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

Table of Contents:

List of Tables:

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)

