this product. WILBUR-ELLIS COMPANY MAKES NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS STATED ABOVE.

F-703

Manufactured by:
WILBUR-ELLIS COMPANY
P.O. Box 16458 - Fresno, California 93755

WILBUR-ELLIS
IDEAS TO GROW WITH®
PO BOX 16458 • FRESNO CA 93755

MATERIAL SAFETY DATA SHEET

PRODUCT/TRADE NAME:
SPORAX

I. NAME

PRODUCT/TRADE NAME: SPORAX
EPA REGISTRATION #: 2935-501
CHEMICAL NAME/COMMON NAME:
Sodium Tetraborate Decahydrate

II. HAZARDOUS INGREDIENTS

	CAS#	OSHA PEL	ACGIH TLV
Sodium Tetraborate Decahydrate	1303-96-4	NE	NE

III. PHYSICAL DATA

SPECIFIC GRAVITY (H_2O = 1): NA
MELTING POINT: 62ºC
VAPOR DENSITY (AIR = 1): NA
% VOLATILES BY VOL.: NA
ODOR: None
APPEARANCE: White Crystaline Solid
FLASH POINT/METHOD: NA
VAPOR PRESSURE (mmHg): NA
SOLUBILITY IN H_2O: Partially

IV. FIRE & EXPLOSION HAZARD

EXTINGUISHING MEDIA: [ ] Water Fog [ ] Foam [ ] Alcohol Foam
[ ] CO2 [ ] Dry Chemical [X] Other
FIRE FIGHTING PRECAUTIONS & HAZARDS:
This product is not flammable. It also can act as a fire retardant.

V. CARCINOGEN STATUS

[ ] OSHA [ ] NTP [ ] IARC [X] No Listing Type

VI. REACTIVITY

[X] Stable HAZARDOUS POLYMERIZATION
[ ] Unstable [ ] May Occur [X] Will Not Occur
AVOID: Elemental Zircon
HAZARDOUS DECOMPOSITION PRODUCTS: NA

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE OF SPILL: Vacuum or sweep up and reuse or place in a disposal container.
DECONTAMINATION: Treat area with detergent and water. Repeat as necessary until area is clean.
ENVIRONMENTAL HAZARDS: Dike to prevent entering drains, sewers or water courses.
DISPOSAL: Dispose of in accordance with federal, state and local regulations.

VIII. HEALTH PRECAUTION DATA

INGESTION: Acute oral LD50 (rat) 6.13 g/kg (U.S. Borax). Do not ingest. Wash thoroughly before eating, drinking or smoking.
INHALATION: May cause slight nasal irritation.
SKIN ABSORPTION: Not expected to cause irritation.
EYE EXPOSURE: Causes irreversible eye damage. Wear proper eye protection to prevent exposure.
EFFECTS OF OVEREXPOSURE: Symptoms of overexposure are sneezing, coughing and eye damage. Ingestion may cause nausea, vomiting, diarrhea and facial flushing.
FIRST AID: In all cases, get prompt medical attention. If ingested, give several glasses of water. Do not induce vomiting. For skin exposure, wash with water. For eye exposure, irrigate a minimum of 15 minutes with water. If inhaled, remove to fresh air.

IX SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Use NIOSH/MSHA - approved respiratory protection for nuisance particulates.
PERSONAL PROTECTIVE EQUIPMENT: Safety goggles or glasses with side shields and brow protection.
VENTILATION: Local exhaust ventilation recommended for control of nuisance dust.

X. SPECIAL PRECAUTIONS

Keep out of the reach of children. Read and follow all label instructions.

XI. REGULATORY DATA

SARA HAZARD CLASS: [X] Acute [ ] Chronic [ ] Flammable
[ ] Pressure [ ] Reactive [ ] None
SARA 313: [ ] Yes [X] No Chemical:
SARA 302: [ ] Yes [X] No Chemical:
TPQ:
CERCLA: [ ] Yes [X] No Chemical:
RQ:
RCRA: [ ] Yes [X] No

NFPA HAZARD RATING:
Health: [2]
Fire: [0]
Reactivity: [0]
Special: [ ]

NFPA HAZARD RATING SCALE:
0 = Minimal 3 = Serious
1 = Slight 4 = Severe
2 = Moderate

HMIS CODES:
Health: [2]
Fire: [0]
Reactivity: [0]

HMIS HAZARD RATING SCALE:
0 = Minimal 3 = Serious
1 = Slight 4 = Severe
2 = Moderate

DATE PREPARED: March 31, 1993
REVISED DATE: February 5, 2002

Notice: This information was developed from information on the constituent materials. No warranty is expressed or implied regarding the completeness or continuing accuracy of the information contained herein, and Wilbur-Ellis disclaims all liability for reliance thereon. The user should satisfy himself that he has all current data relevant to his particular use.

*Technical Material NE - Not Established NA - Not Applicable

24 Hour Emergency Phone Number
CHEMTREC: (800) 424-9300

wecomsds\Sporax.PM65

The following contract clauses are included in the timber sale contract for the prevention and removal of spilled hazardous substances and to provide instructions for the application of borax to stumps.

B6.34 – Sanitation and Servicing. Purchaser shall take all reasonable precautions to prevent pollution of air, soil, and water by Purchaser's Operations. If facilities for employees are established on Sale Area, they shall be operated in a sanitary manner. In the event that Purchaser's Operations or servicing of equipment result in pollution to soil or water, Purchaser shall conduct cleanup and restoration of the polluted site to the satisfaction of Forest Service.

Purchaser shall maintain all equipment operating on Sale Area in good repair and free of abnormal leakage of lubricants, fuel, coolants, and hydraulic fluid. Purchaser shall not service tractors, trucks, or other equipment on National Forest lands where servicing is likely to result in pollution to soil or water. Purchaser shall furnish oil-absorbing mats for use under all stationary equipment or equipment being serviced to prevent leaking or spilled petroleum-based products from contaminating soil and water resources. Purchaser shall remove from National Forest lands all contaminated soil, vegetation, debris, vehicle oil filters (drained of free-flowing oil), batteries, oily rags, and waste oil resulting from use, servicing, repair, or abandonment of equipment.

B6.342 – Hazardous Substances. Purchaser shall notify the National Response Center and Contracting Officer of all releases of reportable quantities of hazardous substances on or in the vicinity of the Sale Area that are caused by Purchaser's employees or contractors, directly or indirectly, as a result of Purchaser's Operations, in accordance with 40 CFR 302.

C6.412# - Treatment of Stumps. (9/2004) Within areas shown on Sale Area Map, Purchaser shall treat stumps of all live and dead conifer trees equal to or greater than 14 inches stump diameter, unless otherwise agreed in writing. Treatment shall be with an EPA registered borate compound, which is registered in California for prevention of annosus root disease.

Treatment shall consist of removal of sawdust and other loose debris from the cut surface of the stump and application of a thin layer of the borate compound uniformly over the entire cut surface of the stump, including exposed wood surfaces on the sides, at the rate specified on the product label. For colorant use, Purchaser shall follow directions on the colorant label. Treatment shall be completed within four hours after felling.

Any surface irregularities on the stump which will prevent application of a uniform layer of borax shall be cut level prior to treatment. Purchaser shall provide the borate compound and apply it in compliance with the State of California laws and regulations pertaining to pesticides and pest control operations. Purchaser shall provide Forest Service with a copy of the "Monthly Summary of Pesticide Use Reports" submitted to the appropriate County Agricultural Commissioner.

II. Effectiveness of Borax

Use of borax on stumps in the Pilgrim project is limited to stumps 14 inches in diameter and greater based on the **latest** scientific research by Kliejunas and Woodruff (2004)[3]. This research paper cites survey results from the McCloud Ranger District which is where the Edson project is located. "Stump diameters were measured during a survey on the McCloud Ranger District, Shasta-Trinity NF (DeNitto 1988). Results suggested that stumps less than 14 inches (35.6 cm) in diameter will not support active annosus infection centers." This same survey was also cited in Dave Schultz's report for the Edson Sale[4] where he described no infection of 14 inch diameter pine stumps, less than 5% infection of 18 inch diameter stumps and approximately 10% infection of 22 inch diameter pine stumps. However, he did note that "the percent of pine stumps infected with H. annosum increases abruptly in the 18 inch stump class, so there would be serious consequences if there was less than 100% compliance by the applicator."

Several other studies have demonstrated the efficacy of using borax as a stump treatment in California. Graham (1971)[5] in a study on the Lassen National Forest found that less than 1% of borax treated Jeffrey and ponderosa pine stumps (8 to 16" in height) became colonized 4 weeks after artificial inoculation with annosum compared to over 61% of the untreated control stumps similarly inoculated and examined became colonized. Smith (1970)[6] in a study on the Eldorado National Forest and the Lassen National Forest demonstrated that borax treatment of stumps in a white fir pole stand reduced infection significantly with 50 to 70% of the non-treated stumps becoming infected after inoculation compared to none of the borax treated stumps becoming infected. Kliejunas (1989)[7] summarized the existing literature on borax effectiveness in the eastside pine type.

III. Alternatives to Borax Application

Discontinue Logging: Discontinuing all timber harvesting is not a feasible alternative as thinning over-dense stands to meet objectives for forest health and fire reduction is essential to meeting the purpose and need of the proposed project. The No Action alternative in the EIS details the effects of no harvesting of trees.

Present logging techniques help prevent damage to residual trees and thereby reduce the points of entry for annosum spores. Design techniques in the Pilgrim Project such as directional felling, the use of

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[3] Kliejunas and Woodruff, 2004. *Pine Stump Diameter and Sporax® Treatment in Eastside Pine Type Stand.* USDA Forest Service, Pacific Southwest Region, Report Number R04-01, 7 p.
[4] Dave Schultz, Forest Entomologist, Input for Edson Sale (Report No. 04-02), March 2004
[5] Graham, D.A. 1971. *Evaluation of borax for prevention of annosus root rot in California*. Plant Disease Reporter. 55(6)June 1971:490-494
[6] Smith, R.S., Jr. 1970. *Borax to control Fomes annosus infection of white fir stumps*. Plant Disease Reporter 54: 872-875.
[7] Kliejunas, J. T. 1989. *Borax stump treatment for control of annosus root disease in the eastside pine type forests of Northeastern California*. pg. 159-166 in Proceedings of the Symposium on Research and Management of Annosus Root Disease in Western North America. GTR-PSW-116. USDA Forest Service. Pacific Southwest Forest and Range Experiment Station.

feller/bunchers and the adherence to Best Mananagement Practices will reduce the incidence of tree wounding.

Seasonal Restrictions: Cutting when annosus spores are lowest has been suggested, but there are no data or studies to support the efficacy of such a treatment in California. Morrison (1999)[8]determined there was no significant difference in season of cutting in coastal British Columbia. Schmitt et al (2000)[9] 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)[10] recommend thinning during dry, hot months in the SE US or during winter months in the NE 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 SE US, summer thinning only slightly reduced infection over controls and that borax treatment was much more effective. Filip and Morrison (1998)[11] and Stambaugh (1989)[12] report that cutting in the summer (April thru August) in the SE 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.

Seasonal Restrictions (**cont**): In Russell et al (1973)[13], 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)[14], 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.

Prescribed Burning: 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

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[8] Morrison, D.J. and A.L.S. Johnson. 1999. Incidence of *Heterobasidion annosum* in precommercial thinning stumps in coastal British Columbia. Eur. J. For. Path. 29(1999):1-16.
[9] Schmitt, Craig L., John R. Parmeter, and John T. Kliejunas. 2000. *Annosus Root Disease of Western Conifers*. Forest Insect and Disease Leaflet 172. US Department of Agriculture Forest Service
[10] Ammon, Vernon and Mukund V. Patel. 2000. *Annosum Root Rot. Ornamental and Tree Diseases. Plant Disease Dispatch Sheets*. M-416
[11] Filip, G.M. and Morrison D.J. 1998. Chapter 23 - North America. In, *Heterobasidion annosum*: Biology, Ecology, Impact and Control. Editors: S. Woodward, J. Stenlid, R. Karjalainen, and A. Huttermann. pg.405-427. CAB International.
[12] Stambaugh, W.J. 1989. *Annosus root disease in Europe and the Southeastern United States: Occurrence, research, and histroical perspective*. pg. 3-9 in Proceedings of the Symposium on Research and Management of Annosus Root Disease in Western North America. GTR-PSW-116. USDA Forest Service. Pacific Southwest Forest and Range Experiment Station
[13] Russell, K.W., J.H. Thompson, J.L. Stewart, C.H. Driver. 1973. *Evaluation of chemicals to control infection of stumps by Fomes annosus in precommercially thinned western hemlock stands*. State of Washington Department of Natural Resources, DNR Report No. 33. 16 pages
[14] James, R.L., F.W. Cobb, Jr. 1984. *Spore deposition by Heterobasidion annosum in forests of California*. Plant Disease Reporter. 68(3):246-248.

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)[15]. This trial was unsuccessful because the stumps were still too wet to burn, even three years after harvest.

Froelich et al 1978[16] studied prescribed burned plots versus unburned plots in loblolly and slash pine plantations in the Coastal Plain of the southern United States. The study concluded that prescribed burned plots developed less infection than unburned plots. However, they also point out that other studies have resulted in an apparent increased severity of annosus root rot and that prescribed burning to reduce annosus root rot may not have practical application outside of the Coastal Plain or on soils with heavier texture than those in the study. The study further concludes that "borax, when applied to the fresh stump, has proved to be the most effective treatment in preventing losses."[17]

Froelich et al 1978 and Ammon & Patel 2000 are focused on management of forests in the Coastal Plain of the southern United States. Flip & Morrison 1998 mention prescribed burning only in their discussion of impacts and management in the southeastern United States – but in none of the other regions of North America. There is no literature supporting prescribed burning as a control of annosus in California ecosystems.

Removal of Injured Trees: There is no literature supporting the removal of injured trees as an effective control method of annosus in California ecosystems. Damaged and injured trees are routinely designated for removal during marking of all silvicultural treatments. Trees damaged during logging are routinely removed by the purchaser under timber sale contract clause B2.131(b). While the removal of injured trees will eliminate some sources of infection, there are no data or studies that indicate that the practice will eliminate the need for borax application.

Mechanical Removal of Stumps: Mechanical removal of stumps is not feasible due to high costs and environmental impacts. Kliejunas et al 2005 reports that results 12 years after treatment indicate that removal of infected trees and roots in a southern California campground may have significantly reduced conifer mortality caused by annosus root disease[18]. Treatment consisted of removing all conifer trees, stumps, and visible roots from six annosus centers prior to development of a campground. The largest of these sites was approximately 0.75 acre.

Removal of infected stumps and roots would be effective in preventing the spread of annosus through trees roots but would not prevent annosus infection through freshly cut stumps surfaces unless all new stumps were also removed.

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[15] Pronos, J. 1994. *Attempts to destroy stumps in an annosus root disease center buffer strip*. Appendix pages xiv-xivi. In, Proceedings of the 43rd Annual Meeting, California Forest Pest Council, November 16-17, 1994. Rancho Cordova, CA

[16] Froelich, R.C., C.S. Hodges, Jr., S.S. Sackett. 1978. *Prescribed burning reduces severity of annosus root rot in the South*. Forest Science. 24(1):93-100.

[17] Froelich et al 1978, pages 98-99

[18] Kliejunas et al 2005, page 158.

While stump removal may be appropriate on a small scale in high-value sites such as campgrounds, it is not a suitable method of controlling annosus root disease over large acreages due to high costs and environmental impacts. Of particular concern are:

- the potential for increased erosion due to disturbance of soil and ground litter.
- additional soil compaction from heavy equipment.
- impacts to visual quality due to soil disturbance and burn piles.
- impacts to habitat for sensitive mollusks and fungi (including S&M species).
- the increased risk of noxious weeds becoming established in areas of exposed soil.

Use of Bio-pesticides: *Phlebiopsis gigantean* and/or *Streptomyces griseoloalbus* are not currently registered for use as a biopesticide by the US Environmental Protection Agency and California. 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 Environmental Protection Agency and California. Until such time as both efficacy and registration are met, these two remain indefensible options.

Cultural Control: This is already recognized as a method to reduce impacts from annosus root disease. From the R-5 Supplement to FSH 3409.11 (Chapter 60) (USDA Forest Service 1994a): Species Conversion. Because of host specificity of H. annosum favor the non-infected host species.

Both strains of annosus root disease are prevalent in the Pilgrim project area. The P-group infects pines and incense-cedar. The S-group infects true fir and Douglas-fir. Since all conifer species in the area are affected by one of these strains borax would be applied to all stumps 14 inches in diameter and greater.

Cultural Control (**cont**): The stands in the Pilgrim Project are ponderosa pine stands consisting of ponderosa pine with minor components of white fir and incense cedar. Therefore a species conversion from Ponderosa pine to White fir/mixed conifer would entail regeneration harvests on approximately 2000 acres rather than the 375 acres that is proposed. Intermediate commercial thinning treatments are proposed to reduce stand densities to recommended levels for forest health and fire resistance. The sanitation prescription is designed to capture most of the mortality of the next 5 years while still maintaining existing mature stands. Pine trees that become infested with bark beetles during the life of the project may be removed to capture imminent mortality and reduce the probability of catastrophic fire. Species diversity is desired and will be included where possible when selecting trees to leave in the thinning treatments.

A mixed conifer planting mixture is also proposed in the majority of harvest/replant areas.

IV. Human Risk Assessment

A peer reviewed Human Health and Ecological Risk Assessment[19] is a document written by professional toxicologists concerning the risks of using borax for stump treatments. The 2006 publication concludes

[19] USDA Forest Service. Human Health and Ecological Risk Assessment for Borax (Sporax®) – Final Report. February 2006. Prepared for USFS by Syracuse Environmental Research Associates, Inc. (SERA Inc.).

that except for the most extreme exposure scenario considered in this risk assessment – i.e., the direct consumption of Sporax from a tree stump by a child – the use of Sporax in Forest Service programs will not substantially contribute to boron exposures in humans. In addition, the use of Sporax in Forest Service programs will not typically or substantially contribute to concentrations of boron in water or soil. *(page x, 2nd paragraph)*

The Human Health Risk Assessment details three scenarios:

- worker exposure via spill of granular product to the lower legs and hands
- ingestion of applied Sporax by a child
- exposure via consumption of water contaminated by accidental spill or by run-off.

For worker exposure from granular Sporax spilled on the lower legs and hands, hazard quotients are well below the level of concern. Thus, workers do not appear to be at risk from Sporax under typical application conditions. *(page xiv, 2nd paragraph)*

For the general public, hazard quotients for consumption of Sporax from a tree stump by a child…are below levels of exposure associated with nonlethal effects such as diarrhea and vomiting… Thus, while this exposure scenario raises concern in that the Reference Dose (Rfd) could be substantially exceeded in a child directly consuming Sporax from a treated stump, the most likely adverse effects would probably be vomiting and diarrhea. *(page xiv, 3rd paragraph)*

For consumption of water from a pond contaminated by Sporax due to runoff, none of the hazard quotients exceed the level of concern, even for the highest application rate of 5 lbs Sporax/acre. The highest hazard quotient for consumption of water contaminated by an accidental spill is 0.7, associated with a child consuming water contaminated by the spill of 25 pounds of Sporax into a small pond. Thus, based on this risk assessment, the only exposure scenario that appears to present a significant potential risk is exposure by direct consumption under upper bound conditions. *(page xiv, 4th paragraph)*

Details of the assumptions and calculations involved in the exposure assessments are included in the final report. A summation of the Human Health Risk Assessment's findings is listed below:

3.4.2 Workers

> …based on the available information and under the foreseeable conditions of application, there is no route of exposure or scenario suggesting that workers will be at any substantial risk from acute exposures to Sporax. *(page 3-25, 1st paragraph)*
>
> …even if workers were to repeatedly spill granular Sporax on the lower legs and hands every day, the hazard quotient associated with longer term exposures would be far below the level of concern. *(page 3-25, 3rd paragraph)*
>
> …eye irritation is likely to be the only overt effect as a consequence 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. *(page 3-25, last paragraph)*

3.4.3 General Public

> With the exception of the direct consumption of Sporax applied to a tree stump by a small child, none of the hazard quotients exceed the level of concern. *(page 3-26, 1st paragraph)*

> …even at the highest application rate, there does not appear to be a risk associated with acute or chronic exposure to water contaminated by runoff. *(page 3-26, 4th paragraph)*

3.4.4 Sensitive Subgroups

> …exposure of pregnant women to borate compounds places the developing fetus at risk. *(page 3-27, 2nd paragraph)*

> …males with underlying testicular dysfunction could be at increased risk for boron-induced testicular toxicity. However, no data are available to quantify this risk. *(page 3-27, 2nd)*

Application of Sporax does not require mixing of any components therefore reports of accidents involving mixing would not make sense and are not known in the Region. If there have been spill incidents into streams, these have not been reported to the Regional Office. As per FSH 2109.14, (USDA Forest Service 1994b) all pesticide incidents must be reported to the Regional Office (Regional Pesticide-Use Specialist). All applications of pesticides on Forest Service projects in California follow all applicable Federal and California rules and regulations, including requirements for worker protection, storage, and environmental protection. Personnel are instructed to scoop up any spilled material and place it back in the application container. Using proper spill procedures, it is highly unlikely that humans or the environment would be harmed from borax treatments.

V. Ecological Risk Assessment

The 2006 Human Health and Ecological Risk Assessment uses the following scenarios to access the risk of borax application:

Exposure of wildlife species

- direct consumption of applied Sporax
- ingestion of contaminated water

Exposure of aquatic species

- water contaminated by an accidental spill or by runoff

Exposure of terrestrial plants

- soil contaminated by runoff

Details of the assumptions and calculations involved in the exposure assessments are included in the final report. A summation of the 2006 Human Health Risk Assessment's findings is listed below:

4.4.2 Terrestrial Organisms

4.4.2.1 Terrestrial Vertebrates

…the exposure scenarios considered in this risk assessment are the direct consumption of Sporax applied to tree stumps (acute exposure), consumption of water contaminated by an accidental spill (acute exposure), and acute and chronic exposure by consumption of water contaminated by runoff. With the exception of direct consumption of Sporax applied to tree stumps, none of the exposure scenarios are associated with hazard quotients that exceed the level of concern. *(page 4-19, 2nd paragraph)*

For the direct consumption scenario, there appears to be very little risk to either mammals or birds. Sporax applied to tree stumps does not appear to have attractant effects for deer and no clinical signs of toxicity were observed in deer allowed free access to Sporax-treated stumps. *(page 4-19, 3rd paragraph)*

Risks associated with other exposure scenarios are very low…risk of exposure via the longer term consumption of contaminated water is characterized for a small mammal and range from 0.000003 to 0.005 and are below the level of concern by factors of about 200 to over 330,000. . …this reflects the fact that the use of Sporax in Forest Service programs will not substantially contribute to or increase concentrations of boron in water or soil beyond those that are associated with the normal occurrence of boron in the environment. *(page 4-19, 4th paragraph)*

4.4.2.2 Terrestrial Plants

…nontarget terrestrial plants do not appear to be at risk from exposure to borax at the maximum application rate used by the Forest Service. However, this risk assessment is based on data from relatively few terrestrial plant species. It is possible that more sensitive species exist and may be at risk for boron-induced toxicity. *(page 4-20, 1st paragraph)*

4.4.2.3 Other Terrestrial Organisms

Since borax is used effectively in the control of fungi and insects, adverse effects of environmental exposures to insects and nontarget microorganisms is possible. However, given the atypical application method for Sporax, widespread exposures are not likely. *(page 4-20, 2nd paragraph)*

4.4.3 Aquatic Organisms

4.4.3.1 Aquatic Animals

With the exception of amphibians, all HQs[20] associated with exposure of aquatic animals to water contaminated by an accidental spill are well below the level of concern. For worst-case scenario of the spill of 25 pounds of Sporax into a small pond, the HQ for amphibians of 1.3 only marginally exceeds the level of concern; HQs for spill of 6.25 and 12.5 pounds of Sporax are below the level

[20] HQ = Hazard Quotient. The estimated dose divided by the toxicity value.

of concern. Based on the results of this analysis, if large amounts of borax accidentally contaminate surface waters, amphibians may be at risk. However, for all other aquatic animals, there is no indication that adverse effects will occur. *(page 4-20, 4th paragraph)*

Hazard quotients for acute and chronic exposure of aquatic animals to water contaminated by runoff are all below the level of concern, even at the maximum application rate of 5 lbs Sporax/acre. (*page 4-20, 5th paragraph)*

…there is no basis for asserting that effects on nontarget aquatic species are likely for either acute or longer-term exposures. *(page 4-21, 1st paragraph)*

4.4.3.2 Aquatic Plants

The highest HQ for any exposure scenario is 0.3 associated with algae for the accidental spill of 25 pounds of Sporax into a small pond. All other HQs for the accidental spill scenario and for acute and longer-term exposures to water contaminated by runoff are well below the level of concern. Thus, based on this analysis, there is no basis for asserting that effects on aquatic macrophytes or algae are likely for either acute or longer-term exposures. *(page 4-21, 3rd paragraph)*

4.4.3.2 Aquatic Microorganisms

The results of this risk assessment indicate that more sensitive microorganisms may be at risk following accidental spill of large quantities of Sporax into a small pond, but that exposure *via* runoff does not present a risk to aquatic microorganisms. *(page 4-21, 5th paragraph)*

Appendix K: Response to Comments on DEIS

Agencies have a responsibility under the National Environmental Policy Act (NEPA) to first “assess and consider comments both individually and collectively” and then to “respond…stating its response in the final statement.” The content analysis process, considered comments received “individually and collectively” and considered them equally, not weighting them by the number received or by organizational affiliation or by any other status of the respondent.

All letters, emails, faxes, and comment forms received as public comment on the Pilgrim DEIS were compiled, organized, read, and analyzed by the project planning team.

Comments were received from the Conservation Congress (CC), the American Forest Resource Council (AFRC), The Environmental Protection Information Center (EPIC), Siskiyou County Planning Department (SIS), Sierra Pacific Industries (SPI), The Winnemem Wintu Tribe (WW) and Mr. Steve Funk (SF). A letter was also received from the U.S. Department of Interior, Office of Environmental Policy and Compliance that offered no comments.

The following public concern statements are identified by respondent. Each public concern statement has been derived from one or several individual public comments.

Comment # 1: CC

The DEIS admits that cumulative effects analysis (CEA) is largely qualitative and admits quantitative data is missing. (DEIS P-31). Without actual hard data, the CEA is based largely on opinion and innuendo.

Response:

Quantitative data, based on field surveys and cited research is presented as appropriate for the affected resource. For example, see the discussion of direct and indirect effects of alternatives on snag counts on page 77 of the FEIS and supporting information in the analysis file. The FEIS provides a reasoned analysis of the available information and makes that information available to all concerned. As appropriate, the document also contains qualitative discussions of the impacts for all resources analyzed.

Comment # 2: CC

The DEIS geographically bounds cumulative effects differently for each resource. For example, some wildlife species impacts are bounded at the 5th field watershed scale, while timber harvest is bounded at the 8th field watershed scale. Why not bound the all cumulative effect at the same geographic scale?

Response:

The boundary of the cumulative effects analysis is usually not limited to the project area because environmental consequences vary by resource. In order to take a hard look at the cumulative impacts of the proposed action and alternatives, the boundaries of different resource impacts are determined individually. For example, cumulative effects as related to spotted owls (page 57 of the FEIS) are bounded differently than cumulative effects for soils (page 91 of the FEIS). Cumulative effects boundaries are established by the extent and duration of the effects. Effects from the project in context with the effects of other projects must overlap in both time and space in order to be cumulative.

Comment # 3: CC

The DEIS seems inconsistent pages 49 and 50, 80% vs. 92% fuel model 10?

Response:

Page 49 of the DEIS is a discussion of the cumulative effects to fuel conditions by taking no action. Page 50 of the DEIS is a discussion of the direct and indirect effects to fuel conditions of implementing Alternative 1, the Proposed Action.

Comment # 4: CC & EPIC

Why didn’t the DEIS analyze an alternative that replaces northern spotted owl habitat?

Response:

All action alternatives improve habitat conditions for northern spotted owl when compared to taking no action. FEIS page 59 “The greatest cumulative impact to the Northern Spotted Owl and its critical habitat … is the continued loss of habitat from insect infestations and root disease…” Page 61 of the FEIS states that “Future stand conditions will increase and improve dispersal habitat in 5 to 15 years, as thinned plantations grow into suitable owl dispersal habitat and thinned natural stands recover canopy closure and trees increase in size.”

Comment # 5: CC

How did you determine that there would be no direct, indirect, or cumulative impacts to northern spotted owl?

Response:

The Biological Evaluation and Consultation with US Fish and Wildlife Service concluded that the Pilgrim project “may affect, but is not likely to adversely affect the northern spotted owl. Direct, indirect and cumulative impacts are discussed on pages 59-62 of the FEIS. Protocol surveys for the Northern Spotted Owl in the Pilgrim Project Area over the last three years have detected no owls. The project file includes the record of a conversation between Ron Clemenson of the US Fish and Wildlife Service, Red Bluff, CA, and Eric Forsman, Research Wildlife Biologist (noted expert on the Northern Spotted Owl), in which Mr. Foresman states that Northern Spotted Owls have never been found to use ponderosa pine types as nests, roosting or foraging habitat. The entire Pilgrim Project is ponderosa pine type forest and is classified as “dispersal habitat.” The FEIS, page 61, does reflect some minor impacts to Northern Spotted Owls that may attempt to disperse through the project area.

Comment # 6: CC & EPIC

Were the 2004-05 and historic northern spotted owl surveys conducted to protocol?

Response:

Surveys for the Northern Spotted Owl were done to the protocol adopted by the U. S. Fish and Wildlife Service. Documentation of survey results is in the project file.

Comment # 7: CC

The DEIS, page 4 identifies 1.3 miles as the home range territory for northern spotted owl. What is the rationale for this standard?

Response:

The home range as based on extensive research on the Northern Spotted Owl and was adopted by the U.S. Fish and Wildlife Service after the NSO was listed as threatened under the Endangered Species Act.

Comment # 8: CC

The DEIS claims to have little effect on habitat for marten, pallid bats or goshawks. What is the rationale for this finding?

Response:

The description of the Affected Environment for Sensitive Wildlife and Fish, pages 63-64 of the FEIS, describes the project area as marginal for martens, pallid bats and goshawks due to the lack of riparian vegetation, limited perennial streams and naturally discontinuous canopy cover.

Protocol surveys for goshawks were completed in 2004, 2005 and 2006. No goshawks were found in the project area.

Surveys for martens in a broad area on the east side of Mt. Shasta, including the project area, completed in 2002 and 2003, confirm that American Marten are found above 4500 feet elevation and associated with true fir types and some perennial water source. This habitat type does not exit in the project area.

Pallid bats are insectivorous and their habitat in conifer forests is normally associated with wet meadows and perennial streams where insects are abundant. Pallid bats have never been observed in the project area, and habitat is very limited. See FEIS, page 64 and the Biological Evaluation, page 8.

Comment # 9: CC

The DEIS disclosure of impacts to mule deer is not based on population trend data so how can it find that populations are declining?

Response:

Deer population trends are disclosed in the Project Level Management Indicator Assemblages Report for the Pilgrim Vegetation Management Project, (Appendix L, page 32) and were derived from the most current information from the California Department of Fish and Game (Cited as a html in the report; *Long Term Trends in California's Deer Population, updated in 2005*).

Comment # 10: CC

Because there are less than 1.5 snags in 8000 acres of young plantations, the project violates Forest Plan standards and guidelines.

Response:

Most of the plantations being treated in this project are from brushfield conversions; few if any snags existed in these reforested areas at the time they were planted. The trees in the plantations are not large enough to meet the LRMP size requirements for snags. Reaching desired snag size can be achieved by thinning these overstocked plantations and accelerating tree growth, as proposed in this project. Where trees are large enough and snags exist, snag retention requirements will be met. See Design Criteria Common to All Action Alternatives "Retain, where feasible, an average of 2 or more snags per acre meeting the minimum requirements…" FEIS, page 23.

Comment # 11: CC

What is the rationale for determining a population of less than 50 white headed woodpeckers is reasonable?

Response:

The White-headed Woodpecker has been dropped as a management indicator species in the FEIS. The Management Indicator Assemblage Report, Appendix L of the FEIS, has been revised to show population trends at the appropriate scale to be meaningful.

Comment # 12: CC & EPIC

The DEIS page 72 states that "Removing snags in the Pilgrim Project may reduce the total snag and downed wood habitat in the short term…" but concludes "the project is unlikely to have an effect on the population trend of this species." Explain how removal of habitat would not affect population trends.

Response:

Since completion of the DEIS most of tree marking has been done for the Pilgrim Project and none of the snags identified in the 2005 inventory were marked for removal. The FEIS, on page 77, indicates that snag densities will remain between 2 and 3 per acre after harvest and should increase to 3 or more per acre with the next decade. The FEIS, page 78, indicated that at the forest level, the snag and downed log assemblage acres are increasing and the regional population trends for the snag dependent species is also increasing.

Comment # 13: CC

The DEIS page 82 “The project area is within two 5th field watersheds, Ash Creek and the Upper McCloud River.” Page 86 states the cumulative effects for hydrology are bounded by the 8th order watershed as described in Appendix F. “The Equivalent Road Acres method of assessing cumulative watershed impacts was not used in this analysis because the 5th order watershed has a high threshold of concern (18%).” In other words, has the Forest used the actual 5th field watersheds the project area actually is in, the impacts would be too great, therefore it used a smaller area in the 8th field order to give the appearance of lesser impacts from the proposed project. Then the DEIS makes the grand conclusion “Based on these conditions, there are no cumulative effects to water and riparian resources from past actions within the watershed.”

Response:

The DEIS clearly described the lack of hydrologic connectivity to larger watersheds and on page 86 goes on to say “Characteristics of almost flat terrain, high soil infiltration rates and very low erosion hazards associated with the McCloud Flats are responsible for this high threshold.” See FEIS page 99.

Page 32 of the DEIS states that “The larger fifth field watersheds were discounted as the cumulative effects bounded area because they encompass a much larger area (about 260,000 acres) that includes mountainous terrain with different soil types, vegetation and hydrological function. These larger watersheds also include about half the Mt. Shasta Wilderness, which would dilute some effects.”

Also see response to comment # 2. See FEIS pages 98-100.

Comment # 14: CC& EPIC

The Forest Plan 4-25 states the no more than 15% of harvested lands are to be dedicated to non-productive uses such as roads, trails, and landings. It is unclear if the project is consistent with this standard.

Response:

The Transportation Section of the FEIS, page 104, states that for the Pilgrim project there are approximately 100 acres of existing roads and proposed new road construction, about 80 acres for landings and about 50 acres for skid trails which would total about 230 acres or around 6 percent of the commercial forest land in the project area. Based on this assessment, the project is well within the 15% threshold.

Comment # 15: CC

The proposed road activities map in the back of the DEIS doesn't show where the 80 landings will be built. This information must be clearly displayed in the FEIS. DEIS #1-12 on page 150 states log landings will be determined in advance or approved by the sale administrator. A decision can't be made on this project in regard to impacts until landing sites have been decided.

Response:

The reference on page 150 is to a timber sale contract requirement. Landings are never designated in advance of awarding of a contract as different contractors use different equipment that can vary the number of landings actually needed. Landing locations are always approved by the sale administrator prior to construction and are located in openings, if they exist and outside riparian areas. The Forest Service Timber Sale Contract, Clause B6.422, requires mutual agreement on landing locations. The effect of landings is disclosed in the Transportation Section of the FEIS.

Comment # 16: CC

How will soil productivity be impacted by roads and landings? P- 107 states there will be a loss of soil productivity on about 80 acres. This statement goes no further in analyzing what the loss of soil productivity will be in relationship to additional road and landing construction, impacts to vegetation, or to the watershed.

Response:

Page 107 of the DEIS is a summary of unavoidable adverse effects. The environmental consequences to soils are discussed in the Soils Section of the FEIS and conclude " the reduction in overall soil compaction from any of the action alternatives could result in an increase in the amount of land capable of growing desired vegetation. This is because the proposed action includes subsoiling of areas with residual soil compaction, page 20 of DEIS. The Transportation Section of the FEIS does disclose an irretrievable loss of about 230 acres of commercial forest lands to landings, skid trails and new road construction.

Comment # 17: CC

Large timber sales in the Pilgrim cumulative effects analysis (CEA) area include the Davis, Hemlock, Edson, Mountain Thin, Little Horse Salvage, First Creek, Tennant WUI, Tamarack, Powder, Pomeroy, and Erickson Thin sales which total well over 100,000 acres. Of these sales, <u>only</u> Edson is listed in Appendix F. These other timber sales must be included in a CEA for the FEIS.

Response:

None of the sales listed are in the designated cumulative effects area defined in Appendix F. A small portion of the Hemlock sale is in the Ash Creek fifth-field watershed and was included in the vegetation diversity calculations. None of the other sales are within the two fifth-field watersheds for the Pilgrim Project. Six of these sales (Little Horse Salvage, First Creek, Tennant WUI, Tamarack, Pomeroy, and Erickson Thin) are not within the same river basin as the Pilgrim Project.

Comment # 18: CC & EPIC

The DEIS page 5 states. "Field review in June 2005 showed that the stands are continuing to succumb to western pine beetle attacks, even in root- disease infected areas that were previously thinned (1990) and recently (2005) salvaged. As a result, few healthy or live overstory ponderosa pine trees remain in several of the stands." This statement demonstrates that thinning and salvage does little to reign in endemic beetle cycles. Why does the Forest believe doing more of the same will result in a different outcome with the Pilgrim Project?

Response:

The Pilgrim project intends to break the disease cycle that fosters pine beetle outbreaks by removing diseased trees and regenerating stands currently affected by root disease. See Purpose and Need, FEIS page 4-7. Page 40 of the DEIS states that past thinnings retained 45-60 percent canopy closure, which had little to no effect on reducing the spread of root disease. Past thinning also maintained basal area stocking above that recommend for pine stands to be less susceptible to bark beetles, DEIS, page 6.

Thinning of stands on approximately 3,100 acres is to improve stand health and resilience to bark beetle attacks. Research demonstrates that thinning to prescribed basal area reduces the incidence of pest damage to a stand. Less competition increases the health and vigor of the remaining trees resulting in a reduction of risk to bark beetle attack, DEIS page 37.

Comment # 19: CC

The DEIS page 4 indicates that 40 acres of Old growth would be harvested. Since old growth is a small amount of percentage of the area and is a limiting factor in the area, the 40 acres should be left for the species that require them.

Response:

The FEIS on page 5 states that the 40 acres of mature pine and white fir has an understory of 50 to 100 year-old trees that is overstocked at 180 to 240 square feet of basal area. It is this layer of trees that will be thinned to improve tree vigor and susceptibility to insects and disease.

Comment # 20: CC

According to the DEIS, currently about 10 percent of the project area has fuel loadings in excess of 15 to 25 tons per acre. That infers that 90% of the project area has open stands and/or does not have excessive fuel loadings, bringing the entire need for the project into question.

Response:

The DEIS page 49 goes on to say that with no action over the next 10 years another 500 acres of excessive fuel loading will develop. Reducing surface fuels is only one part of the purpose and need for this project, DEIS pages 2-10. See FEIS, pages 8-9.

Comment # 21: CC

The economy was not identified as a significant issue in scoping and should not have been a driving force in the selection of an alternative.

Response:

Economics was considered as part of the overall analysis, but was not a not a driving factor in the selection of the Preferred Alternative. See Record of Decision. The economic analysis appears in the DEIS / FEIS because the Forest Service is required to consider the economic costs and benefits of timber sales.

Comment # 22: CC

Have any of the BMP's been analyzed for success rates? Simply claiming BMP's will be used does not assure impacts will be lessened. They need to be regularly monitored for performance levels. If monitoring results are available, they should be included in the FEIS to provide assurance the claims made are legitimate.

Response:

BMP's are monitored annually on the Shasta-McCloud Management Unit. The 2004 to 2006 BMP Monitoring Reports are part of the project record for the Pilgrim Project. These reports shown all monitored sites were effective in protecting aquatic and riparian resources. See FEIS, page 100.

Comment # 23: EPIC

Rather than consider a reasonable range of alternative actions, the DEIS has considered two alternatives to the proposed action, each of which addresses only one of two primary objections to the proposed action. Why haven't you considered an action alternative which does not amend the 15% GTR forest plan standard?

Response:

The DEIS considers the no action alternative and three action alternatives in detail. These alternatives were developed to respond to unresolved issues raised during scoping. Action Alternative 3 does not amend the 15% GTR forest plan standard. Three additional alternatives were considered, but not fully developed because they failed to meet the purpose and need, or were otherwise inconsistent with laws, regulations or policies. See FEIS, pages 28-30.

Comment # 24: EPIC

We oppose the proposal to amend the Forest Plan to permit a level of logging which we are very concerned will lead to unnecessary and long-term negative impacts on soil, wildlife habitat, and fire conditions.

Response:

The DEIS discloses the impacts of four alternatives, including no action to soils, wildlife habitat, and fire conditions. Our analysis concludes that there would be no long-term negative impacts to soils, wildlife habitat or fire conditions. Surface fuels would increase under Alternatives 3 and 4. See FEIS pages 119-121 and Chapter 3, Affected Environment and Environmental Consequences.

Comment # 25: EPIC

The proposed action would degrade dispersal habitat for NSO, and would also degrade a formerly active goshawk territory; the more responsible course would be to maintain canopy closure in these areas.

Response:

The consequences of retaining a 60 percent canopy closure are disclosed on page 41of the DEIS. See page 39-41 of the FEIS. This level of stand density is not sustainable in ponderosa pine types and leads to increased tree mortality and loss of canopy cover. It should be noted that the recent outbreak of western pine beetle infestation in the McCloud Flats was in pine stands that mostly had 60 percent or greater canopy closure. For example, in one stand that had not been thinned, over 90 percent of the pine was killed by the western pine beetle while an adjoining stand that had been recently thinned to an average basal area of 150 ft^2 had only endemic levels of mortality from western pine beetle.

No Goshawk territory will be degraded by the proposed actions. The one former Goshawk territory in the project area was lost to a western pine beetle infestation (page 64 of FEIS.)

Comment # 26: EPIC

We remained very concerned by the proposal to construct approximately a third of a mile of new road in the project area.

Response:

The respondent does not state what their concern is. The effects of approximately 1760 feet of construction of a single lane, earth surface road are disclosed on page 91 of the DEIS. See FEIS page 104. This road would be located on very flat terrain with no watercourses within about one mile. The proposed location is generally in open areas that avoids large trees and areas of conifer tree reproduction. The road will be closed to public traffic after its use for this project.

Comment # 27: EPIC

Very rarely does road removal and decommissioning fully rehabilitate the soils, invasive species, and fragmentation impacts of previous roads. As well, it has too often been our experience that road removals promised as mitigations in other projects are not completed as scarce resources are redirected following logging.

Response:

It is our experience that roads on the McCloud Flats that are not used on a regular basis become overgrown with trees in about 5 years and effectively remain closed. Subsoiling has proven very effective in returning compacted soils to productive use.

Noxious weeds will be monitored for three years following completion of harvest in the project area, DEIS page 21. With respect to fragmentation, this project actually reduces road density in the project area, even when the new construction is considered. See FEIS, page 103. The project economic analysis indicated adequate funds to support all the proposed road actions.

Comment # 28: EPIC

How will the forest ensure that the promised road closures and decommissioning are accomplished, particularly in view of the likelihood that ORV users will continue to try to use roads that have been only partially blocked or decommissioned, thus continuing many of the impacts of a fully operational road?

Response:

See response to comment # 27. The economic analysis, pages 113 to 117 of the FEIS, show sufficient revenue to ensure road closures and decommissioning is accomplished. The Forest Service is currently developing regulations that will restrict all OHV's to designated routes. These regulations should go into effect by late 2007 or 2008.

Comment # 29: EPIC

What will the road densities be in the project area following road removal? Will road densities be brought below the level of 2 miles of road per square mile of area (2m/m2) which has been shown to reduce habitat fitness for deer and elk?

Response:

Post project road density is disclosed on page 91 of the DEIS and will be about 3.4 miles per square mile.

There is no forest standard, policy or regulation that requires are given road density be attained. Road closures and decommissioning are done to return unneeded roads to a forested condition and reduce long-term road maintenance costs.

Comment # 30: EPIC

The DEIS offers no meaningful definition for the extent of mortality that would qualify a fire as "catastrophic" or stand-replacing. Nearly all fires result in some mortality, and much of that mortality can be seen as benign or even beneficial from an ecological point of view.

Response:

Footnote 5 on page 3 of the DEIS/FEIS defines catastrophic fire.

Comment # 31: EPIC

A recent peer-reviewed article strongly suggests that recent increases in the average size, duration, and temperature of forest fires in the western US, including Northern California, can best be explained as consequences of the effects of global warming, including an earlier snowmelt, lower overall precipitation, and higher average temperatures. How does the proposed logging in the Pilgrim project take into account these findings.

Response:

Global warming effects are beyond the scope of this analysis. One of the objectives of the Pilgrim project is reducing fuel hazards by modifying existing stand conditions, such as fuel ladders, and surface fuel which would in turn reduce fire intensity and probability of stand replacing wildfire. While global climate change was not a driving consideration, the stand density management, meadow restoration and forest health objectives that are part of the Pilgrim project are, in our opinion, all consistent with managing forest landscapes in a warmer, drier climate.

Comment # 32: EPIC

(The 40 acres of old growth) stands should be conserved; if they are thinned to reduce fire risks only the smallest (<18 in dbh) stems should be removed, and only in numbers sufficient to maintain substantial (>60% or better) canopy closure.

Response:

The prescription for this stand requires leaving all old-growth trees. Thinning is to remove hazard trees and selected trees from the suppressed and intermediate crown classes. The tallest dominant and codominant trees that have good crown rations and free of insect and disease damage will also be retained. Some trees over 18 inches DBH could be marked under this prescription, as this size tree is not considered old-growth. Also see response to comment # 19.

Comment # 33: EPIC

150 (square feet of basal area) is a very open stand. Taken by themselves, these indices do not seem to justify the intensity of the proposed action's proposed logging.

Response:

The prescribed residual basal area is supported by research that is cited in several footnotes in the FEIS, specifically on pages 7, 37 & 39.

Comment # 34: EPIC

The project is targeting co-dominant trees, often among the most important parts of the forest for current and future habitat. Co-dominants should be conserved in nearly every instance in these forests.

Response:

Codominant trees are not being "targeted" for removal. The thinning prescriptions are designed around reducing overcrowded forest stand conditions to a sustainable level.

The thinning prescriptions on the stand record cards all give a marking priority that is as follows:

- Leave tallest dominant/codominant with best overall condition and live crown ratio, free of insect/disease damage
- Leave intermediate crown classes with greatest vigor and live crown ratio, free of insect/disease damage
- Healthy Douglas-fir and sugar pine will be retained; there is no other species preference although species diversity is desired.

Commercial thinning could remove some otherwise healthy dominant and co-dominant trees to attain the desired residual basal area.

Comment # 35: EPIC

We are particularly concerned by the potential loss of future snags, a critical element of habitat for many species.

It is our understanding that snags, especially large ones, can persist for several decades in dry forests, even when the trees are killed by root rot.

Response:

Research cited in the FEIS shows continued tree mortality of from 1-3 trees per acre per decade in thinned ponderosa pine and up to 20 trees per acre per decade mortality for unthinned ponderosa pine, FEIS, pages 37 & 76. Research also indicates about 10 percent of pine snags killed by bark beetle can persist up to 30 years.[1] With the existing snag density of about 2.9 per acre, some of which could remain for up to 30 years, and future mortality rate of about 1-3 trees per acres per decade, snag densities should remain around 2-3 per acre. This is within the density range recommended for suitable habitat for cavity nesting birds.

Comment # 36: EPIC

It is inappropriate to rely on Best Management Practices to avoid future damage where those BMPs have not sufficed to prevent such damage in the past. Please avoid operations with tractors in areas subject to serious compaction.

Response:

The reason for BMP's is to avoid future resource damage. Annual Monitoring of BMP's on the unit has shown all management practices to be effective in avoiding future resource damage to soils, water and riparian areas, FEIS page 100. The soils assessment does identify some legacy compaction, all associated with landings and skid trails within 200 feet of landings. These areas will be treated to reduce soil compaction, but as noted in the transportation section of the document, many of these landings will be used again in the future.

Comment # 37: EPIC

Have any surveys for Barred Owls been conducted?

Response:

Yes, Barred Owls respond to the same protocol survey methods as Spotted Owls. No Barred Owls have been detected during the last three years of surveys for this project.

Comment # 38: EPIC

In our comments to date on the project, including comments submitted by Scott Hoffman Black of the Xerces Society - all of which we hereby incorporate by reference - we have pointed out the abundant findings in peer-reviewed scientific literature that call into question key assumptions made in the Pilgrim project planning documents about the appropriateness and efficacy of "logging to control insect outbreaks."

Response:

Nowhere in the Pilgrim FEIS is there a statement that the purpose of the project is to control an insect outbreak. The purpose of the Pilgrim proposed action is to treat forest health problems associated with root disease and thin overstocked stands to prevent future insect outbreaks (FEIS pages 4-6). See also (attached) ***Forest Service Summary of the Logging to Control Insects: The Science and Myths***

[1] How Long do Ponderosa Pine Snags Stand? PNW Range Experiment Station, September 1949

Behind Managing Forest Insects 'Pests.' Our response to scoping comments (# 24 of Appendix B) on thinning to reduce destructive insect infestations, cites several research publications that show thinning to prescribed stocking levels reduces the incidence of pest damage in forest stands. The project record contains no comments from Scott Hoffman Black.

Comment # 39: AFRC & SPI

I want to go on record as supporting Alternative 1.

Response:

An alternative will be selected by the deciding officer after consideration of the environmental effects and benefits and public comments. See Record of Decision.

Comment # 40: SIS

The no action alternative would simply allow forest health to decline even further in these forest stands and also expand to other stands. I believe, given the present situation, that not taking management actions in the area would lead to catastrophic loss of forest resource and values. I support the intent of the project and the preferred alternative.

Response:

An alternative will be selected by the deciding officer after consideration of the environmental effects and benefits and public comments.

Comment # 41: SF

Congress has directed the Forest Service, in several laws, to harvest a sustained yield of timber with harvests at regular intervals. This direction should be part of the purpose and need.

Response:

The Pilgrim Vegetation Management Project includes harvest and sale of timber that contributes to the Forest Plan allowable sale quantity (ASQ).

Comment # 42: SF

I would like to suggest an alternative that changes the dry meadow restoration stands (401, 456 and the east half of 459) into a standard pine thinning prescription, while leaving an equivalent acreage (approximately 170 acres) unplanted in regeneration units.

Response:

The extent of historic dry meadows was determined from 1944 aerial photos and is generally representative of late historic conditions.

Regeneration units are required by law to be reforested within 5 years of harvest.

Comment # 43: SF

You ought to sample mark some stands, or completely mark one stand from each major prescription, and show a stand table before and after. This will assist in explaining to the public what the project will look like.

Response:

Most of the project has been marked as of this date and the public is welcome to inspect these areas.

Comment # 44: WW

Expand unit 460 by about 10 acres and apply the same prescription (meadow restoration).

Response:

This recommendation was incorporated into the proposed action based on a pervious field review of the project with the Winnemem Wintu Tribe.

Forest Service Summary of the Logging to Control Insects:

The Science and Myths Behind Managing Forest Insects 'Pests.'
Region 6 -- Forest Health & Protection
November 2005

This 82-page report summarizes 177 published reports concerning the effects of "logging," thinning, and other stand management techniques on conifer attack and mortality caused primarily by bark beetles or defoliating insects. There are 150 published articles that are annotated. The report has not been published in a refereed journal nor does it appear to have been peer-reviewed. The sole author of the report, Scott H. Black, is the executive director of the Portland-based Xerces Society for Invertebrate Conservation. He has degrees in ecology, horticulture, plant science, and entomology from Colorado State University.

One of the major problems with the Black report and its title is that the author fails to define the terms "logging" or "thinning." The Dictionary of Forestry by J.A. Helms (1998) defines "logging" as "the felling, skidding, on-site processing, and loading of trees or logs onto trucks." It is synonymous with "harvesting." Helms defines thinning as "a cultural treatment to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality." The Black report appears to differentiate "thinning" from "logging" when, technically, thinning can be a form of logging especially when trees in thinned stands are selectively felled and loaded onto trucks. Because the term "logging" is not defined in the report, it is difficult to support statements concerning the effects of "logging" especially since the term is seldom used in the literature that is cited in the report. This becomes especially confusing to the public and politicians, who rarely differentiate "logging" from "thinning" when comments are made about the effects of "logging" on forest insects.

One key finding of the Black report is that "there is no evidence that 'logging' can control bark beetles or forest defoliators once an outbreak has started." Despite the fact that the terms "logging" and "control" are not defined in the report, it is generally accepted by most forest scientists and managers that this statement is true. The bulk of the literature cited, however, says that prevention of bark beetle attacks by thinning overly dense forests **before,** rather than after an outbreak has started is one of the best methods of reducing infestation and preventing mortality caused by bark beetles on residual trees, should they occur (Sartwell and Stevens 1975, Cole and Cahill 1976, Mitchell et al. 1983, Amman and Logan 1998, Kolb et al. 1998, McDowell et al. 2003; all cited in the Black report).

An extensive compilation of scientific literature is listed under subject matter headings that implies that this literature supports the views and conclusions expressed in the Black report. For example, another key finding of the Black report is that "although thinning has been touted as a long-term solution to controlling bark beetles, the evidence is mixed as to its effectiveness." Although the author has cited many fine papers that report studies concerning thinning effects on bark beetles, he fails to properly summarize their significance. For instance, of 18 cited papers that report the effects of thinning on bark beetles, 14 of these clearly show a positive effect of thinning on preventing bark beetle attack and mortality of the residual trees. The Black report cites 42 papers under "Effectiveness of Thinning" but only 18 of these papers report the effects of actual "thinning" on bark beetles. The other 24 cited papers report the effects of stand density, salvage-logging, tree physiology, fire, or other stand conditions **but not thinning** on bark beetle populations and dynamics. Thinning is a well-established and universally accepted prevention strategy by professional foresters and scientists to significantly reduce susceptibility to endemic bark beetle activity.

The Black report contains many generalities that are accepted by most scientists and foresters. There are many statements, however, within the report that are taken out of context, misleading, or simply not true. For instance, it is not true that all Buprestidae "infest only dead and already dying trees." As an example, the bronze birch borer (*Agrilus anxius*) typically attacks live birch (Solomon 1995). Similarly, the flatheaded fir borer (*Phaenops drummondi*) on Douglas-fir and spruce and the California flatheaded borer (*P. californica*) on ponderosa and sugar pine have been reported to attack and kill living trees under stress (Furniss and Carolin 1977). The statement, "It is commonly accepted that fire suppression and logging have led to simplified forests…" is not correct and is not supported by the references cited. Typical old-growth ponderosa pine stands that were subjected to frequent periodic and naturally occurring underburns are, in fact, very simple systems. Fire suppression and selective harvesting of the largest pines have converted these ecosystems into vegetatively diverse systems with shade-tolerant true fir and Douglas-fir that are subject to many forest health problems, including insect, disease, and wildlife-caused tree mortality (Goheen and Hansen 1993, Hessburg et al.1994, Ferrel 1996, Filip et al. 1996).

In the Black report, literature is selectively cited, and opinions are extrapolated from research that often is inappropriately used to support the points being made. For example, where "logging" or "management" is cited as causing or aggravating bark beetle attack, most are examples of outdated or improperly done management techniques that are not indicative of good forestry practices today. The report states that "high-grade logging increases the relative abundance of shade-tolerant trees, which are more susceptible to insects." High-grade logging has not been considered a proper silvicultural technique by most if not all current foresters and forest managers for many years.

Many of the cited examples of logging/bark beetle dynamics are from mixed-conifer coastal forests where bark beetle-caused tree mortality is often minor compared to beetle

outbreaks in the drier eastside or interior forests of western North America. Extrapolating information collected in one type of ecosystem and inferring that it applies equally to a totally different ecosystem is not appropriate use of the literature. Also, the Black report cites literature from Mexico or Europe, which may have little or no relevance to logging/bark beetle dynamics in western USA and Canada.

The Black report advocates that natural processes be the preferred response to forest health problems and issues with minimal human intervention. There is an overlying theme in the report that only "nature" can properly "manage" forests. The author considers that actions taken by humans are outside of controls that occur "in nature." Management or societal objectives (such as protecting or enhancing threatened or endangered species; protecting and maintaining existing or future old-growth forests; or reducing fuels within urban/wildland interface) that require human intervention to achieve a desired outcome or in a more timely manner, are largely ignored.

In several places throughout the manuscript, the author juxtaposes two unrelated statements or studies that lead a reader with no background in forest entomology or forestry to erroneous conclusions. For example, in the executive summary it is stated that "many in the timber industry see them (insects) as agents of destruction … and some foresters believe that the solution to the problem is increased logging." The unstated and erroneous assumption is that federal and state agencies support this view when the conclusion is reached: "There is an urgent need for federal and state agencies and land managers to reevaluate their current strategy for managing forest insects..."

In conclusion, the Black report contains many examples of erroneous statements that are not even supported by the report's cited literature. Professional foresters and land managers will be able to see this deficit. Unfortunately, this report may be viewed by others as refuting hundreds of published papers on effectively managing forest insects and diseases, which it does not. It will be more unfortunate when a poorly written but popular document such as the Black report is used as supporting information during litigation. During any project analysis, such a document should be considered in the context of its biased authorship, limited credibility, and dubious scientific value. It is recommended that analysis teams refer directly to the appropriate refereed or peer-reviewed literature and site-specific data, rather than popular review reports such as this.

Project Level
Management Indicator Assemblage Report

Pilgrim Vegetation Management Project

Shasta McCloud Management Unit
Shasta Trinity National Forest

Prepared by ______________________ Date: 2/15/2007
Kelly Wolcott
Shasta-Trinity Forest Biologist

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Introduction

The purpose of this project-level report is to evaluate and disclose the impacts of the Pilgrim Vegetation Management Project on the habitat components of the wildlife management indicator assemblages as identified in the Shasta-Trinity National Forest Land and Resource Management Plan (LRMP) (USDA 1995). This report documents the effects of project alternatives on the habitat of selected assemblages and/or their representatives. Detailed descriptions of the Pilgrim Vegetation Management Project alternatives are found in Chapter 2 of the Project Environmental Impact Statement (USDA, 2006).

Nine assemblages were selected as wildlife management indicators and are identified in the Shasta-Trinity Land and Resource Management Plan (LRMP) (USDA 1995, Pages 3-24 through 3-26), which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). Agency guidance for Forests that have plans developed under the 1982 planning rule directs Forest Service resource managers to:

(1) at the project scale, analyze the effects of proposed projects on the habitats of each management indicator assemblage affected by such projects, and
(2) at the national forest (Forest) or bioregional scale, monitor habitat trends of forest management indicator assemblages as identified by the LRMP, and if required by the LRMP, monitor the populations trends for their selected representative species.

The Shasta-Trinity National Forest LRMP also established three fisheries assemblages (USDA 1995, Pages 3-11) and five fisheries management indicator species selected to represent those assemblages. Winter-run steelhead, spring run Chinook and summer steelhead were selected as management indicators for the anadromous fish assemblage, the rainbow trout was selected for the coldwater inland fish assemblage and the largemouth bass was selected for the inland warmwater fish assemblage. The Pilgrim Vegetation Management Project has unusually few aquatic areas within the project area and will not impact aquatic habitats. Therefore, the fisheries MIS and the aquatic management indicator assemblage will not be analyzed under this document.

1. MIS Analysis

1.a. Direction Regarding the Analysis of Project-Level Effects on MIS or Management Indicator Assemblage Habitat

Project-level effects on management indicator assemblages are analyzed and disclosed as part of environmental analysis under the National Environmental Policy Act (NEPA). This involves examining the impacts of the proposed project alternatives on management indicator assemblage habitat by discussing how direct, indirect, and cumulative effects will change the quantity and/or quality of assemblage habitat in the analysis area.

These project-level impacts to habitat are then related to broader scale (generally national forest and bioregional) population and/or habitat trends. The Shasta-Trinity NF LRMP allows for either population or habitat monitoring. For the selected management indicator assemblages, project-level effects analysis can be informed by forest-scale habitat monitoring and analysis alone. The Forest supplements this with extensive survey data at bioregional scales on the population trends of over 200 species of birds. The Shasta-Trinity NF LRMP requirements for management indicators analyzed for the Pilgrim Vegetation Management Project are summarized in Section 3 of this report.

Therefore, adequately analyzing project effects to management indicator assemblages, including Threatened, Endangered, and Sensitive (TES) species that are adequate representatives of the assemblages, involves the following steps:

1. Identifying which management indicator assemblages have habitat that would be either directly or indirectly affected by the project alternatives; these assemblages are potentially affected by the project.
2. Disclosing the LRMP forest-level or bioregional-level monitoring requirements for this subset of forest management indicator assemblages.
3. Analyzing project-level effects on management indicator assemblage habitats or habitat components for this subset.
4. Discussing the forest scale habitat trends and/or the bioregional population trends of representative species for this subset.
5. Relating project-level impacts on management indicator assemblage habitat to habitat at the forest scale and/or to population trends of representative species of the affected assemblages at the forest or bioregional scale.

1.b. Direction Regarding Monitoring of MIS Population and/or Habitat Trends at the Forest or Bioregional Scale.

Forest or bioregional scale monitoring requirements for the Shasta-Trinity NF's wildlife management indicator assemblages are found in the Monitoring Action Plan of the LRMP (USDA 1995, pages 5-16). The Shasta-Trinity LRMP allows the Forest to "use appropriate indicator species or habitat components to represent the assemblage." It also proposes that the Forest "survey for occupancy, reproductive success, population stability and growth and ecological health." For more information on the LRMP Forest level requirements, please see the Shasta-Trinity National Forest Wildlife Management Indicator Assemblage Report (USDA, 2006b).

Table 1: Shasta Trinity NF Forest and/or Bioregional Monitoring Proposals for the Management Indicator Assemblages Selected for the Pilgrim Vegetation Management Project (USDA 2006).

Management Indicator Assemblage	LRMP Forest Level Management Indicator Assemblage Monitoring Requirements [a]			
	Occupancy	Reproductive Success	Population Stability and Growth	Ecological Health
Late Seral	Records of assemblage or species occurrence	Population trend of selected representative species/ Habitat Trend	Population Trend Monitoring or habitat trend monitoring	Multiple factors [b]
Open and Early Seral	Records of assemblage or species occurrence	Population trend of selected representative species/ Habitat Trend	Population Trend Monitoring or habitat trend monitoring	Multiple factors [b]
Multi-Habitat	Records of assemblage or species occurrence	Population trend of selected representative species	Population Trend Monitoring or habitat trend monitoring	Multiple factors [b]
Snag and Down Log	Records of assemblage or species occurrence	Population trend of selected representative species/ Habitat Trend	Population Trend Monitoring or habitat trend monitoring	Multiple factors [b]
Hardwood	Records of assemblage or species occurrence	Population trend of selected representative species/ Habitat Trend	Population Trend Monitoring or habitat trend monitoring	Multiple factors [b]

[a] The Shasta Trinity NF LRMP Monitoring Plan (USDA 1995 pages 5-16) proposes that we use either an “appropriate indicator species or habitat components” to represent the assemblage. (LRMP, Monitoring Action Plan, pages 5-16, USDA 1995.)
[b] For more details, please see the Shasta-Trinity National Forest Wildlife Management Indicator Assemblage Report (USDA 2006)

Habitat Components: Status and Trend.

The Shasta-Trinity NF LRMP (USDA 1995) requires forest-scale monitoring of habitat status and trend for the selected management indicator assemblages on the Shasta-Trinity NF. For management indicator assemblages with habitat potentially affected by the Pilgrim Vegetation Management Project, these habitat monitoring requirements are summarized in Table 2 of this report. Habitat status is the current amount of assemblage habitat on the Shasta-Trinity NF. Habitat trend is the direction of change in the amount of habitat between the time the LRMP was approved and the present. The methodology for assessing habitat status and trend is described in detail in the Shasta-Trinity National Forest Wildlife Management Indicator Assemblage Report (USDA 2006).

Assemblage habitats are composed of the vegetation types (for example, mixed conifer forest) and/or structural features (for example, cliffs or lakes) and any special habitat elements (for example, snags) associated with a particular management indicator assemblage. “Habitat components” refers to those key characteristics that typify the category, such as trees of a certain average size and density for the Late Seral Assemblage, or the dominance of well-defined Chaparral shrubs for the Chaparral Assemblage.

The Forest will frequently supplement assemblage habitat analysis with an optional analysis of selected representatives of the management indicator assemblages. Representatives for each wildlife habitat assemblage are selected based on known habitat associations. For each representative of a wildlife management indicator assemblage on the Shasta-Trinity NF, the habitat relationship models are selected either from the California Wildlife Habitat Relationship (CWHR) System (CWHR 2005) or better, more recent or more appropriate models or local descriptions. The CWHR System is considered “a state-of-the-art information system for California’s wildlife” and provides the most widely used habitat relationship models for California’s terrestrial vertebrate species. In the case of some representatives of management indicator assemblages that are also federally threatened or endangered or Forest Service sensitive species, many have been studied in detail and additional habitat relationships information may be used to augment the CWHR system. Habitat relationships for fish and plant representatives of the management indicator assemblages are identified individually. Detailed information on the habitat relationships for these representatives on the Shasta-Trinity NF and on the CWHR System can be found in the Shasta-Trinity National Forest Wildlife Management Indicator Assemblages Report (USDA 2006b).

Management indicator assemblage habitat trend is monitored using ecological and vegetation data for the Shasta-Trinity NF. These data include spatially explicit ecological and vegetation layers created from remote-sensing imagery. This data is verified using photo-imagery, on-the-ground measurements, and tracking of vegetation-changing actions or events (for example, timber sales and wildland fires).

Appropriate Indicator Species: Population Status and Trend.

Forest or Bioregional monitoring requirements for the management indicator assemblage of the Shasta-Trinity NF are identified in the Monitoring Action Plan of the LRMP (USDA 1995, pages 5-15 through 5-18). The Shasta-Trinity NF LRMP did not select species as representatives of each of the assemblages. The Monitoring Action Plan provides us the option of selecting either habitat components or appropriate species to represent the assemblage. The monitoring requirements for the management indicator assemblages with habitat potentially affected by the Pilgrim Vegetation Management Project are summarized in Table 2 of this report. All monitoring data are collected and/or compiled at the forest or bioregional scale, consistent with the LRMP and the 2005 Planning Rule that "site specific monitoring or surveying of a proposed project or activity area is not required" (36 CFR 219.14(f)).

Population status is the current trend of the selected representatives of the affected assemblage. Population trend is the direction of change in that population measured over time.

There is a wide range of monitoring data used professionally to describe the status and trend (or change) of populations. This data ranges from describing changes in distribution based on presence-absence data to describing changes in population structure. Distribution population monitoring consists of collecting presence data for the management indicator assemblage representatives across a number of sample locations; over time, changes in the distribution of a representative species can be identified and tracked. Presence data is collected using a number of direct and indirect methods, such as surveys (population surveys), bird point counts, tracking number of hunter kills, counts of species sign (such as deer pellets), wildlife sightings and so forth. Trend data can be derived from periodic point counts of numbers of individuals of species present at standardized survey sites as well.

Population trend data for species that have been selected to represent the management indicator assemblages are collected and consolidated by the Shasta-Trinity NF in cooperation with State and Federal agency partners (including the California Department of Fish and Game, U.S. Geological Survey, and USDI Fish and Wildlife Service) or conservation partners (including Partners in Flight and various avian joint ventures). Population data includes presence data, which is collected using a number of direct and indirect methods, such as surveys (population surveys), bird point counts, tracking number of hunter kills, counts of species sign (such as deer pellets), and so forth. The Shasta-Trinity NF's management indicator monitoring program for species typically hunted, fished, or trapped was designed to be implemented in cooperation with California Department of Fish and Game (CDFG), consistent with direction in the 1982 Planning Rule to monitor forest-level population trends in cooperation with state fish and wildlife agencies to the extent practicable (36 CFR 219.19(a)(6)). To be biologically meaningful for wide-ranging species, presence data are collected and tracked not only at the forest scale, but also at larger scales, such as rangewide, state, province, or important species management unit (for example, Deer Assessment Unit or waterfowl migratory routes). Population data at various scales are important to both assess and provide meaningful context for population status and trend at the forest scale.

2. Selection of Project Level Management Indicator Assemblages

Management Indicator Assemblages for the Shasta-Trinity NF are identified in the LRMP (USDA 1995, page 3-24). The wildlife management indicator assemblages analyzed for the Project were selected from this list of assemblages identified in the LRMP, as indicated below in Table 2. Table 2 below identifies the management indicator assemblages, categorizes them relative to the effect the project will have on the assemblage habitat, and if appropriate and useful, a representative species with which to supplement the analysis (3rd column).

Table 2: Management Indicator Assemblages and Selection of representative MIS for Project-Level Analysis for the Pilgrim Vegetation Management Project.

Management Indicator Assemblages	Category for Project Analysis [1]	Project Level Assemblage Representative Species
Riparian	1	NA
Aquatic	1	NA
Cliffs, Caves, Talus, and Rock Outcropping	1	NA
Chaparral	1	NA
Multi-habitat	3	Mule deer
Snag and Down Log	3	Red-breasted nuthatch
Late Seral	3	Red-breasted nuthatch
Openings and Early Seral	3	Mule deer
Hardwood Assemblage	3	White-breasted nuthatch

[1] 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.

Category 1 Assemblages:
Riparian, Aquatic, Chaparral and Cliffs, Caves, Talus and Rock Outcroppings
Assemblages are not found within the project implementation area. As described previously, this is a flat area with deep, but highly porous soils that do not support open water or the moisture necessary for riparian zones. There are no mappable rock outcroppings in this area and the chaparral is limited by lack of surface moisture allowing trees to reliably out-compete chaparral species in this harsh environment.

Category 2 Assemblages:
There are no category 2 assemblages.

Category 3 Assemblages:
Multihabitat: Although this is poor habitat for many game species and low diversity habitat for many species, the project area does include several assemblage types and implementation will cause a shift of some assemblage types to others.

Snag and Down Log: Snags and downed logs exist in the project area and will be affected by implementation.
Late Seral: Late seral stands exist in the project area and will be affected by implementation.
Openings and Early Seral: Openings and early seral habitat exists in the project area and will be affected by implementation.
Hardwood: Hardwood stands and individual hardwoods exist in the implementation area and will be affected indirectly by project implementation.

Assemblages identified as Category 1 above are not in or adjacent to the project area. The proposed project will not directly or indirectly affect the habitat for these Assemblages and will, therefore, have no impact on forest-level habitat or populations trends. These assemblages will not be further discussed in this report.

Category 2 Assemblages are present within the analysis area but are not either directly or indirectly affected by this assemblage. There are no category 2 assemblages in the Pilgrim Vegetation Management Project. Therefore, the project will neither directly nor indirectly affect the habitat for this assemblage and will, therefore, have no impact on forest-level habitat or population trends. These assemblages will not be further discussed in this report.

The Management Indicators whose habitat would be either directly or indirectly affected by the Pilgrim Vegetation Management Project, identified as Category 3 in Table 1, are carried forward in this analysis. This analysis will evaluate the direct, indirect, and cumulative effects of the proposed action and alternatives on the habitat of these Management Indicators.

Based on the criteria identified within the LRMP (USDA 1995), as summarized above, the assemblages selected for Project-Level Management Indicator analysis for the Pilgrim Vegetation Management Project are: openings and early seral stage forest, snag & downed logs, late-seral, multi-habitat and hardwood assemblages.

The Shasta-Trinity LRMP allows for analysis of either representative species or habitat components. We have chosen to analyze the habitat components with a supplementary analysis of representative species to provide a more comprehensive and detailed analysis. The species listed in column 3 of table 2 above were selected for the following reasons:

(1) Each has been documented near the project area;
(2) Each has been observed at least once annually east of McCloud or at the ranger station;
(3) Each species is regularly found within the habitat for the assigned assemblage.

3. LRMP Monitoring Requirements for Management Indicator Assemblages Selected for Project-Level Analysis

3.a. Management Indicator Assemblages Monitoring Requirements.

The Shasta-Trinity NF LRMP (USDA 1995, pages 3-24 through 3-26) identifies nine forest wildlife management indicator assemblages. The LRMP Monitoring Action Plan on pages 5-15 through 5-18 of the LRMP describes forest and bioregional scale monitoring proposals for the Shasta-Trinity NF management indicator assemblages. Habitat and population monitoring results for the Shasta-Trinity NF's management indicator assemblages are described in the Shasta-Trinity National Forest Wildlife Management Indicator Assemblage Report (USDA 2006) and are summarized below for the management indicator assemblages being analyzed for the Pilgrim Vegetation Management Project.

Table 3. Shasta Trinity NF LRMP Requirements for the Project-Level Management Indicator Assemblages Selected for the Pilgrim Vegetation Management Project (USDA 2006).

Selected Management Indicator Assemblages	Project Level Management Indicator Assemblage Monitoring Requirements (Select one option, if appropriate supplement the analysis with the other option) [a]		Selected Project-Level Representative Species
	Representative Species	Habitat or Habitat Components	
Late Seral	Population Trend Monitoring	Habitat trend	Red-breasted nuthatch
Open and Early Seral	Population Trend Monitoring.	Habitat trend	Mule deer
Multi-Habitat	Population Trend Monitoring	Habitat trend	Mule deer
Snag and Down Log	Population trend Monitoring	Habitat trend	Red-breasted nuthatch
Hardwood	Population Trend Monitoring	Habitat trend	White-breasted nuthatch

[a] The Shasta Trinity NF LRMP Monitoring Plan (USDA 1995 pages 5-16) requires that we use either an appropriate indicator species or habitat components to monitor the assemblage.

3.b. How Management Indicator Assemblage Monitoring Requirements are Being Met.

The Shasta-Trinity National Forest uses a multi-prong strategy to provide our decision makers with information regarding the 'state' of our Forest. The strategy contains the following components:

(1) Monitoring the changes in the habitat components defined for Forest level Assemblages.
(2) Cooperating with Federal researchers to monitor the population trends of over 240 selected species on three different time scales over six geographic areas.
(3) Cooperating with California Department of Fish and Game officials to monitor the populations of selected species.
(4) Maintaining a data on other factors such as climate, pathology occurrence, and other ecologically sensitive processes.

Monitoring of Assemblage Habitat Components:

As noted above, the Shasta Trinity monitors the changes in vegetation patterns occurring on the forest over time. Vegetation disturbance in forest ecosystems occurs at various scales through relatively common events such as wildfire, windthrow, snowload and extreme weather damage, floods, landslides, insect and disease attacks and windthrow, and through uncommon events such as volcanic activity, glacial activity and climatic change (Oliver and Larson 1990). Forest growth and plant competition shift vegetation composition over time, some species out competing others in a particular growing space with particular conditions. Timber harvest, forest management and fire suppression can also profoundly affect vegetation composition and structure.

With the exception of forest management and fire suppression, each of these processes present a natural mechanism shifting overall habitat composition and distribution. Some environments and habitats such as many riparian zones are more variable and subject to continual disturbance events, other areas such as some high altitude forests such as the red fir forests, are less susceptible to frequent, large scale disturbance events and tend to be more stable over time. Species adapt in variable ways to these patterns of habitat disturbance and utilize them in their own survival strategies.

By monitoring large-scale disturbance events on the Forest, decision makers can evaluate their stewardship opportunities and responsibilities to better inform their decisions.

Habitat Component Monitoring

Each of the nine wildlife assemblages is characterized by a suite of features that distinguish them from the others. For example, a forested stand cannot be categorized as part of the late-seral assemblage without trees of a minimum size and density. These key components allow us to identify and monitor the distribution and quantity of habitat assemblage types over time. Each of these components is a reliable indicator for the more complex entity that is the assemblage.

Table 4. Habitat components for the wildlife management indicator assemblage monitoring on the Shasta Trinity NF (USDA 2006).

Management Indicator Assemblage	Habitat components for Analysis
Late Seral [a]	Tree stands with average crown diameter equal to or greater than 13' and having a crown density equal to or greater than 40% as represented in LRMP database (size class 3N and above).
Open and Early Seral	Meadows, openings, and tree stands with average crown diameter less than 13' or tree stands with average crown diameter between 13' and 24' with crown cover less than 40% as represented in LRMP database (size class 3P and below).
Multi-Habitat	Appropriate combinations of the other assemblage types as represented in the LRMP database.
Snag and Down Log	Tree stands with average crown diameter equal to or greater than 13' and having a crown density equal to or greater than 40% (size class 3N and above) containing snags and down logs as represented in LRMP database.
Riparian	The presence of riparian classified vegetation components as mapped in the Forest LRMP data base.
Aquatic	Open bodies of water such as rivers, creeks, lakes, ponds, etc., as mapped on the Forest LRMP database.
Hardwood	Vegetation types containing significant proportions of hardwood trees as represented in the LRMP database.
Chaparral	Shrub dominated vegetation communities containing or dominated by chaparral species.
Cliffs, Caves, Talus and Rock Outcrops	The presence of significant rocky habitat sites on the Forest LRMP database.

[a] Please note that common definitions for the term 'late-seral' differ considerably depending on the context. Different interpretations of what constitutes 'late-seral' on the complex continuum of forest structure and type are legitimate and depend highly on the proposed usage, the academic discipline in which the analysis takes place and the legal context. Our definition for late seral relative to management indicator assemblages differs from late-seral or late-successional definitions as used in the project FEIS. Late-seral for management indicator assemblages was defined relative to the two seral stage categories established in the LRMP, Opening and Early Seral and Late-seral. In other analyses, categories may include mid-seral types or other categories. The LRMP database allows the forest to break forested vegetation communities into many different categories. The California Wildlife Habitat Relationship systems alone has over 23 forest types (depending on how you wish to categorize them) each split into 18 separate seral stages according to average tree size (or age in some cases) and average density producing over 399 potential descriptors of any forest stand. Wildlife usage is also frequently continuous over these categories, varying with species, season, ecological conditions, predator pressure, competitive pressure, prey and forage conditions, and other factors. Similar to the use of significant figures in mathematics, as ecologists we try to avoid false representations of accuracy when characterizing habitat by lumping habitat into categories significant for the species and use. Assemblage habitats then are lumped into the nine terrestrial categories found in the LRMP, including the two significant seral stages, Openings and Early Seral and Late seral.

[1] The Shasta Trinity NF LRMP Monitoring Plan (USDA 1995 pages 5-16) proposes that we use either an "appropriate indicator species or habitat components" to represent the assemblage. (LRMP, Monitoring Action Plan, pages 5-16, USDA 1995.)
[2] For more details, please see the Shasta-Trinity National Forest Wildlife Management Indicator Assemblage Report (USDA 2006b)

Table 5. Shasta Trinity NF Monitoring Proposals for the Selected Management Indicator Assemblages for the Pilgrim Vegetation Management Project (USDA 2006).

Management Indicator Assemblage	LRMP Management Indicator Assemblage Monitoring Requirements [a]				Selected Project Level Assemblage Representative
	Occupancy	Reproductive Success	Population Stability and Growth	Ecological Health	
Late Seral	Records of assemblage or species occurrence	Assemblage habitat trend and/or population trend of selected representatives	Assemblage habitat trend and/or population trend of selected representatives	Multiple factors [b]	Tree stands with average crown diameter equal to or greater than 13' and having a crown density equal to or greater than 40% as represented in LRMP database.
Open and Early Seral	Records of assemblage or species occurrence	Assemblage habitat trend and/or population trend of selected representatives	Assemblage habitat trend and/or population trend of selected representatives	Multiple factors [b]	Meadows, openings, and tree stands with average crown diameter less than 13' or tree stands with average crown diameter between 13' and 24' with crown cover less than 40% as represented in LRMP database.
Multi-Habitat	Records of assemblage or species occurrence	Assemblage habitat trend and/or population trend of selected representatives	Assemblage habitat trend and/or population trend of selected representatives	Multiple factors [b]	Appropriate combinations of the other assemblages as represented in the LRMP database.

Management Indicator Assemblage	LRMP Management Indicator Assemblage Monitoring Requirements [a]				Selected Project Level Assemblage Representative
	Occupancy	Reproductive Success	Population Stability and Growth	Ecological Health	
Snag and Down Log	Records of assemblage or species occurrence	Assemblage habitat trend and/or population trend of selected representatives	Assemblage habitat trend and/or population trend of selected representatives	Multiple factors [b]	Tree stands with average crown diameter equal to or greater than 13' and having a crown density equal to or greater than 40% as represented in LRMP database.containing snags and down logs (as represented on the LRMP database).
Hardwood	Records of assemblage or species occurrence	Assemblage habitat trend and/or population trend of selected representatives	Assemblage habitat trend and/or population trend of selected representatives	Multiple factors [b]	Vegetation types containing significant proportions of hardwood trees as represented in the LRMP database.

[a] The Shasta Trinity NF LRMP Monitoring Plan (USDA 1995 pages 5-16) proposes that we use either an "appropriate indicator species or habitat components" to represent the assemblage. (LRMP, Monitoring Action Plan, pages 5-16, USDA 1995.)

[b] For more details, please see the Shasta-Trinity National Forest Wildlife Management Indicator Assemblage Report (USDA 2006)

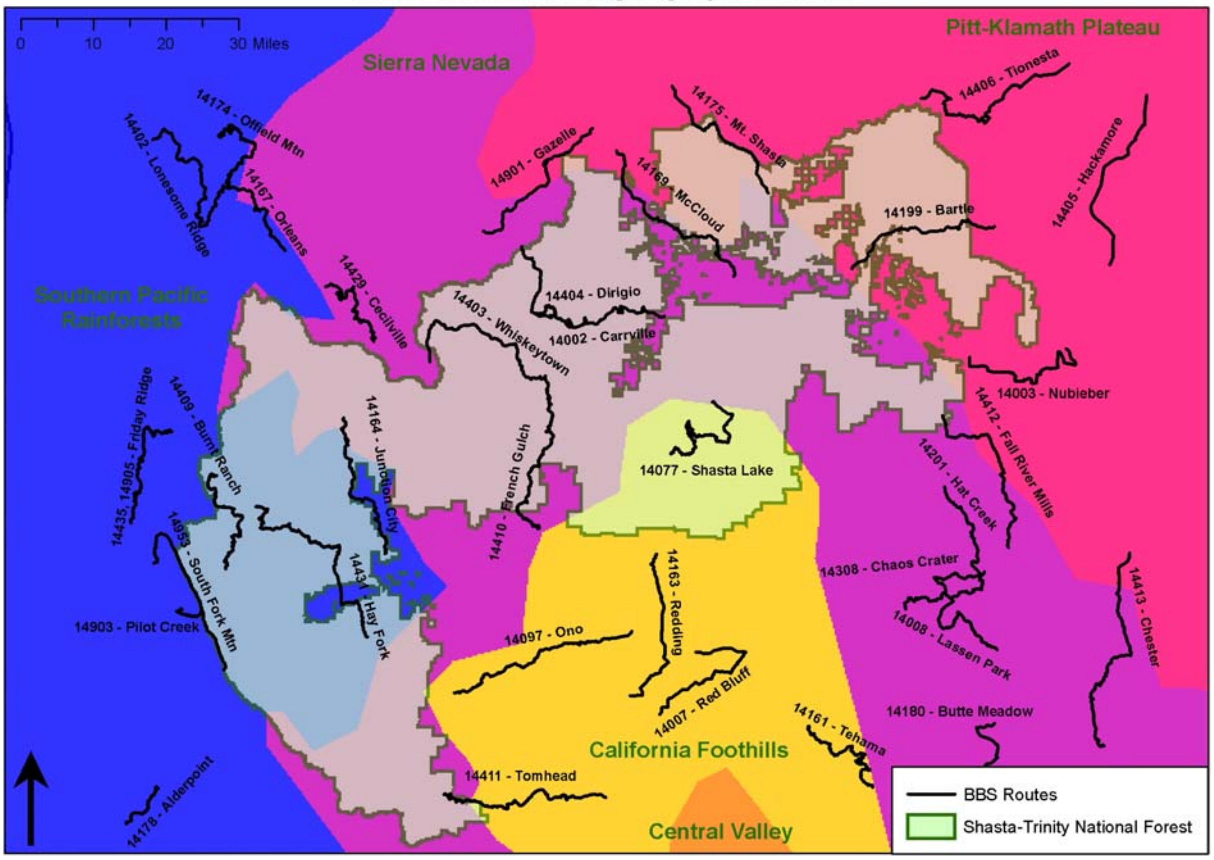
Species Population Trend Monitoring:

To supplement the habitat information provided by Forest level analysis, the Shasta-Trinity National Forest also monitors the population trends of over 240 species found on the Forest. The large part of this data comes directly from the international Breeding Bird Survey operated by the wildlife research arm of the United States Geological Service (USGS). This data allows us to monitor directly the population trends for a large number of vertebrate species over six geographic areas over three time periods. In some cases, such as the Bartle route on McCloud, we have more than 30 years of data from the BBS program.

Bioregional scale analysis gives a more robust and stronger analysis than project or forest level analysis. The Breeding Bird Survey has partitioned North America into Biogeographic strata that have similar habitats, conditions and fauna. Particularly with highly mobile animals such as birds, these biogeographic regions allow us to pool the data from individual routes, evening out the highly variable data at a route level and allowing us to get a much better understanding of population trends. This tends to even out the large local fluctuations of highly mobile species such as birds. Map 1 below illustrates the nearby BBS routes found on and close to the Forest and places them in the appropriate strata.

In the map below, the Pilgrim Vegetation Management Project is located in the Pitt-Klamath Plateau strata, colored pink in the upper right portion of the map and salmon where it overlaps with the Shasta-Trinity National Forest. Nearby routes include the Bartle, McCloud, Mt. Shasta, Nubieber and Tionesta.

BBS Routes on or near Shasta-Trinity National Forest and associated Biogeographic Strata



Map 1: BBS Biogeographic Strata and BBS routes on or near the Shasta-Trinity NF. Routes are indicates by black lines, green lines show the Shasta-Trinity NF boundary, and the colors indicate strata overlapping with the Forest.

This data is summarized in the Shasta-Trinity Forest Wildlife Management Indicator Assemblage Report (USDA, 2006).

The following species have been selected as representatives of the Assemblages.

Mule deer: Population information for mule deer has been obtained from the California Department of Fish and Game (CDFG) as part of its program to manage hunted species. CDFG assesses mule deer population status and trend by both Hunt Zone and DAU as part of their Environmental Documentation for the hunting program (CDFG 2003). Annual variation in deer population estimates may be high due to annual changes in environmental conditions, and varies geographically (CDFG 2003).

Red-breasted Nuthatch: The red-breasted nuthatch is a common resident of coniferous forests from sea level to 10,000 feet elevation. They are both primary excavators of snags and live trees and secondary (opportunistic) users of already excavated holes. They prefer mature or late-seral stands, especially those with snags for nesting.

White-breasted nuthatch: The white-breasted nuthatch is a common resident of coniferous and riparian forests from sea level to 10,000 feet, and commonly nests in a natural cavity, abandoned woodpecker nest or its own excavated hole in a large deciduous tree. The white-breasted nuthatch is strongly associated with mature, deciduous woodlands and mixed coniferous and deciduous forests (Pravosudov et al. 1993).

4. Description of Proposed Project.

Vegetation management treatments including timber harvest, prescribed burns, precommercial thinning and other treatments are proposed on approximately 3,780 acres. Please note that multiple treatments may occur on the same acres. For example, the acres involved in the dry meadow restoration will see both the removal of small conifers on 275 acres as well as burning on an estimated 160 acres of those same treated areas. Because of this overlap of treatments, the total table acreages will exceed the project acreage noted above.

Specifically:

Biomass: Trees will be thinned to a spacing of approximately 25 feet on approximately 785 acres of 25-45 year old pine stands. About 90% of these stands are older plantations. Canopy cover in these stands will be reduced from an average of 60% to about 40%.

Thinning: On approximately 1200 acres of 75-95 year old pine stands, the project will remove trees that are dead from insect attack, root disease and/or drought. In the remaining areas of ecologically unsustainable tree density, trees will be thinned to 120-150 square feet of basal area. Regeneration needs due to past and present tree mortality will be evaluated post harvest and if necessary areas larger than 1 acre in size would be planted. Canopy cover in these stands will be reduced from about 50% - 60% to about 40% outside of areas of high mortality. The residual canopy cover following project implementation will depend on the site-specific tree mortality and the local (individual tree) resistance to disease. These factors are of course related and highly variable.

Thinning/Sanitation: Approximately 1035 acres of 75-110 year old pine stands are currently experiencing more mortality than the "thinning" stands. In theseareas, the project will remove trees that are dead from insects, root disease and/or drought. The remaining areas of ecologically unsustainable tree densities will be thinned to 100-120 square feet of basal area. Regeneration needs due to past and present tree mortality will be evaluated post harvest and if necessary areas larger than 1 acre in size would be planted.

The thinning prescriptions include removing trees in all crown classes (i.e., unhealthy and slow growing) as well as diseased or dying trees. The objective is to concentrate growth on the residual trees in the stand with the best ability to respond to less competition. These trees have larger crowns and a greater capacity to photosynthesize and increase their crown size as more light reaches the full crown. Canopy cover in these stands will be reduced from approximately 40% to 60% to approximately 30% to 40% outside of areas of high mortality. Resistant and healthy trees will remain standing and be left to form the post-harvest canopy.

Mature Stand Thin: On approximately 40 acres, thin two-storied mature stands to reduce understory ladder fuels and maintain older trees, especially pines. Canopy cover in these stands will be reduced from 60% to70% to approximately 50%.

Knobcone Sanitation: Remove dead knobcone pine on approximately 10 acres. Tractor pile and burn residual slash and re-plant with ponderosa pine. Canopy cover in these stands will be reduced to approximately 13% to 30%. The remnant 10% of cover will be provided by existing trees other than knobcone. Please note that these very open stands of knobcone pine are considered as part of the openings and early seral stage assemblage. Although the knobcone pine has reached larger sizes, it is a shortlived, early seral species. Generally, knobcones begin to die between 50 and 75 years unless a fire regenerates a new, young stand {Johnston 1994 #2208}.

Regeneration harvest: Regeneration harvest approximately 415 acres of 95-110 year old pine stands suffering from root disease and bark beetle mortality. Diseased trees that have chlorotic foliage, ragged and fading crowns, poor needle retention and/or evidence of successful insect attacks will be removed. If available, retain up to 6-10 trees/acre of healthy and full crowned overstory trees. All species other than pine will be favored as leave trees, as their long-term viability will be greater. Retention areas should include the largest, oldest (where available) and healthiest live trees, decadent, and hard snags occurring in the unit. Leave all healthy white fir, incense-cedar, sugar pine, Douglas-fir, aspen, and black oak. Tractor pile and burn residual slash. Re-plant with mixed species in shaded areas, ponderosa pine in open areas.

Manage Forest Fuels – Prescribed Burn: The thinning treatment stands will be examined post harvest and if necessary treatments will be prescribed to reduce excessive accumulations of down wood and deep needle slash by underburning or mastication on approximately 200 acres. This treatment occurs on acres that are also receiving other treatments, such as the dry meadow restoration.

Manage Forest Fuels – Mastication and or tractor piling and burning: The thinning treatment stands will be examined post harvest and if necessary treatments will be prescribed to reduce excessive accumulations of down wood and deep needle slash by tractor piling and burning on approximately 700 acres.

Road Management - Closures: Following harvest and fuels treatments approximately 10 miles of existing roads will be closed with either guardrail barricades or earth berms. These 10 miles cover approximately 20 acres.

Road Management - Decommissioning: Following harvest and fuels treatments approximately 2.1 miles of existing roads will be decommissioned and removed from the forest road system. These 2 miles cover about 4 acres.

Road Management - New Road Construction: Prior to harvest and fuels treatments approximately 0.3 miles of new road construction will needed to reduce skidding distance in one harvest unit. These 0.3 miles of road cover about 0.7 acres. Please see the Appendix in the FEIS for a list of specific road management actions.

Hardwood Management: Release aspen from conifer competition on approximately 20 acres by removing conifers within 100-150 feet of aspen. Oaks are unusual, but will be released from conifer competition if found. About ten acres of this is found in a discrete, single aspen stand. The rest consist of small clusters or stands of aspen intermixed with the conifers. These acres overlap with acres in the thinning units.

Dry Meadow Restoration: On approximately 275 acres, adjacent to historic dry meadow areas, remove small diameter (< 14” dbh) conifers and thin remaining overstory trees to 80 sq.ft/acre of basal area to restore the openness of these dry meadow areas.

Table 6: Summary of treatment units and pre-treatment and post treatment CWHR habitat types for terrestrial habitat.

Treatment Type	Acres	Treatment Prescription	Pre-treatment CWHR [1] Type – Acres (same as Alt 4, No Action)	Post Treatment CWHR[1] Type - Acres		
				Alt 1	Alt 2	Alt 3
1	785	Biomass	PPN 3D – 785 acres	PPN 3M – 785 acres	PPN 3M – 785 acres	PPN 3M – 785 acres
2	1200	Thinning	PPN 5D – 1200 acres	PPN5M – 1200 acres	PPN 5M – 1200 acres	PPN5M – 1200 acres
3	1035	Thinning/Sanitation	PPN5D – 1035 acres	PPN5P – 1035 acres	PPN5M – 1035 acres	PPN5M– 1035 acres
4	40	Mature Stand Thin	SMC5D – 40 acres	SMC5M – 40 acres	SMC5M – 40 acres	SMC5D – 40 acres
5	10	Knobcone Sanitation	KP4P – 10 acres	PPN1S – 10 acres	PPN1S – 10 acres	PPN1S – 10 acres
6	415	Regeneration harvest	PPN5P – 415 acres	PPN1S – 415 acres	PPN1S – 415 acres	PPN1S – 415 acres
7	200	Manage Forest Fuels – Prescribed Fire	PPN5M –100ac PGS-100	PPN5S – 100 ac /PGS 100 –	PPN5S-100 ac /PGS –100	PPN5S-100 ac /PGS –100
8	700	Manage Forest Fuels – mastication and/or tractor piling & burning	PPN5M – 700 acres	PPN5M– 700 acres	PPN5M– 700 acres	PPN5M – 700 acres
9	20	Road Management - closures	BAR – 20 acres	BAR 20 acres	BAR– 20 acres	BAR – 20 acres
10	4	Road Management - Decommissioning	BAR – 4 acres	PGS – 4 acres	PGS – 4 acres	PGS – 4 acres
11	.7	Road Management – New Road Construction	PPN4D – 0.7 acres	BAR – 0.7 acres	BAR – 0.7 acres	BAR – 0.7 acres
12	20	Hardwood Management	ASP3S/PPN5M – 20 acres	ASP3S/PPN5S – 20 acres	ASP3S/PPN5S – 20 acres	ASP3S/PPN5S – 20 acres
13	275	Dry Meadow Restoration	PPN5M – 100 acres PPN3M-175 ac	PPN5S-100 ac /PGS – 175	PPN5S-100 acres PGS - 175 acres	PPN5S-100 acres /PGS – 175 acres

[1] CWHR Habitat Type Classification System Codes:
SMC = Sierra Mixed Conifer, PPN = Ponderosa Pine; ASP = Aspen; PGS = Perennial Grasses; BAR = Rock or bare soil (road); KP = Knobcone Pine; RFR = Red Fir; WFR = White Fir; MHW = Montane Hardwood (Black Oak); LPN = Lodgepole Pine; MCP = Montane Chaparral;
1 = seedlings <1" diameter at breast height (dbh); 2 = saplings 1"-6" dbh; 3 = poles 6" – 11" dbh; 4 = small trees 11" – 24" dbh; 5 = medium/large trees > 24" dbh
D = Canopy cover (CC) > 60%; M = CC 40% - 59%; P = CC 25% - 39%; S = CC 10% - 24%

Vegetation Diversity and Cumulative Effects:

For a complete analysis of the shifts in vegetation structure that have occurred within the two affected fifth field watersheds, please see the Vegetation Diversity Section of Chapter Three of the Final Environmental Impact Statement for the Pilgrim Vegetation Management Project (USFS, 2007).

The Land and Resource Management Plan for the Shasta Trinity National Forest recommends that the Forest Service analyze changes in forest vegetation diversity at the scale of the fifth field watershed. The project area is located within two 5th order watersheds[1], Ash Creek and Upper McCloud River. Most of the project (about 75%) is within the Ash Creek watershed. Vegetation typing data combined with calculations to account for growth and harvest[2] in these watersheds was used to determine seral stage and vegetation diversity and the percent late successional forest in each watershed.

The following provides a context for the analysis at the scale of a fifth field watershed.

Over the past 10 years, the Forest Service:

- has regenerated approximately 1000 acres through regeneration harvests such as green tree retention and salvage.
    - A majority of this harvest (670 acres) was salvage of dead and dying Ponderosa pine from Western Pine Beetle infestations.
    - The other 330 acres was regeneration of lodgepole pine and knobcone pine. Approximately 700 acres is likely to be regenerated within the Mudflow Project in the reasonably foreseeable future.
    - Combined with the 535 acres of regeneration harvest proposed in alternatives 1, 2 and 3 of the Pilgrim Vegetation Management Project, the project is likely to reduce the amount of late-successional forests by approximately:
        - 1.0 percent in the Ash Creek fifth field watershed and
        - about 2.8 percent in the Upper McCloud fifth field watershed[3].
        - These stands have some residual mid and late seral stage trees and groups of trees with a much lower canopy closure.
    - Past and proposed future regeneration harvest will reduce the amount of late-successional forest:
        - in the Upper McCloud Watershed by about 2.2 percent and

[1] Forest Plan page 4-63 describes assessment of late-successional forest at the 5th field watershed scale.
[2] Forest Plan (1975/19130) data with 1990 and 1995 updates for plantations. Not grown. Calculations were made to account for growth. Timber harvest since 1996 included in calculations. See the vegetation diversity calculations in the project file.
[3] Vegetation diversity calculations in project file.

        - in the Ash Creek Watershed by about 0.9 percent.
    - Past and proposed future projects will or have thinned approximately 2,700 acres of mid-successional plantations that will increase the acres of late-successional forest in 30 to 50 years in both watershed.

- has commercially thinned approximately 11,400 acres in the two fifth field watersheds.
    - These operations have not changed the amount of late successional forest in the short term (10 years and less).
    - These operations will increase the percent of late successional forest in the long term (15 and longer) as mid successional (3b and c) stands that were thinned grow into the late successional (4b and c) stage more rapidly than they might without treatment.
    - The treatments will reduce the probability of catastrophic loss from fire, insects or disease occurring within these stands.
    - Past and currently proposed thinnings will have commercially thinned approximately:
        - 20 percent (8,700 acres) of the commercial forest lands in the Ash Creek Watershed and
        - 20 percent (11,100 acres) in the Upper McCloud Watershed.
        - Absent unforeseen catastrophic events from wildfire, insects or disease, these watersheds are likely to accumulate late-seral assemblage habitat faster than they lose it through harvest and wildfire.

There are also two proposed projects within the fifth field watersheds.

- The Mudflow Project (Upper McCloud Watershed) will commercially thin approximately 2,100 acres of natural stands and plantations and treat root disease centers ranging from small group selection area (2-4 acres) to regeneration with reserve trees in areas of more extensive root disease on approximately 500 acres and remove encroaching conifers from approximately 200 acres of wet meadows.
    - Regeneration and sanitation harvest on approximately 700 acre of the Mudflow Project will reduce the amount of late- successional forest in the Upper McCloud Watershed by 1.3 percent.
- The Algoma Project will commercially thin approximately 4,000 acres of natural stands and plantations, partly in the Upper McCloud Watershed and partly within the Ash Creek Watershed.
    - This project is in a late successional reserve and may treat root disease centers or insect infestations.
- These projects are predominantly thinning of mid and late successional stands to improve growth and resistance to insect, disease and wildland fires.

- There is a large percent of both watersheds currently in this mid-successional dense stage, 3b-c (33 percent of the Ash Creek and 31 percent of the Upper McCloud Watershed) that should develop into the late-successional stage in the next 10 to 40 years.

Overall there will be a short-term reduction in the percent of late successional forest in both watersheds, but they will remain above the 15 percent threshold. The percent of late-successional forests will increase over the next 10 to 40 years as mid-successional stands, especially those that have been or will be thinned, grow into the late-successional stage.

5. Effects of Proposed Project on Assemblage Habitats

The following table summarizes the management indicator assemblage habitat type changes in the project area that would be implemented by the three project alternatives. Treatments that result in a change in management indicator assemblage habitat type are highlighted in yellow. Please note that a few assemblage categories overlap. For example, a stand may be a late-seral assemblage habitat and a riparian assemblage habitat all at the same time. Because of this overlap, acreage totals in the following tables will exceed the total project acres.

Table 7: Shifts in Assemblage type in each alternative. Operations that will shift some assemblage types are highlighted in yellow.

Treat-ment Type	Acres	Treatment Prescription	Pre-treatment Assemblage Type – Acres (same as Alt 4, No Action)	Post Treatment Assemblage Type - Acres			Change in Assemblage Category		
				Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3
1	785	Biomass	LS– 785 SDL - 785	LS– 785 SDL - 785	LS– 785 SDL - 785	LS – 785 SDL - 785	None	None	None
2	1200	Thinning	LS – 1200 SDL - 1200	LS - 1200 SDL - 1200	LS – 1200 SDL - 1200	LS - 1200 SDL - 1200	None	None	None
3	1035	Thinning/Sani-tation	LS – 1035 SDL - 1035	LS – 1035 SDL - 1035	LS – 1035 SDL - 1035	LS– 1035 SDL - 1035	None	None	None
4	40	Mature Stand Thin	LS – 40 SDL - 40	LS - 40 SDL - 40	LS - 40 SDL - 40	LS - 40 SDL - 40	None	None	None
5	10	Knobcone Sanitation	OES – 10	OES – 10	OES – 10	OES – 10	None	None	None
6	415	Regeneration harvest	LS – 415 SDL-415a	OES – 415	OES – 415	OES – 415	415 ac LS to OES,	415 ac LS to OES,	415 ac LS to OES,

Treat-ment Type	Acres	Treatment Prescription	Pre-treatment Assemblage Type – Acres (same as Alt 4, No Action)	Post Treatment Assemblage Type - Acres			Change in Assemblage Category		
				Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3
							415 ac SDL lost	415 ac SDL lost	415 ac SDL lost
7	200	Manage Forest Fuels – Prescribed Fire	OES – 160 LS - 40	OES – 160 LS - 40	OES – 160 LS - 40	OES – 160 LS - 40	None	None	None
8	700	Manage Forest Fuels – mastication and/or tractor piling & burning	LS – 700 SDL - 700	LS - 700 SDL - 700	LS - 700 SDL - 700	LS - 700	None	None	None
9	20	Road Management - closures	N/A – 20	N/A -20	N/A - 20	N/A -20	N/A – 20	N/A – 20	N/A – 20
10	5	Road Management - Decommission ing	N/A – 4	OES - 4	OES 4	OES – 4	4 ac BAR to OES -	4 ac BAR to OES -	4 ac BAR to OES -
11	0.7	Road Management – New Road Construction	LS – 0.7 SDL – 0.7	NA – 0.7	NA – 0.7	NA – 0.7	LS to NA – 0.7	LS to NA – 0.7	LS to NA – 0.7
12	20	Hardwood Management	LS- 20 Hrdwd – 20	Hrdwd – 20	Hrdwd – 20	Hrdwd – 20	Loss of LS - 20	Loss of LS - 20	Loss of LS - 20
13	275	Dry Meadow Restoration	LS – 100 SDL – 100 OES 175	OES – 275	OES - 275	OES - 275	LS to OES – 100, Loss of SDL - 100	LS to OES - 100, Loss of SDL - 100	LS to OES - 100, Loss of SDL - 100

Assemblage Type Codes: **LS** = Late-seral Assemblage; **OES** = Openings and Early Seral Assemblage; **Hrdwd** = Hardwood Assemblage; **SDL** = Snag and Downed Log; **NA** = Not Applicable, habitat type such as road not covered by Assemblage categories;

[a] Please note that we assign snag and down log assemblage habitat to the same vegetation categories as Late-seral assemblage to reduce the effect of small snags present in all forest stands would have on our estimations. Because larger snags are more valuable (in general) to more wildlife species, we disallow for snags in smaller stands (please see the Forest Wildlife Management Assemblage Report for further details). Although this treatment shifts assemblage categories reducing the amount of snag and down log assemblage we can count, we maintain more than the minimum required snag allocation required by the LRMP, and thus snags will remain on site.

[b] Please note that 160 acres of the prescribed burn occurs on the dry meadow restoration area post clearing of the small conifers encroaching on the meadow. The underburning within the 40 acres of late seral assemblage type will not change the management indicator assemblage habitat character of that stand.

In summary, approximately 535 acres will be shifted from the late-seral assemblage category to the openings and early seral assemblage category (treatment types 6, 12 and 13), 4 acres will shift from NA (Not Applicable, meaning it does not fit in one of the assemblage habitat categories) to the openings and early seral assemblage type (treatment 10), and 0.7 acres will shift from late-seral to NA (treatment 11). All alternatives of the project will lose a total of approximately 535 acres of late-seral assemblage to another category and gain about 535 acres of openings and early seral assemblage. Approximately 535 acres of forest land currently categorized as snag and down log assemblage habitat will downgrade and lose it's categorization as snag and down log assemblage habitat. This area will however, retain snags at or above the Forest minimum where they are available.

Three thousand and sixty (3,060) acres of late seral (LS) will remain late-seral and snag and down log assemblage habitats, one hundred and eighty five (185) acres of openings and early seral (OES) assemblage type remains the same and twenty acres of hardwood ("hrdwd") assemblage habitat remains as hardwood assemblage habitat. "In-growth' or the growth of trees during this time from an openings and early seral assemblage type to a late-seral assemblage type would be insignificant over the time of project implementation.

Table 8: Acres of assemblage habitat shifted to another assemblage habitat type

Acres of…	…this assemblage habitat will shift to …	…this assemblage habitat
535	Late-seral	Openings and early seral
535	SDL	Openings and early seral

Table 9: Acres of assemblage habitat removed and lost from assemblage habitat (replaced by developed areas, roads, or other areas not included in the assemblage types)

Acres of…	this assemblage habitat will be lost …	…to this type of non-assemblage habitat (roads, building, parking lots, etc.)
0.7	Late-seral	roads

Table 10: Acres of non-assemblage acreage (roads, parking lots, etc) restored to assemblage type habitat

Acres of Non-assemblage habitat will be restored …	…to this type of assemblage habitat
4 (roads)	Openings and early seral (decommissioned roads)

Table 11: Acres of assemblage habitat that will be modified but remain the same assemblage type

Acres of…	this assemblage habitat will be modified, but remain the same assemblage type
3,060	Late-seral

3,060	Snag and down log
20	Hardwood
185	Openings and early seral

Analysis of the Assemblage Habitat of Representative Species

5.a. Mule Deer (Open and Early Seral, Multi-Habitat Assemblages)

5.a.1. Habitat/Species Relationship.

Mule deer range and habitat includes coniferous forest, foothill woodland, shrublands, grassland, agricultural fields, and suburban environments. Suitable habitat is composed of four distinctly different elements: fawning, foraging, cover, and winter range. Hiding and thermal cover is typically close to the ground and thick enough to camouflage the outline of the deer, without being so dense as to obscure the approach of potential predators. Thermal cover is similar and generally thought to be denser, with the additional property of sheltering deer from the elements. Winter range tends to be lower elevation habitats that meet the requirements for forage, hiding, and thermal cover described above. Mule deer migrate seasonally between higher elevation summer range and low elevation winter range.

Foraging habitat includes brush, shrubs, forbs, grasses, and trees where deer feed most actively at dawn and dusk. Hardwoods, such as oaks, are important for mast production, especially in winter range.

The California Wildlife Habitat Relationship System provides a habitat capability model for mule deer habitat (USDA, 1995, Page G-8). The model lists 3b, 3c, 4b, and 4c vegetation types for providing cover and 1, 2, 3a and 4a types for providing foraging during the spring, summer and fall. The ratio of forage habitat to cover strongly affects habitat quality with a 50:50 (1) ratio providing the highest quality habitat and moderate habitat provided by anything else ranging from a low forage ratio of 20:80 (0.25) to a low cover ratio of 75:25 (3). Any forage to cover ratio below 0.25 or above 3 is considered poor. Denser and older types usually provide cover and the more open environments usually provide foraging. Under the vegetation classification scheme used by the Shasta-Trinity, size classes 3, 4 and 5, density classes N or G provide cover, and type classes 1 (including XX plantations and dry meadows) and size classes 2, 3P, 3S, 4P and 4S provide foraging habitat. With the exception of the 4S type, this corresponds with the late-seral assemblage habitat type providing cover while the younger openings and early seral assemblage types providing foraging.

5.a.2. Project-level Effects Analysis for Habitat

Key Habitat Factor(s) for the Analysis: Wildlife biologists commonly use acres of forage habitat to acres of cover habitat as an index for quality of mule deer habitat (Giles Jr. 1978).

Analysis Area for Project-level Effects Analysis:

SPATIAL: Because of its smaller and more analytically appropriate size, project effects analyses for deer are bounded by the HUC8 watershed, an 8th order watershed. The project extends across two large 5th order watersheds. In the McCloud area of the Forest, the 5th order watersheds are unusually large due to the level, porous terrain and the lack of stream courses. These watersheds are so large and disconnected that distant projects in the same watershed are unlikely to have any mutual affect relative to the species considered. Also, the project is in a habitat type that bears little relationship to the large portion of the 5th field watershed. The hydrology, topography, soils, and vegetation are significantly different from the larger portion of the watershed.

TEMPORAL: Locally, ten years have provided sufficient time to allow for forest recovery post thinning and provide a reasonable frame of analysis for both pre and post project cumulative effects. Post-implementation cumulative affects are bounded by what is reasonably foreseeable based on planning efforts and the commitment of resources.

Current Condition of the Key Habitat Factor(s) in the Analysis Area:

Bitterbrush (Purshia spp.) dominates the 2060 acres of foraging habitat found in the analysis area. These acres include the more open size classes 1, 2, 3P, 3S, 4P and 4S stands.

Although bitterbrush browse is plentiful throughout the project area, they show very little signs of browsing. Higher quality forage in riparian areas is very limited. Although the deer forage is very extensive and plentiful, it is low quality (pers. comm. Charlie D. Clements, USDA Research, 2003).

There are 1720 acres of cover habitat within the analysis area. This includes 3N, 3G, 4N and 4G types as well as anything larger.

This provides 2060 acres of foraging habitat to the 1720 acres of cover habitat, a 1.2 to 1 ratio. Although this ratio would appear to be excellent, the apparent low nutritional content of the local bitterbrush may decrease the foraging value of the available forage.

Alternative 1 (Proposed Action)

Direct and Indirect Effects to Habitat.

In general, thinning projects will affect canopy cover and stand density in treated stands. Include brief discussion of functionality, arrangement, season of use, etc.

Cover and forage for deer is always abundant in the flats, though forage is low quality. Thinning harvests are designed to leave overhead tree cover and some lateral brush cover, with particular attention paid to preserving deciduous trees and known superior forage plants. These also provide cover.

Biomass: Thinning small trees on approximately 785 acres of 25-45 year old pine stands will reduce canopy cover in those areas by 20% (60% cover to 40% cover) but due to the small size of the trees in these units, the area will remain in the same assemblage category – openings and early seral. In addition, tree stands in this area are typically clumpy and provide small areas of denser vegetation providing more effective cover.

Mule deer use of these stands will not significantly shift. Early seral pine stands will remain early seral pine stands for the next ten years and there will be no change relative to the assemblage type. These changes will not significantly affect mule deer habitat in the area.

Thinning: Thinning mid seral, dead trees on approximately 1200 acres of 75-95 year old pine stands will not significantly change the seral stage of the stand, but will affect the Snags and Down Logs Assemblage through the removal of dead trees. The removal of snags and down logs will not affect mule deer habitat.

Thinning/Sanitation: Again, the thinning of approximately 1035 acres of 75-110 year old pine stands which are currently experiencing more mortality than the “thinning” stands, the project will remove some trees that are dying from insects, root disease and/or drought, will affect the density of snags and down logs in the area but not significantly shift the assemblage category from late-seral to early seral.

Mature Stand Thin: Thinning approximately 40 acres of these thin, two-storied mature stands to reduce understory ladder fuels and maintain older trees, but will not shift the assemblage type from late seral to early seral. The opening up of the stand may allow some additional forage growth, but should not significantly affect forage to cover ratios for mule deer.

Knobcone Sanitation: This ten-acre sanitation action will remove almost all forest cover from these stands. However, the current knobcone stand is typical of knobcone: thin and young. It is currently within the Openings and Early Seral Assemblage and will remain so when modified. The change is likely to allow some small amount of additional forage growth, but is unlikely to significantly affect the current forage to cover ratio.

Regeneration harvest: The regeneration harvest of approximately 415 acres of 95-110 year old pine stands suffering from root disease and bark beetle mortality will shift the habitat assemblage from a late-seral type to an openings and early seral type. It will also decrease the density of snags and downed logs that would be generated on site if the diseased trees were to remain. The shifting of late-seral habitat to early seral habitat will shift habitat from cover types to forage types, marginally increasing the forage to cover ratio.

Manage Forest Fuels: The understory treatment proposed for the thinning area will not shift assemblage type from one category to another. Although these operations will affect the understory vegetation, they will not affect the assemblage type.

Road Management: The proposed road construction and decommissioning will not significantly change the assemblage types on the project. Although road decommissioning will allow for additional vegetation to grow into the former roadbeds, they will not significantly change the open and highly variable patterns of vegetation density on this area and will not change the overall assemblage type. Road construction will also not significantly change the pattern of vegetation density and will not shift the general assemblage type.

Hardwood Management: Although the release of aspen should help maintain this hardwood component within our pre-dominantly conifer forests, and even enhance their ability to spread, the operation will not significantly shift the assemblage types in the area.

Dry Meadow Restoration: The removal of small diameter conifers on approximately 175 acres of an historic dry meadow will not modify the openings and early seral assemblage habitat category types in the area. The removal of larger conifers on 100 acres will shift this area from a late-seral assemblage habitat type to an openings and early seral assemblage habitat type.

Cumulative Effects to Habitat:

Within the last 10 years, the Forest Service and private timber companies have thinned approximately 8,345 acres, regenerated 549 acres and salvaged 1,492 acres of forestland within the 29,860 acre 8th Order watershed (Appendix F, Pilgrim Draft Environmental Impact Statement, 2006).

In general, the thinnings have opened up stands temporarily, creating greater amounts of forage habitats and decreasing cover value. Most Federal projects (over 75% of the thinning projects in the area) do not reduce canopy cover to below 40%. Most of the stands in this group may have opened up but did not shift assemblage type.

Cumulative Effects Conclusion:

Implementation of this alternative when combined with past and currently proposed actions will shift approximately 2,550 acres of habitat previously identified as cover into forage habitat types. The shift of cover into a forage type habitat is unlikely to alter deer use of the area for the following reasons:

Neither cover nor forage quantity are limiting factors in this area. Forage quality and water availability are limiting and are unlikely to change given the project’s implementation
Deer use this area only during the summer months where cover is not as important.

The 8th field watershed has 16,272 acres of deer foraging habitat and about 13,437 acres of cover habitat. The cumulative effects are a reduction in cover habitat of about 18% and an increase in forage habitat of about 15%.

Alternative 2

Direct and Indirect Effects to Habitat:

Alternative 2 proposes thinning 535 acres to 60% canopy cover instead of the wider spacing used in Alternative 1. The direct effects under alternative 2 are identical to Alternative 1. The same areas will be disturbed in essentially the same way and within the same time frame. Cutting fewer trees necessitates more care and maneuvering to get the harvested trees out, so the disturbance times are about the same.

Cutting fewer trees will provide slightly better thermal and escape cover but slightly less forage on 535 acres. In an area of already superabundant cover and low-quality forage, the 535 acres represents about 14% of the project area and about 1.8% of the larger 29,860 acre watershed. This small proportional loss of cover and gain of foraging area should have no significant effect on the deer.

The effects of alternative 2, where 535 acres of thinning will retain at least 60% canopy cover, have no significant difference in the effects on deer for the following reasons:
The 535 affected acres out of about 3,780 in the project area are relatively small proportion of the 29,860-acre watershed.

Cover is already abundant, and not needed on high elevation summer range. Heat is not a factor at this elevation, and deer are not present in winter.

The area offers abundant low quality forage but almost no riparian forage. The Forage forgone by not clearing more extensively is not needed, and forage created would be low quality.

Cumulative Effects to Habitat:

The cumulative effects of alternative 2 are the same as alternative 1.

Alternative 3

Direct and Indirect Effects to Habitat:

For Alternative 3, where 415 acres have 15% of the best available trees retained, the direct effects are practically identical to Alternative 1. The same areas will be disturbed in essentially the same way and the same time frame. Cutting a slightly smaller area necessitates more care and maneuvering to get the harvested trees out, so the disturbance times are about the same.

For Alternative 3, where 415 acres have 15% of the best available trees retained, the direct effects are practically identical to Alternative 1. The same areas will be disturbed in essentially the same way and within the same time frame. Cutting fewer trees will provide better thermal and escape cover but slightly less forage on 415 acres. In an area of already superabundant cover and low-quality forage, the 3,780 project acres within the 29,860 acre watershed have no significant effect on the deer.

The effects of alternative 3 where 415 acres of regeneration will retain 15% of the best areas even if diseased, dying, or dead, will have no significant difference on deer for similar reasons. The 415 affected acres out of about 3,780 in the project area are a relatively small portion of the 29,860-acre watershed.

Cover is already abundant, and not needed on high elevation summer range. Heat is not a factor at this elevation, and deer are not present in winter.
The area has abundant low quality forage and almost no riparian forage. A low-quality forage increase or decrease on these acres is irrelevant due to the present abundance.

Cumulative Effects to Habitat:

The cumulative effects are the same as alternative 1.

Alternative 4 (No Action)

Direct and Indirect Effects to Habitat:

Under alternative 4, or no action, no direct effects occur.

Under alternative 4, or no action, indirect effects occur relative to the proposed action.

Forgoing the project would result in a higher probability of a wildfire becoming catastrophic and uncontrollable. The heavy fuels and abundant dead trees provide strong conditions for severe fire behavior. Although catastrophic for overstory cover, these fires would be likely to improve the average forage value in deer habitat for a decade. However, it would also reduce the available thermal cover until brush and trees re-grow. Under no action, forage would likely continue to be abundant and low-quality and cover would continue to be highly available and of excellent quality.

Due to the likelihood of greater insect and disease infestation, salvage sales are likely to become more common in the area.

Relative to the baseline of the proposed project, no action in this area is likely to result in the following indirect effects:

- As the forests grow denser, cover will increase. However, cover is currently not limiting (this area has abundant cover) and additional cover is not likely to affect populations in this area. Cover that is too dense may actually be a disadvantage.
- As the forest grow denser, additional stress is likely to increase the occurrence of insect and disease infestation.
- Increased disease and insect infestation is likely to lead to increased stand mortality.
- Increased stand mortality will increase wildfire hazard and risk.
- Increased stand mortality and increased wildfire hazard and risk are likely to reduce the amount of available cover and lead to additional salvage sales.
- The higher probability of wildfire is likely to lead to additional fires which in turn would produce additional forage.
- No action would forego the additional forage produced in the proposed thinnings.
- We cannot determine if the proposed thinnings or the likely additional wildfire under the no action alternative would provide a greater amount of forage. These factors may or may not balance.

- In the short term, deer populations are unlikely to respond to the additional cover left in the no action alternative, but in the long term, may respond to the additional forage produced in wildfires. The additional nutrients left in the soil after a burn may help improve the quality of the forage for a period of time. Historically, deer populations have increased following burns.

Cumulative Effects to Habitat:

No action and continued fire suppression in this area would maintain the present process of stand densification which is likely to result in greater cover for mule deer, greater risk of catastrophic stand loss, which would result in a creation of additional low-quality forage and a reduction in cover.

Cumulative Effects Conclusion:

Over the last 10 years, 28% of the 8th order watershed has been thinned. In general, this thinning has favored maintaining late-seral assemblage habitat conditions by retaining at least 40% cover. Approximately 2,150 acres has shifted from cover to forage habitat as a result of regeneration harvest and salvage. In general, harvest operations in this area have not affected the occurrence, distribution or apparent local population levels of deer.

5.a.3. Summary of Habitat and Population Status and Trend at the Forest Scale

The Shasta-Trinity NF LRMP requires either habitat components or appropriate indicator species to represent the assemblages in forest monitoring (Table 2); hence, the openings and early seral stage assemblage effects analysis for the Pilgrim Vegetation Management Project must be informed by either management indicator assemblage habitat monitoring data or population trend data of the appropriate indicator species. Either one of the analyses would be sufficient to satisfy our requirements under the LRMP. We provide both as a convenience to decision-makers and the public to better enable interpretations of management indicator trends.

The sections below summarize the habitat status and trend data. This information is drawn from the detailed information on management indicator assemblage habitat and population trends in the Shasta-Trinity National Forest Management Indicator Assemblage Report (USDA 2006), which is hereby incorporated by reference.

Habitat Status and Trend.

Open and Early Seral stage habitat on the Forest is decreasing relative to our larger land base. Although new openings and early stage habitat is created through natural disturbances such as wildfire or pest infestations and through management actions such as timber harvest, the large amount of class 2 Openings and Early Seral Assemblage stands on the Forest are currently growing more wood and transitioning into class 3 late-seral stands faster than we are losing them. All in all there is a net loss of openings and early seral stage assemblage type on the Forest. Some of this represents the densification of forest stands that were historically maintained more open by frequent ground fires. For additional information, please see the Shasta-Trinity National Forest Management Indicator Report (USDA, 2007).

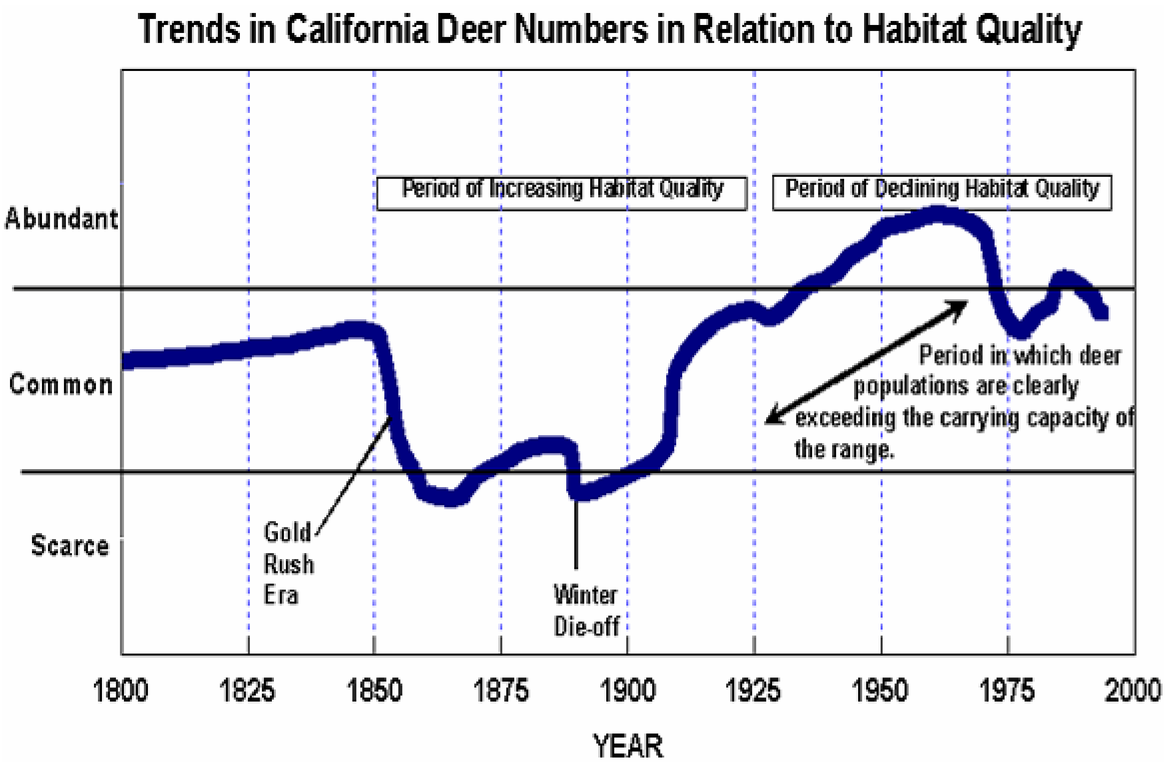
Table 12: Net shifts in late-seral and early seral habitat assemblages

Assemblage	Amount of Assemblage Type Habitat in 1991 (in acres)	Change in Acres due to wildfire and harvest since 1991 (in acres)	Forest Growth – Shift from Early Seral to late-seral Assemblage Habitat Types	Net Shift in Habitat from Early Seral to late Seral Assemblages
Late-seral	779,121	-61,432	218,154	935,843
Openings and Early Seral	914,244	77,187	-218,154	773,277

Population Status and Trend.

Current data from the State indicates that mule deer population has been decreasing since the early 1960s.[4] The graph below, taken from the California Department of Fish and Game website on deer populations, indicates a declining population from the mid-sixties continuing to the present. This is borne out by hunter's perceptions (personal communication, Jess Hoopes, Mule Deer Foundation and Rich Kallas, California Department of Fish and Game).

[4] http://www.dfg.ca.gov/hunting/deer/d_grph1.html



Graph 1: Relative population changes and trends of the mule deer in California (Courtesy of the California Department of Fish and Game)

The State of California attributes most of this decline to reductions in early seral habitat accompanying less timber harvest and increasingly more effective fire suppression throughout this period. The Mule Deer Foundation however, attributes most of the decline to heavy predator pressure. Currently, the available data is not sufficient to conclude the causes of the decline.

5.a.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the species.

All three alternatives including the proposed project (Alternative 1) will shift approximately 540 acres of late-seral assemblage habitat and other non-assemblage type acreage (roads) into openings and early seral assemblage habitat. This represents an approximate 0.07% increase in the available openings and early seral stage habitat on the forest. This represents a very minor net gain in forage habitat for the mule deer, but is so small as to be insignificant at the Forest scale. Due to the decrease in harvest rates over the last 20 years on the Shasta-Trinity National Forest, the proportion of openings and early seral stage habitat appears to be decreasing. The proposed project will not significantly affect that larger trend.

Thinning in these stands may, however, decrease the probability that these stands would be lost through catastrophic, stand-replacing fires. This indirect effect may have a larger affect on the current decreasing trend in openings and early seral stage assemblage habitat than the direct affect of project implementation. Lower probabilities of stand replacing fires means a lower probability of this area being converted wholesale into openings and early seral stage habitat through catastrophic wildfire. However, even if the entire 3780 acres within the project were to burn in any given year, it would still represent only a 0.5% increase in the available openings and early seral stage habitat available on the Forest. Even this catastrophic shift in assemblage habitat represents a small proportion of the habitat available on the Forest.

To summarize the direct, indirect, and cumulative effects of the proposed Pilgrim Project on mule deer as representatives of the openings and early seral stage assemblage, the final analysis is "no observable effects." This project has several favorable effects, driven by pathogenic activity that will actually produce about the same effects as timber harvest. These occur in low-quality habitat that is naturally incapable of producing good habitat, so beneficial effects are slight. This type of habitat is abundant in this management unit and also the smaller HUC8 watershed, so any effects are practically unobservable in this huge local context. Although the project is likely to add additional openings and early seral stage assemblage habitat on the forest, the quantities are so small as to be immeasurable (within the margin of error for forest wide measurements). We therefore conclude that:

(1) The project-level habitat impacts will not meaningfully alter or contribute to existing forest-wide trends.

5.b. White-breasted nuthatch (WN) (Hardwood Assemblage)

5.b.1. Habitat/Species Relationship.

This species represents the hardwood assemblage. This small grey and white bird is common and generally prefers to forage on mature, deciduous trees. This species is a common resident seen throughout the year, occasionally migrating to lower elevations. Although present in the area, like most birds, sightings in the Pilgrim project are uncommon. Usually it is seen near oak trees, which are uncommon in the project, and seen outside the project nearer to water sources. Oaks are found around the edges of McCloud Flats and likely account for nuthatch sightings.

The most comprehensive summary of white-breasted nuthatch biology, demography, and behavior can be found at Cornel Lab of Ornithology Birds of North America website:
http://bna.birds.cornell.edu/BNA/account/White-breasted_Nuthatch/INTRODUCTION.html

A California-specific summary may be found at the CWHR website at:
http://www.dfg.ca.gov/whdab/cwhr/lha/lha_B362.pdf

This WHR information is related below to the project area, and is related specifically to the hardwood assemblage.

Although it can survive in coniferous forests, this species has strong associations with hardwoods and uses old woodpecker holes [5]or excavates its own holes in soft snags.[6]. It forages on arthropods of all kinds gleaned from live or dead trees, and also eats acorns and seeds when available. The white-breasted nuthatch often will cache large seeds for the winter. White-breasted nuthatches nest and live in old woodpecker holes, but will excavate its own cavity only

[5] (Pravosudov and Grubb 1993)
[6] Zeiner, 1990. WHR Bird Narratives Vol. 2.

in soft snags over 14” dbh. They prefers soft snags about 25” dbh and makes a hole about 19’ above ground. Populations in riparian areas are over four times higher than those in coniferous forests.[7]

Hardwood habitats comprise about 20 acres of scattered aspen in the project. Since this bird is a soft-snag cavity excavator and soft snags are unusual due to rapid decay from termites and ants, the habitat is considered low-quality. Raphael and White[8] summarize that in a good conifer forest habitat about 2.4 breeding pairs per 100 acres may be expected or about 40 acres per pair. Since the aspen component is only 20 acres in scattered clumps over about 3,780 acres, the data implies that at best in the project’s aspen habitat, a nesting pair may occur in conjunction with conifers nearby. Aspen may be providing slight forage diversity in very small acreages, and the occasional oak would be so rare as to make no difference in the low-quality habitat.

Quality and quantity of Forage:

Strictly speaking in terms of hardwood habitat, the forage opportunity for the white-breasted nuthatch is poor on the basis of having only 20 acres of aspen in the entire project as shown on project maps. The white-breasted nuthatch can survive on insects from conifers, and this could account for its presence in the project area. The periphery of the flats has small oak groves and scattered oaks that may account for the white-breasted nuthatch as a year-long resident. We presently have abundant insect-killed trees on the flats, mute testimony that insect food for birds is likely plentiful at this time. The quantity of acorns varies greatly from year to year and may account for shifting populations, but these are rare in the flats. The extremely limited riparian vegetation with no hardwood association indicates low-quality habitat.

Quality and quantity of Nesting Habitat:

Soft snags are very uncommon in the project area, perhaps due to rapid felling from termites, carpenter ants, and snow loading. Very likely the white-breasted nuthatch nests in old woodpecker holes in this area. White-breasted nuthatches readily accept birdhouses when they are available,[9] and a local biologist reports white-breasted nuthatches nesting annually in his birdhouses in Mount Shasta City.

The onsite snag density is very high at this time, averaging about 3 per acre in timber surveys, but much higher than that in pathogen areas. The high density of snags provides ample resources for other primary excavators such as woodpeckers. These primary excavators create nesting sites for a variety of birds and small mammals including the white-breasted nuthatch. The white-breasted nuthatch, however, prefers riparian areas, and the dry sandy habitat on the flats offers few riparian areas.

[7] Ibid.
[8] Raphael and White 1978. Cited in Zeiner, 1990 WHR Bird Narratives, Vol. 2. as displayed in the website above.
[9] Francis Mangels, District Wildlife Biologist, Personal communication

This nuthatch feeds on insects gleaned from the boles of trees and from the litter beneath the canopy. They will also eat small quantities of seeds. The white-breasted nuthatch population on the flats is very small relative to the population in riparian areas a few miles away.[10]

5.b.2. Project-level Effects Analysis for Habitat

Action Alternatives 1, 2, and 3

Direct and Indirect Effects to Habitat:

Implementation of these alternatives is designed to restore the healthy representation of aspen within an existing area. Aspen are currently present in the area, but are being overshadowed by conifers. Removal of competing conifers in this area will allow existing aspen to persist and will provide site conditions more favorable to aspen regeneration in that area.

Maintaining vegetative species diversity within the relatively homogenous habitats of the McCloud Flats is key to maintaining the diversity of forest wildlife, including birds. Enhancement of this aspen stand should provide increased foraging opportunity for this species.

Cumulative Effects to Habitat:

Hardwoods are managed for sustainability forest-wide.[11] Private commercial forest lands do not always manage for retention of hardwood species. Currently there are approximately 30 acres of aspen in scattered pockets of ½ to 5 acres within the Pilgrim 8th Field Watershed. All of these aspen stands are in a state of decline due to competition with conifer trees. The proposed project is likely to contribute to retaining and favoring hardwood growth, maintenance and propagation in the area.

Cumulative Effects Conclusion:

Due to the small size and very site specific extent of this activity, there are no anticipated cumulative effects of implementing any of the action alternatives outside of the acres involved.

Alternative 4, no action alternative.

Direct and Indirect Effects to Habitat:

Aspen is only found on 20 acres within the analysis area. Without treatment, conifers will continue to suppress existing aspen. Within the foreseeable future, some of these trees may be eliminated from the stand.

Cumulative Effects to Habitat:

[10] Mangels, common observation, also local Audubon Society members.
[11] Forest Plan, page 4-14

No action maintains the current habitat condition and is likely to lead to a reduction in aspen health and occurrence.

Cumulative Effects Conclusion:

No action will maintain the current condition and trend, and barring catastrophic wildfire, is likely to lead to a decrease in the abundance and health of aspen trees on the flats.

5.b.3. Summary of Habitat and Population Status and Trend at the Forest Scale

Habitat Status and Trend.

Hardwood habitat occurs both as a separate forest type and as a component of almost all forest types on the Forest. Although we have lost 14,856 acres of hardwood habitat on the Forest due primarily to wildfire, an undeterminable amount of hardwood habitat has also grown in or been established in the same amount of time. Current Best Management Practices and Forest policy favors the protection and enhancement of hardwood habitat components, retaining it and releasing oaks, aspen and other common hardwoods from competition. Harvest in these areas is likely to favor hardwoods by retaining them in the thinned stand or selecting them as leave trees in green tree retention units.

Table 13: Loss in acres on the Shasta-Trinity National Forest of Hardwood Assemblage Habitat due to wildfire. [Note: this does not account for ingrowth of hardwood stands]

Assemblage	Amount of Assemblage Type Habitat in 1991 (in acres)	Amount of Assemblage Type Habitat in 2005 (in acres)	Change in Assemblage Habitat Type between 1991 and 2005 without ingrowth (in acres)
Hardwoods	191,819	176,064	-15, 755

In areas of wildfire, hardwoods frequently respond well to fire and hardwoods are likely to replace the burnt stand. Current policy on the Forest is to retain and enhance growing conditions for hardwoods in operational areas. Given this retention, we believe hardwood occurrence is likely to be stable or increasing despite the known losses from wildfire.

Population Status and Trend.

The Breeding Bird Survey provides the most comprehensive and long-term data available on population trends.

Table 14: Breeding Bird Survey population trends for the White-breasted nuthatch for the local strata, California, survey wide (species range), and the three neighboring strata.

		1966 - 2005						1966-1979			1980 - 2005		
Region	RCM	Trend	P	N	(95%	CI)	R.A.	Trend	P	N	Trend	P	N

		1966 - 2005						1966-1979			1980 - 2005		
Region	RCM	Trend	P	N	(95%	CI)	R.A.	Trend	P	N	Trend	P	N
Pitt-Klamath Plateau	1	4.4	0.01	26	1.2	7.6	1.41	14.7	0.67	25	4	0.09	25
California	1	1.9	0.09	118	-0.2	4.1	2.66	6.5	0.21	66	0.9	0.56	106
Survey-wide	2	2	0	1925	1.4	2.5	0.97	0.4	0.63	849	1.3	0	1824
California Foothills	1	1.9	0.11	53	-0.4	4.2	7.19	8.4	0.19	35	0.8	0.64	49
S. Pacific Rainforests	2	3	0.12	26	-0.7	6.7	0.69	-3.3	0.57	13	6.4	0.01	20
Sierra Nevada	2	-1.4	0.72	18	-8.8	6.1	1.57	5.2	0.66	12	9.2	0.01	15

- RCM: Regional Credibility Measure. “1” (“blue” in original data) is highest given by BBS, “2” and “3” have deficiencies – see http://www.mbr-pwrc.usgs.gov/bbs/cred.html
- Trend: Estimated trend, summarized as a % change/year.
- P : Statistical level of significance * Because the trends are estimates, we conduct a statistical test to determine whether the trend is significantly different from 0.
- A "0.01" indicates a 1% probability that a number would have occurred by chance alone.
- The lower the number, the less likely that a particular value would have occurred by chance alone.
- A very low number indicates that we cannot reject the null hypothesis that the trend is different from 0.
- N: Number of survey routes in the analysis. Caution should be used in interpreting any result that was based on less than 14 routes.
- 95% CI: 95% confidence interval for the trend estimate. Estimated as a multiplicative (constant rate) change in counts over time, with covariables to adjust for differences in observer quality. Regional trends are estimated as a weighted average of the route trends.
- R. A.: Relative abundance for the species, in birds/route. This number is an approximate measure of how many birds are seen on a route in the region.

Based on this data, the white-breasted nuthatch is increasing in five of the six geographic analysis areas over the years 1966 to 2005. In the three strata (Pitt Klamath Plateau, California and California Foothills) with the highest level of credibility given by the Breeding Bird Survey, the trend is increasing. The only decreasing trend in the six analysis areas presents itself in the Sierra Nevada and is of intermediate credibility. Although populations may or may not be limited by the occurrence of hardwoods in this area, the dominant increasing population trend of this species is consistent with an increasing trend in hardwood occurrence.

5.b.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the species.

The operation will enhance and protect aspen through elimination of nearby competing conifer. This won’t immediately increase the acreage of aspen or hardwoods in the area, but will enhance and protect the current stands allowing for a higher probability of regeneration. Given the focus on maintaining existing aspen stands, this project is unlikely to have any significant or observable effect on population trends of the white-breasted nuthatch in this area.

The project-level habitat impacts will not alter or contribute to existing forest-wide trends.

5.c. Red Breasted Nuthatch (Snag and Down Log Assemblage)

5.c.1. Habitat/Species Relationship

The red-breasted nuthatch is a common resident in local coniferous forests, especially mature, open ponderosa pine and plays an important role as a primary cavity excavator on trees and snags. It eats mostly conifer seeds, supplementing its diet with gleaning insects from bark. For an up to the date and complete species account of the red-breasted nuthatch, please see the Birds of North America web site at:

http://bna.birds.cornell.edu/BNA/account/Red-breasted_Nuthatch/INTRODUCTION.html

This particular species' dependence on snags for nesting sites and its attraction to mature mixed conifer and to a lesser extent, the ponderosa pine forests found within the project area, make it an able representative of the snag and down log assemblage. The red-breasted nuthatch is amongst the fifteen most commonly seen species in the nearby Bartle Breeding Bird Survey route.

Quality and quantity of Forage Habitat:

The red-breasted nuthatch forages on arthropods during the breeding season and conifer seeds outside of the season. The mixed conifer and ponderosa pine forests found within this 29,860 acre watershed provide ample suitable habitat for this species.

Quality and quantity of Nesting Habitat:

The red-breasted nuthatch prefers excavating nests in dead trees with broken tops. These trees are highly variable in size and range from 5 to 44 inches dbh in Arizona.

Fire suppression in this area has allowed forest stands to grow to densities that would have been uncommon under natural fire regimes. Maintaining ecologically unsustainable and uncommonly high densities (at least 40% canopy cover) for northern spotted owls in designated Critical Habitat on the McCloud Flats has also stressed forest stands, predisposing the pine to pathogens and insect attack. The waves of episodic insect and pathogen attack has eliminated hundreds of acres of moderate-sized pine and suppressed growth. These waves of attack also tend to produce a pattern of areas of unusually high snag densities surrounded by forests with much lower densities.

Past harvests have created plantations on about a third of the watershed. Due to historically large natural openings, some pines have survived in more open-grown situations and some large snags presently exist.

In conclusion, nesting habitat exists, but it is highly fragmented by harvest and natural openings and thus limited at the present. Future potential is excellent if the forest is open enough to limit the spread of pathogens.

5.c.2. Project-level Effects Analysis for Habitat

Key Habitat Factor(s) for the Analysis:

As discussed above, snags are critical for providing foraging and nesting habitat for this species. When timber sales occur, snags are counted and measured not only in standard timber cruises, but also checked by planners and biologists using a one-acre circular plot count or strip count. Average snag density (average snag size is 23" dbh) is now measured at about 3 per acre,[12] but a few unsalvaged pathogen areas may have over 50 snags per acre.

Analysis area for the Project Level Effects Analysis:

Effects are measured in acres, about 3,780 acres of the project in a HUC8 watershed of about 29,860 acres. On these acres, LMP policy requires a minimum of 1.5 snags per acre averaged over 40 acre plots (USDA 1995, LRMP, pages 4-62). Due to the abundance of snags and the extremely likely continued mortality, snag density was set to 2 per acre with the expectation that more pathogenic activity would create an excess of 3 snags per acre. This exceeds the minimum standards established in the Land and Resource Management Plan.

Current Condition of the Key Habitat Factor in the Analysis Area:

Present snag density in the project area exceeds both the minimum standard and the natural density of snags in this type of forest. Snag densities are expected to remain high due to pathogenic activity from root rot, blackstain, and secondary beetle attacks. However, the overall quality of the supporting habitat is low and snag-using species have not observably increased despite rising snag densities for over a decade. This is likely due to very limited surface water and almost total lack of riparian vegetation.

Alternative 1

Direct and Indirect Effects to Habitat:

The direct effects of alternative 1 would be negligible. Based on the marking to date, no current snags would be removed and density should remain at about 2.9 snags per acre averaged on 40 acre plots. It is possible that some snags would be lost during implementation either because they have been identified as a danger tree or they have fallen since the original marking. In this

[12] Timber cruises for Pilgrim project.

case, some minimal loss of nesting habitat for the red-breasted nuthatch may occur. However, compared to the abundance of the pine forest type on this large management unit and the 29,860 acre HUC8 watershed, the reduction of snags in the project would be insignificant at the larger forest scale, and would still exceed the current retention standards. This current snag density is very adequate to support the small population of red-breasted nuthatches in the project and the effect would be unobservable even within the project and certainly within the HUC8 watershed.[13]

Alternative 1 would indirectly reduce the generation of future snags by taking those trees currently dying. However, the thinning of understory trees will most likely result in more vigorous growth in the remaining trees, eventually producing material for better quality, larger snags.[14] The project will extend the time the flats will be forested and thus will be able to produce snags.

Cumulative Effects to Habitat

Within the last 10 years, the Forest Service and private timber companies have thinned approximately 8,345 acres, regenerated 549 acres and salvaged 1,492 acres of forestland within the 29,860 acre 8th Order watershed (Appendix F, Pilgrim Draft Environmental Impact Statement, 2006).

In general, the thinnings have opened up stands temporarily, allowing for growth that will eventually create denser canopies once again. Due to concerns for northern spotted owl designated Critical Habitat, most Federal projects (over 75% of the thinning projects in the area) do not reduce canopy cover to below 40% where owl use is reduced. Most of the stands in this group may have opened up but did not shift assemblage type. Thinnings have to maintain, if available, the 1.5 snags per acre averaged over 40 acres minimum required in the LRMP (USDA 1995, LRMP, pages 4-62). The 1.5 snags per acre is above the natural background levels for snags in this forest type.

Snag plots have been taken in the flats on a regular basis, and findings reported in Environmental Assessments. Generally, the results demonstrate that snag numbers are now unusually high. The snag minimum in the LRMP indicates the 40% of minimum population required by the LRMP is easily achieved by the 1.5 snag-per-acre density, but the district biologist doubts the project area is more than a foraging area for transient individuals due to marginal supporting habitat and high fragmentation.

Cumulative Effects Conclusion

Although the proposed project will reduce the number and density of snags found in the area, levels will remain relatively high, above both the minimum required by the LRMP and the natural background level of snags in this type of forest. Natural limitations of open water in this area are likely the limiting factor in population growth. As long as certain minimum levels of snags are maintained, populations are most likely limited by the lack of open water rather than nesting habitat.

[13] LRMP p. 4-63.
[14] Pilgrim Salvage Sale. Ash Sink Salvage Sale. 2005.

Alternative 2

Direct and Indirect Effects to Habitat:

For Alternative 2, where 535 acres are thinned to 60% canopy cover instead of the wider spacing, the direct effects are practically identical to Alternative 1. The same areas will be disturbed in essentially the same way and the same time frame. Cutting fewer trees necessitates more care and maneuvering to get the harvested trees out, so the disturbance times are about the same. Having more standing live trees in an area where habitat is limited due to other factors will not benefit the population.

Cumulative Effects to Habitat:

For Alternative 2, where 535 acres are thinned to 60% canopy cover instead of the wider spacing, the effects are practically identical to Alternative 1. The same assemblage will be disturbed in essentially the same way and the same time frame. Snags and downed logs will be retained at the same densities and are not likely to be critical to any population expansion or reduction.

Cumulative Effects Conclusion:

The habitat changes proposed by the project are unlikely to result in a change in population trend of the red-breasted nuthatch.

Alternative 3

Direct and Indirect Effects to Habitat:

For Alternative 3, where 415 acres have 15% of the best available trees retained, the direct effects are practically identical to Alternative 1. The same areas will be disturbed in essentially the same way and the same time frame. Cutting a slightly smaller area necessitates more care and maneuvering to get the harvested trees out, so the disturbance times are about the same. Poor water availability is likely to be the largest limiting factor in this area. Although snag density minimums are retained, a higher density of snags in the project area may not provide a significant advantage to a low population in relatively poor natural habitat. In other words, we do not believe that snag availability is likely to be a limiting factor in this area, therefore increasing snag densities may have a minimal effect (if any) on local population, let alone forest wide or larger populations.

Cumulative Effects to Habitat:

For Alternative 3, where 415 acres have 15% of the best available trees retained, the effects are practically identical to Alternative 1. The same assemblage will be disturbed in essentially the same way and the same time frame. Snag density minimums are retained within the project area and additional snags are not likely to provide additional advantage to the population.

Cumulative Effects Conclusion

The habitat changes proposed by the project are unlikely to result in a change in population trend of the red-breasted nuthatch.

Alternative 4

Direct and Indirect Effects to Habitat:

Alternative 4, or no action, will not produce any direct effects. In low-quality habitat, activity or no activity has little effect on local populations.

Relative to the proposed alternative, alternative 4, or no action, is likely to maintain a higher risk of catastrophic fire on the landscape, a higher incidence of pest and disease related mortality, a higher probability of losing individuals and copses of aspen and a short-term, higher occurrence of late-seral stage assemblage habitat in the project area. Long-term higher probabilities of catastrophic fire are likely to lead to long-term loss of additional late-seral assemblage habitat and production of snags through wildfire. This may lead to additional salvage sales and result in a net retention of snags similar to the proposed action At a larger scale, these effects would be minor and undetectable through larger scale monitoring.

Cumulative Effects to Habitat.

No additional effects occur under alternative 4, or the no action alternative. Water availability is likely to be the limiting factor in this area and the relatively small increases or decreases in snag availability are not likely to have even a temporary effect on a local population.

Cumulative Effects Conclusion

The habitat changes proposed by the project are unlikely to result in a change in the population trend of the red-breasted nuthatch.

5.c.3. Summary of Habitat and Population Status and Trend at the Forest Scale

Habitat Status and Trend.

Snags and down logs are a natural and necessary component of almost all forest types. Natural, background densities of snag and down logs vary with forest type [15] and seral stage.

Between 1991 and 2005, 79,318 acres of forest types containing useful snags and downed logs, or about 7.8 % of the 1991baseline, have been burned in wildfire or have been impacted by

[15] (Beardsley and Warbington 1996b)

timber harvest. Although timber harvest will maintain minimum levels of snag densities, wildfire has highly variable results. Most fires, whether 'hot' or 'cool' will leave ample amounts of snags on the landscape. We have modeled a total loss of snags in order to consider the "worst case" scenario.

Table 15: Snag and down log assemblage habitat loss due to wildfire and harvest

Assemblage	Amount of Assemblage Type Habitat in 1991 (in acres)	Amount of Assemblage Type Habitat in 2005 (in acres)	Change in Assemblage Habitat Type between 1991 and 2005 without ingrowth (in acres)
Snags and Downed Logs	1,012,460	933,142	-79,318

However, since 1991, 218,154 acres of younger, early seral forest has grown into the late-seral assemblage category. This also represents an increase in the acreage for the snags and down logs assemblage, over double the acreage for the loss and represents a net increase in the acreage available. This represents an increasing trend in the snag and down log assemblage habitat even under the worst case scenario.

Table 16: Net shifts in late-seral and early seral habitat assemblages

Assemblage	Amount of Assemblage Type Habitat in 1991 (in acres)	Change in Acres due to wildfire and harvest since 1991 (in acres)	Forest Growth – Shift from Early Seral to late-seral Assemblage Habitat Types	Net Gain in late seral assemblage Habitat type from ingrowth
Late-seral	779,121	-61,432	218,154	156,722

Population Status and Trend.

The Breeding Bird Survey (BBS) results for the red-breasted nuthatch (table 17 below) shows a species with statistically insignificant decreases in two nearby strata (Sierra Nevada and Cascade Mountains), statistically insignificant increases in the local strata (Pitt-Klamath Plateau), one nearby strata (California Foothills) and a larger scale (California), statistically significant increases in one nearby strata (South Pacific Rainforests) and a statistically significant increase survey wide (which should cover the entire North American range of the species). With the exception of the California Foothills strata, all of these scales retain the highest credibility given in BBS data. Given the range of data it is hard to conclude that there is any significant relationship between the forest wide increases in late seral assemblage habitat type and population trends of the red-breasted nuthatch. Both decreases in population trends (the Sierra

Nevada strata and the Cascade Mountains strata – both neighboring strata to the local Pitt-Klamath strata) are statistically insignificant whereas the most statistically significant data (where P = 0) is survey wide (the full range of the species) indicating a moderately increasing trend between 1966 and 2005.

Table 17: Breeding Bird Survey population trends for the Red-Breasted Nuthatch for the local strata, California, survey wide (species range), the three neighboring strata, the western BBS region, the FWS region 1 and finally the United States.

		1966 - 2005						1966-1979			1980 - 2005		
Region	RCM	Trend	P	N	(95%	CI)	R.A.	Trend	P	N	Trend	P	N
Pitt-Klamath Plateau	1	1.3	0.28	38	-1	3.6	8.59	-8.2	0.51	12	1.1	0.44	37
California	1	0.1	0.94	104	-1.4	1.5	6.73	-2.3	0.52	48	1	0.18	101
Survey-wide	1	1.4	0	1140	0.8	2	2.29	0.2	0.9	374	1	0	1101
Sierra Nevada	1	-0.7	0.45	29	-2.5	1.1	16.36	-6.8	0.12	15	0.7	0.42	28
Cascade Mountains	1	-0.3	0.64	28	-1.6	1	13.35	-0.8	0.57	12	0.6	0.55	28
California Foothills	2	1.4	0.41	24	-1.9	4.7	1.5	27.6	0.06	14	1.6	0.48	23
S. Pacific Rainforests	1	3.2	0.01	73	1	5.4	3.49	0.7	0.82	24	3.3	0	72
Western BBS Region	1	1.1	0.01	558	0.3	1.9	2.89	-0.1	0.97	144	0.8	0.04	550
FWS Region 1	1	0	0.93	280	-0.8	0.8	5.41	-2	0.17	93	0.5	0.26	276
United States	1	0.5	0.13	746	-0.1	1.1	2.33	-1.3	0.21	244	0.6	0.06	728

- RCM: Regional Credibility Measure. "1" ("blue" in original data) is highest given by BBS, "2" and "3" have deficiencies – see http://www.mbr-pwrc.usgs.gov/bbs/cred.html
- Trend: Estimated trend, summarized as a % change/year.
- P : Statistical level of significance * Because the trends are estimates, we conduct a statistical test to determine whether the trend is significantly different from 0.
- A "0.01" indicates a 1% probability that a number would have occurred by chance alone.
- The lower the number, the less likely that a particular value would have occurred by chance alone.
- A very low number indicates that we cannot reject the null hypothesis that the trend is different from 0.
- N: Number of survey routes in the analysis. Caution should be used in interpreting any result that was based on less than 14 routes.
- 95% CI: 95% confidence interval for the trend estimate. Estimated as a multiplicative (constant rate) change in counts over time, with covariables to adjust for differences in observer quality. Regional trends are estimated as a weighted average of the route trends.
- R. A.: Relative abundance for the species, in birds/route. This number is an approximate measure of how many birds are seen on a route in the region.

5.c.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the species.

These minimal direct and indirect effects are unlikely to affect the population trend of this species and we would expect that current trends will continue. The results of these direct and indirect effects will be a continued population of the red-breasted nuthatch on the flats at roughly the present, uncommon numbers.

To summarize, the red-breasted nuthatch as a representative of the late-seral management indicator assemblage dependent on snags and deadwood will show very little to no observable effects from the project. The flats have abundant snags, but underlying natural habitat is such low quality that it has low populations and hence, few red-breasted nuthatches will be affected. The minimum snags provided post-harvest will be ample habitat for the few birds that may choose to occupy the project. In conclusion:

(1) The project-level habitat impacts will not alter or contribute to existing forest-wide trends.

5.d. Red-Breasted Nuthatch (Late Seral Assemblage)

5.d.1. Habitat/Species Relationship

The red-breasted nuthatch is a common resident in local coniferous forests, especially mature, open ponderosa pine and plays an important role as a primary cavity excavator on trees and snags. It eats mostly conifer seeds, supplementing its diet with gleaning insects from bark. For an up to the date and complete species account of the red-breasted nuthatch, please see the Birds of North America web site at:

http://bna.birds.cornell.edu/BNA/account/Red-breasted_Nuthatch/INTRODUCTION.html

This particular species' dependence on mature forests for the production of suitable snags for nesting sites and its attraction to mature mixed conifer and to a lesser extent, the ponderosa pine forests found within the project area, make it an able representative of the late-seral assemblage. The red-breasted nuthatch is amongst the fifteen most commonly seen species in the nearby Bartle Breeding Bird Survey route.

Quality and Quantity of Forage:

The red-breasted nuthatch forages on arthropods during the breeding season and conifer seeds outside of the season. The mixed conifer and ponderosa pine forests found within this 29,860 acre watershed provide ample suitable habitat for this species.

Quality and Quantity of Nesting Habitat:

The red-breasted nuthatch prefers excavating nests in dead trees with broken tops. These trees are highly variable in size and range from 5 to 44 inches dbh in Arizona.

Fire suppression in this area has allowed forest stands to grow to densities that would have been uncommon under natural fire regimes. Maintaining uncommonly high densities (at least 40% canopy cover) for northern spotted owls in designated Critical Habitat on the McCloud Flats has also stressed forest stands, predisposing the pine to pathogens and insect attack. The waves of episodic insect and pathogen attack has eliminated hundreds of acres of moderate-sized pine and suppressed growth. These waves of attack also tend to produce a pattern of areas of unusually high snag densities surrounded by forests with much lower densities.

Past harvests have created plantations on about a third of the watershed. Due to historically large natural openings, some pines have survived in more open-grown situations and some large snags presently exist.

In conclusion, nesting habitat exists, but it is highly fragmented by harvest and natural openings and thus limited at the present. The availability of water is likely to be the strongest limiting factor in this area. If the forest is maintained sufficiently open to limit pathogen occurrence on the flats, there is excellent future potential for maintaining high levels of suitable late-seral nesting habitat.

5.d.2. Project-level Effects Analysis for Habitat

Key Habitat Factor(s) for the Analysis:

Mature forests offer greater opportunities for the production and maintenance of large snags which are critical for providing foraging and nesting habitat for this species. The presence of late-seral assemblage forests as defined by timber type classifications presents the key factor for this analysis.

Analysis area for the Project Level Effects Analysis:

The project-level effects are measured in acres. About 3,780 acres occur within the project area out of a HUC8 watershed of about 29,860 acres.

Current Condition of the Key Habitat Factor in the Analysis Area:

The project area will affect approximately 515 acres of late seral assemblage habitat. All of this acreage will be converted from late-seral assemblage habitat to openings and early seral assemblage habitat. An additional 0.7 acres of late-seral assemblage habitat will be converted to roadbed, not considered any of the Management Indicator Assemblage types.

Approximately 3060 acres of late-seral assemblage habitat will be treated in the project implementation but will remain late-seral assemblage habitat.

Alternatives 1, 2 and 3

The direct, indirect and cumulative effects for these three alternatives, relative to management indicator assemblage categories, are identical and all will be covered under the following sections.

Direct and Indirect Effects to Habitat:

Under alternatives 1, 2 and 3, the following affects to assemblage type will occur for each treatment category:

- Biomass: No change in late-seral assemblage category/type.
- Thinning: No change in late-seral assemblage category/type.
- Thinning/sanitation: No change in late-seral assemblage category/type.
- Mature stand thin: No change in late-seral assemblage category/type.
- Regeneration harvest: 415 acres of late-seral assemblage habitat will shift to an opening and early seral assemblage habitat type.
- Prescribed Fire: 40 acres of late seral assemblage habitat will be treated by prescribed fire but will remain late seral assemblage habitat.

- Mastication and/or tractor piling and burning: No change in late-seral assemblage category/type.
- New road construction: 0.7 acres of late-seral assemblage habitat will shift to a non-assemblage habitat type.
- Dry meadow restoration: 100 acres of late seral assemblage habitat will shift to openings and early seral stage assemblage habitat.
- Hardwood Management: 20 acres of late seral assemblage habitat will shift to the hardwood assemblage.

Cumulative Effects to Habitat.

Within the last 10 years, the Forest Service and private timber companies have thinned approximately 8,345 acres, regenerated 549 acres and salvaged 1,492 acres of forestland within the 29,860 acre 8th Order watershed (Appendix F, Pilgrim Draft Environmental Impact Statement, 2006).

In general, the thinnings have opened up stands temporarily, creating more open stands with greater resistance to disease and insect attack. Aggressive thinnings that reduced stands to below 40% cover would have shifted most of the stands in this area to openings or early seral. However, most Federal projects (over 75% of the thinning projects in the area) do not reduce cover below 40% where owl use is reduced. Most of the stands in this group may have opened up but did not shift assemblage type.

Regeneration has shifted late-seral assemblage habitat to openings and early seral habitat assemblage on 549 acres.

Cumulative Effects Conclusion

Over the last 10 years, 28% of the 8th order watershed has been thinned. In general, this thinning has maintained late-seral conditions by maintaining at least 40% cover, despite the more utilitarian recognition that wider spacing in thinning helps prevent disease and insect epidemics in the McCloud area.

Alternative 4

Direct and Indirect Effects to Habitat:

Alternative 4, the ‘no action’ alternative, will not cause any direct, operational effects.

Relative to the proposed alternative though, alternative 4, or no action, is likely to maintain a higher risk of catastrophic fire on the landscape, a higher incidence of pest and disease related mortality, a higher probability of losing individuals and copses of aspen and a short-term, higher occurrence of late-seral stage assemblage habitat in the project area. Long-term higher probabilities of catastrophic fire are likely to lead to long-term loss of additional late-seral assemblage habitat and production of snags through wildfire. This may lead to additional salvage sales and result in a net retention of snags similar to the proposed action At a larger scale, these effects would be minor and undetectable through larger scale (forest level or larger) monitoring.

Cumulative Effects to Habitat.

For alternative 4, or no action. No additional effects occur. In low-quality habitat, activity or no activity has little effect on local populations. Activity in very good habitat could have some temporary effect on a local population, but none on a wider scale.

Cumulative Effects Conclusion

Over the last 10 years, 28% of the 8th order watershed has been thinned. In general, this thinning has maintained late-seral conditions by maintaining at least 40% cover, despite the more utilitarian recognition that wider spacing in thinning helps prevent disease and insect epidemics in the McCloud area.

5.d.3 Summary of Habitat and Population Status and Trend at the Forest/Bioregional Scale

Habitat Status and Trend. In general, late-seral assemblage habitat is lost through harvest and wildfire and gained through forest ingrowth. Forest ingrowth occurs continuously of course, but affects assemblage categories when it shifts a stand from a size class 2 or size class 3 stand with less than 40% cover, to a size class 2 stand with greater than 40% cover.

Since 1991, wildfire and timber harvesting shifted 61,432 acres of late-seral assemblage habitat to openings and early seral stage assemblage habitat. This reduced the stock of late-seral assemblage habitat from 779,121 acres down to about 717,689 acres (about a 7.9 percent decrease). During the same time period, about 218,154 acres of size class 2 open and early seral assemblage type grew into size class three or late-seral assemblage type, representing about a 28% increase. The net gain in late-seral assemblage habitat type amounts to about 156,722 acres, or about a 20% increase.

Alternatives 1, 2 and 3 would each shift about 540 acres of late-seral assemblage forest (0.06 % of the existing 935,843 acres of late-successional habitat and about 0.9 % of the 61,432 acres lost since 1991) to an openings and early seral stage assemblage type habitat. That would represent an additional 0.2% increment on the accrued 218,154 acres of openings and early seral stage assemblage habitat created since 1991.

Population Status and Trend.

The red-breasted nuthatch has a small but statistically significant population trend increase of about 1.4% over its range between 1966 and 2005. In the Pitt-Klamath Plateau strata where the project occurs, it presents a statistically less robust (not considered statistically significant) 1.3% increase. Across seven other geographic areas, the species presents a generally increasing trend except in the neighboring Sierra Nevada strata and the northerly Cascade Mountains strata. Both of these strata present statistically weak small declines in the trend since 1966. The coastal South Pacific Rainforest stratum shows the largest population change, demonstrating a statistically significant 3.2% increase since 1966.

Given the range of data it is hard to conclude that there is any significant relationship between the forest wide increases in late seral assemblage habitat type and population trends of the red-breasted nuthatch. Both decreases in population trends (the Sierra Nevada strata and the Cascade Mountains strata – both neighboring strata to the local Pitt-Klamath strata) are statistically insignificant whereas the most statistically significant data (where P = 0) is survey wide (the full range of the species) indicating a moderately increasing trend between 1966 and 2005.

Table 18: Breeding Bird Survey population trends for the Red-Breasted Nuthatch for the local strata, California, survey wide (species range), the three neighboring strata, the western BBS region, the FWS region 1 and finally the United States. Blue lettering represents the most statistically significant data.

		1966 - 2005						1966-1979			1980 - 2005		
Region	RCM	Trend	P	N	(95%	CI)	R.A.	Trend	P	N	Trend	P	N
Pitt-Klamath Plateau	1	1.3	0.28	38	-1	3.6	8.59	-8.2	0.51	12	1.1	0.44	37
California	1	0.1	0.94	104	-1.4	1.5	6.73	-2.3	0.52	48	1	0.18	101
Survey-wide	1	1.4	0	1140	0.8	2	2.29	0.2	0.9	374	1	0	1101
Sierra Nevada	1	-0.7	0.45	29	-2.5	1.1	16.36	-6.8	0.12	15	0.7	0.42	28
Cascade Mountains	1	-0.3	0.64	28	-1.6	1	13.35	-0.8	0.57	12	0.6	0.55	28
California Foothills	2	1.4	0.41	24	-1.9	4.7	1.5	27.6	0.06	14	1.6	0.48	23
S. Pacific Rainforests	1	3.2	0.01	73	1	5.4	3.49	0.7	0.82	24	3.3	0	72
Western BBS Region	1	1.1	0.01	558	0.3	1.9	2.89	-0.1	0.97	144	0.8	0.04	550
FWS Region 1	1	0	0.93	280	-0.8	0.8	5.41	-2	0.17	93	0.5	0.26	276
United States	1	0.5	0.13	746	-0.1	1.1	2.33	-1.3	0.21	244	0.6	0.06	728

- RCM: Regional Credibility Measure. "1" ("blue" in original data) is highest given by BBS, "2" and "3" have deficiencies – see http://www.mbr-pwrc.usgs.gov/bbs/cred.html
- Trend: Estimated trend, summarized as a % change/year.
- P : Statistical level of significance * Because the trends are estimates, we conduct a statistical test to determine whether the trend is significantly different from 0.
- A "0.01" indicates a 1% probability that a number would have occurred by chance alone.
- The lower the number, the less likely that a particular value would have occurred by chance alone.
- A very low number indicates that we cannot reject the null hypothesis that the trend is different from 0.
- N: Number of survey routes in the analysis. Caution should be used in interpreting any result that was based on less than 14 routes.
- 95% CI: 95% confidence interval for the trend estimate. Estimated as a multiplicative (constant rate) change in counts over time, with covariables to adjust for differences in observer quality. Regional trends are estimated as a weighted average of the route trends.
- R. A.: Relative abundance for the species, in birds/route. This number is an approximate measure of how many birds are seen on a route in the region.

5.d.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the species.

Given the small scale of the current activities relative to the Forest, the small increases in the red-breasted nuthatch population trends over most of its range, and the generally increasing quantity of late-seral assemblage habitat on the Forest, it is unlikely that the habitat changes engendered by the project will significantly affect the population trend of this species or the current trend in habitat on the Forest.

The project-level habitat impacts will not alter or contribute to existing forest-wide trends.

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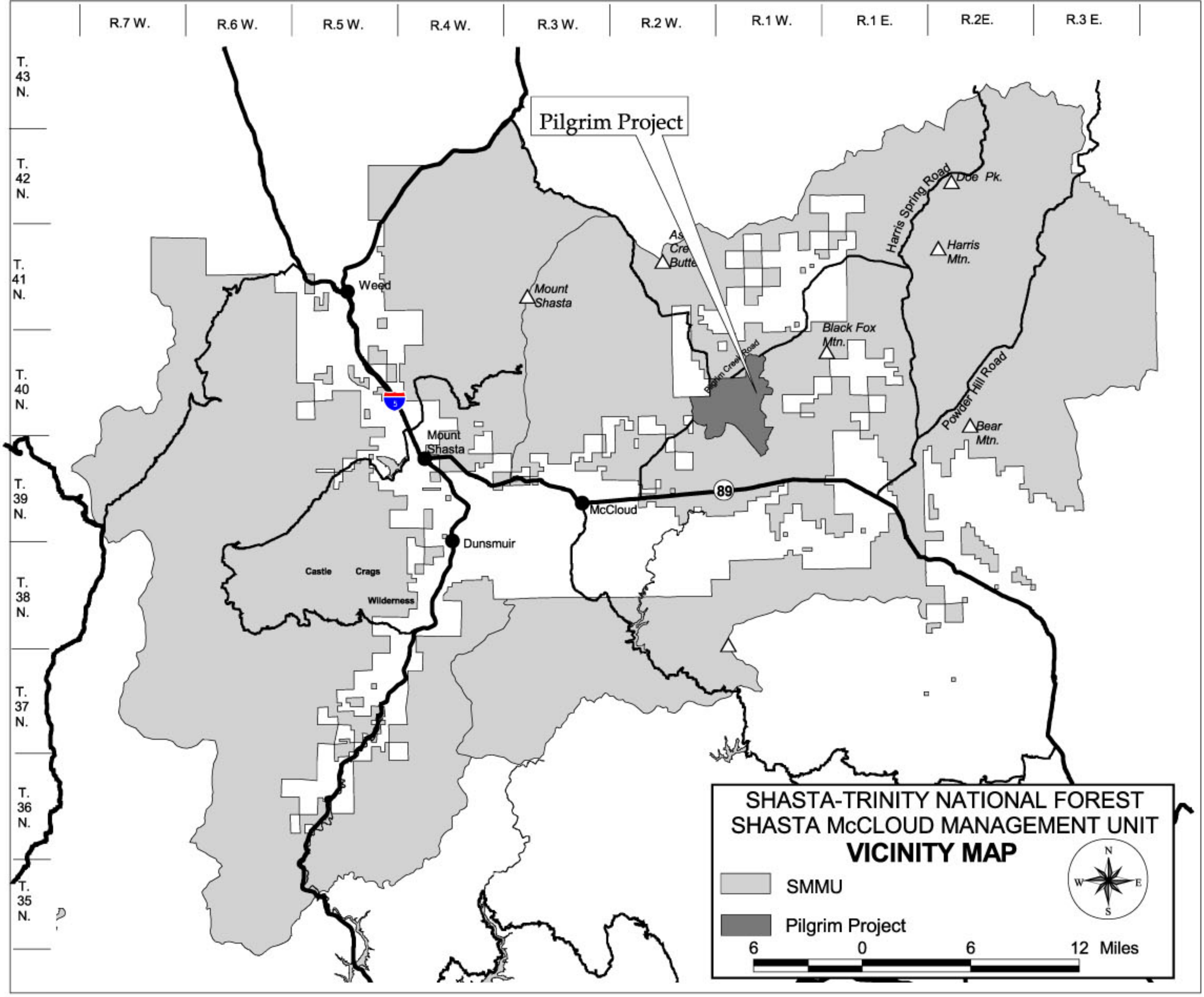
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Pilgrim Project
Weed
Mount Shasta
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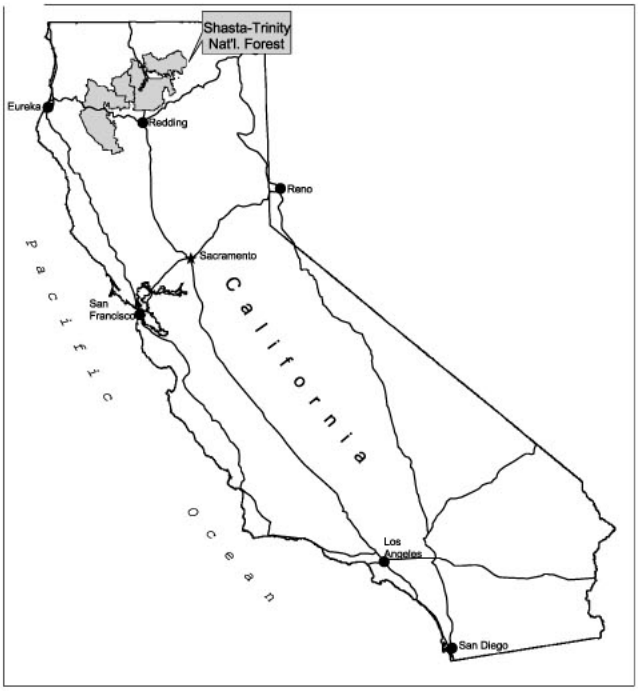
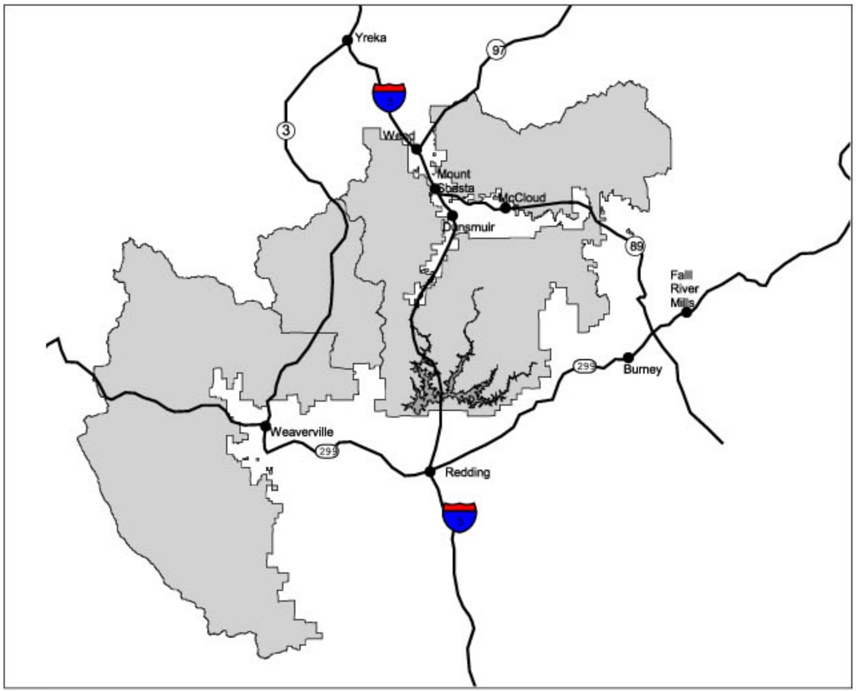
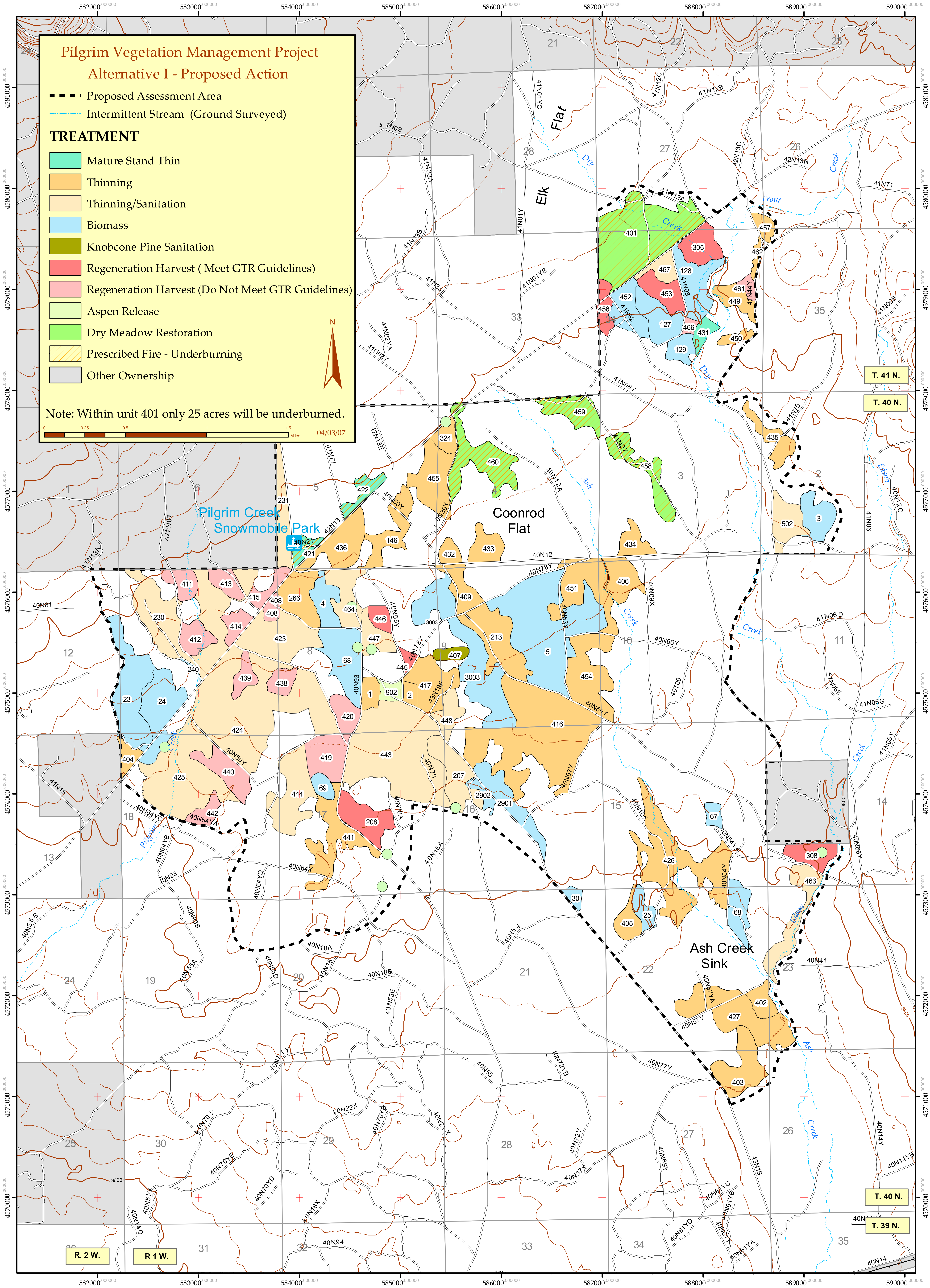
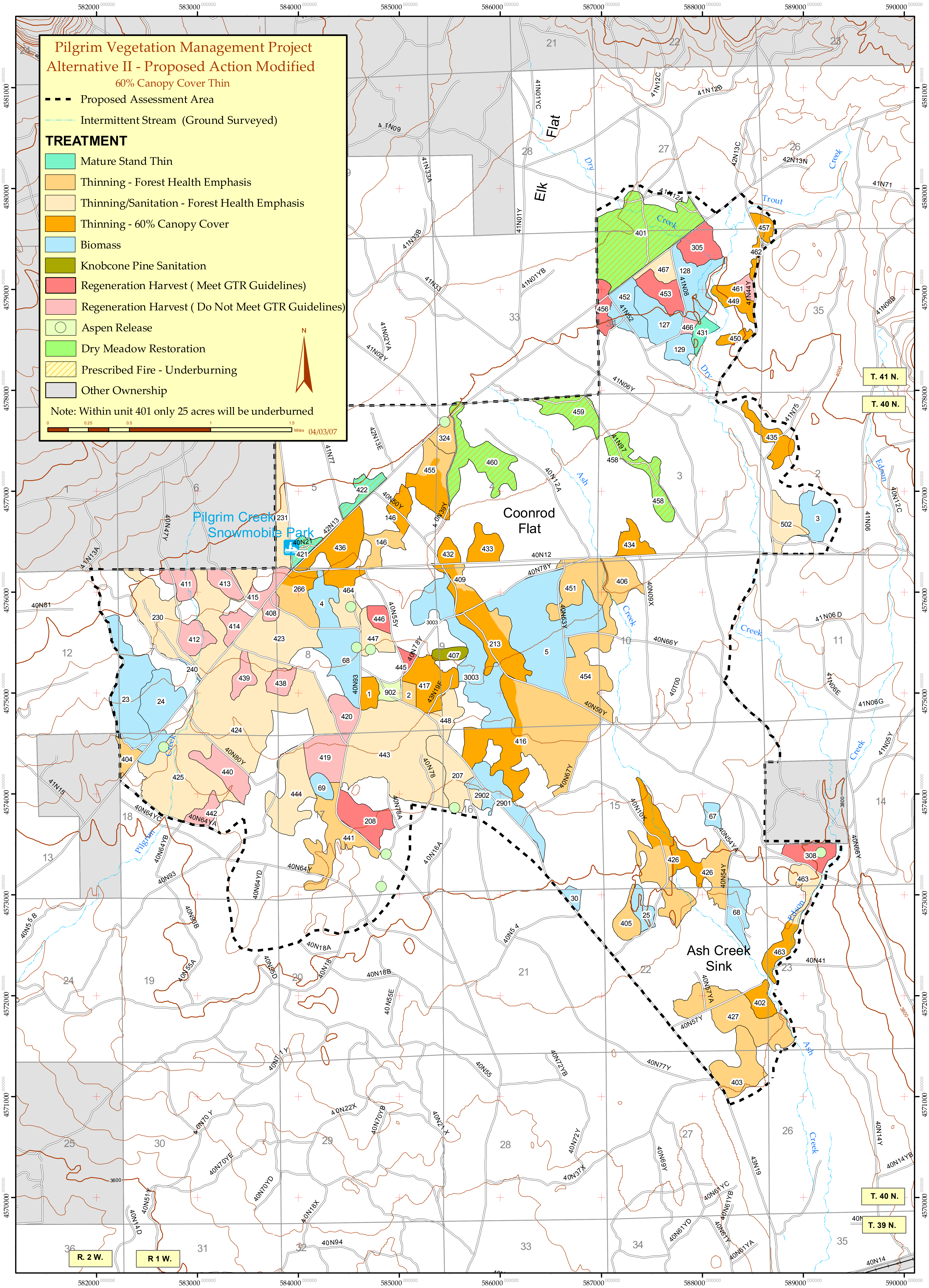
Dunsmuir
Castle Crags Wilderness
Black Fox Mtn.
Harris Mtn.
Doe Pk.
Bear Mtn.
Harris Spring Road
Powder Hill Road
Pilgrim Creek Road
89
5
SHASTA-TRINITY NATIONAL FOREST
SHASTA McCLOUD MANAGEMENT UNIT
VICINITY MAP
SMMU
Pilgrim Project
6 0 6 12 Miles
N
E
S
W


Shasta-Trinity Nat'l. Forest
Eureka
Redding
Reno
Sacramento
San Francisco
California
Pacific Ocean
Los Angeles
San Diego

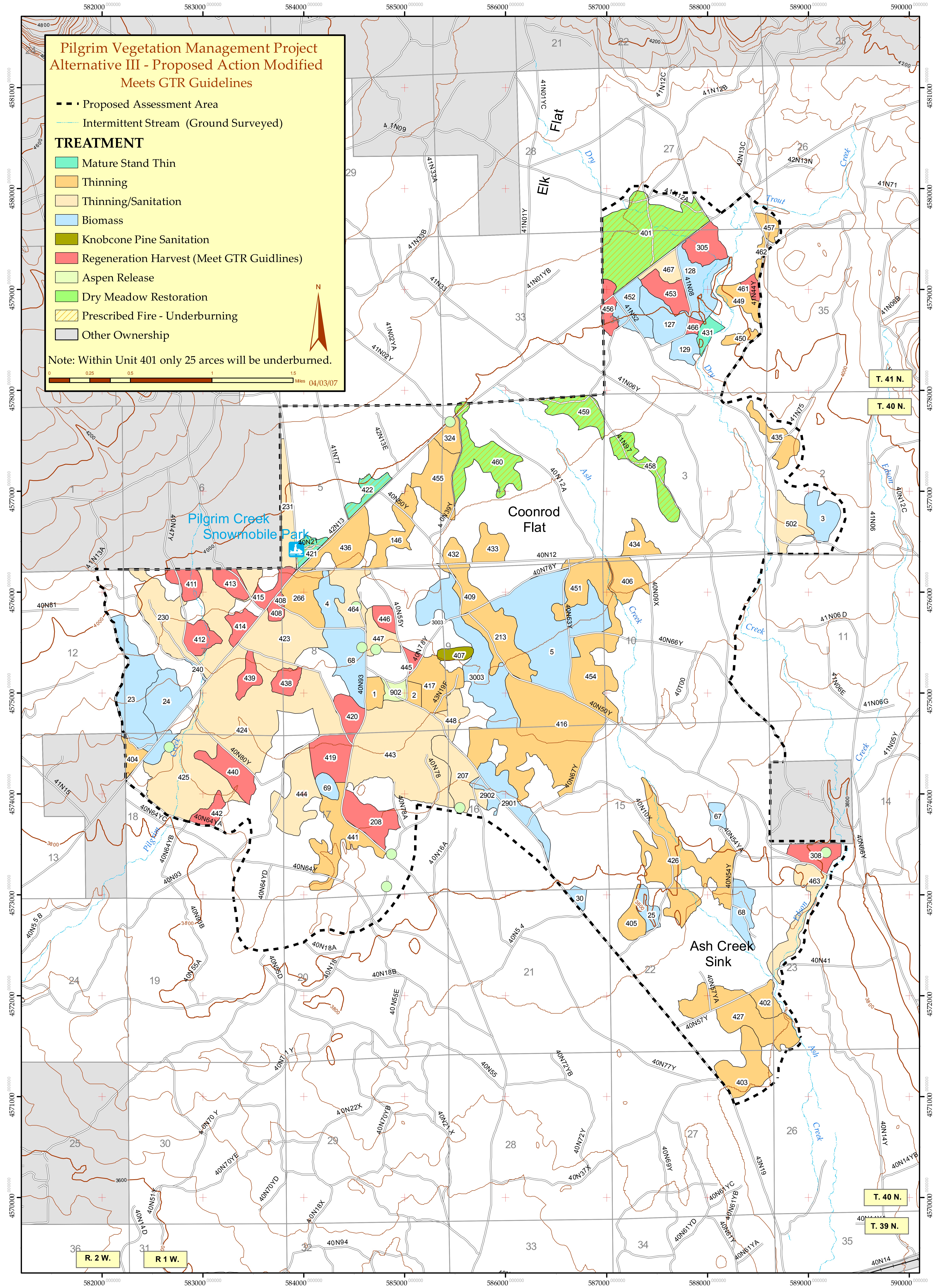

Yreka
97
3
Weed
Mount Shasta
McCloud
Dunsmuir
89
Fall River Mills
Burney
299
Weaverville
299
Redding



Pilgrim Vegetation Management Project
Alternative I - Proposed Action
Proposed Assessment Area
Intermittent Stream (Ground Surveyed)
TREATMENT
Mature Stand Thin
Thinning
Thinning/Sanitation
Biomass
Knobcone Pine Sanitation
Regeneration Harvest (Meet GTR Guidelines)
Regeneration Harvest (Do Not Meet GTR Guidelines)
Aspen Release
Dry Meadow Restoration
Prescribed Fire - Underburning
Other Ownership
N
Note: Within unit 401 only 25 acres will be underburned.
04/03/07
Pilgrim Creek
Snowmobile Park
Coonrod
Flat
Elk
Flat
Ash Creek
Sink
T. 41 N.
T. 40 N.
T. 39 N.
R. 2 W.
R 1 W.



Pilgrim Vegetation Management Project
Alternative II - Proposed Action Modified
60% Canopy Cover Thin
Proposed Assessment Area
Intermittent Stream (Ground Surveyed)
TREATMENT
Mature Stand Thin
Thinning - Forest Health Emphasis
Thinning/Sanitation - Forest Health Emphasis
Thinning - 60% Canopy Cover
Biomass
Knobcone Pine Sanitation
Regeneration Harvest (Meet GTR Guidelines)
Regeneration Harvest (Do Not Meet GTR Guidelines)
Aspen Release
Dry Meadow Restoration
Prescribed Fire - Underburning
Other Ownership
Note: Within unit 401 only 25 acres will be underburned
Miles
04/03/07
Pilgrim Creek Snowmobile Park
Coonrod Flat
Elk Flat
Ash Creek Sink
T. 41 N.
T. 40 N.
T. 39 N.
R. 2 W.
R 1 W.


Pilgrim Vegetation Management Project
Alternative III - Proposed Action Modified
Meets GTR Guidelines
Proposed Assessment Area
Intermittent Stream (Ground Surveyed)
TREATMENT
Mature Stand Thin
Thinning
Thinning/Sanitation
Biomass
Knobcone Pine Sanitation
Regeneration Harvest (Meet GTR Guidlines)
Aspen Release
Dry Meadow Restoration
Prescribed Fire - Underburning
Other Ownership
Note: Within Unit 401 only 25 arces will be underburned.
04/03/07
N
Miles
Elk Flat
Coonrod Flat
Pilgrim Creek Snowmobile Park
Ash Creek Sink
T. 41 N.
T. 40 N.
T. 39 N.
R. 2 W.
R 1 W.

Pilgrim Vegetation Management Project
Proposed Road Activities
Proposed Assessment Area
Activities
Roads
Barricade
Earth Berm
Abandonment
Construction
Decommission
Proposed Units
Barricade
Earthen Berm
N
0
0.25
0.5
1
1.5
Miles
10/21/05
T. 41 N.
T. 40 N.
T. 40 N.
T. 39 N.
R. 2 W.
R 1 W.
43N19
40N12
41N06
Dry
Trout
Creek
Ash
Edson
Pilgrim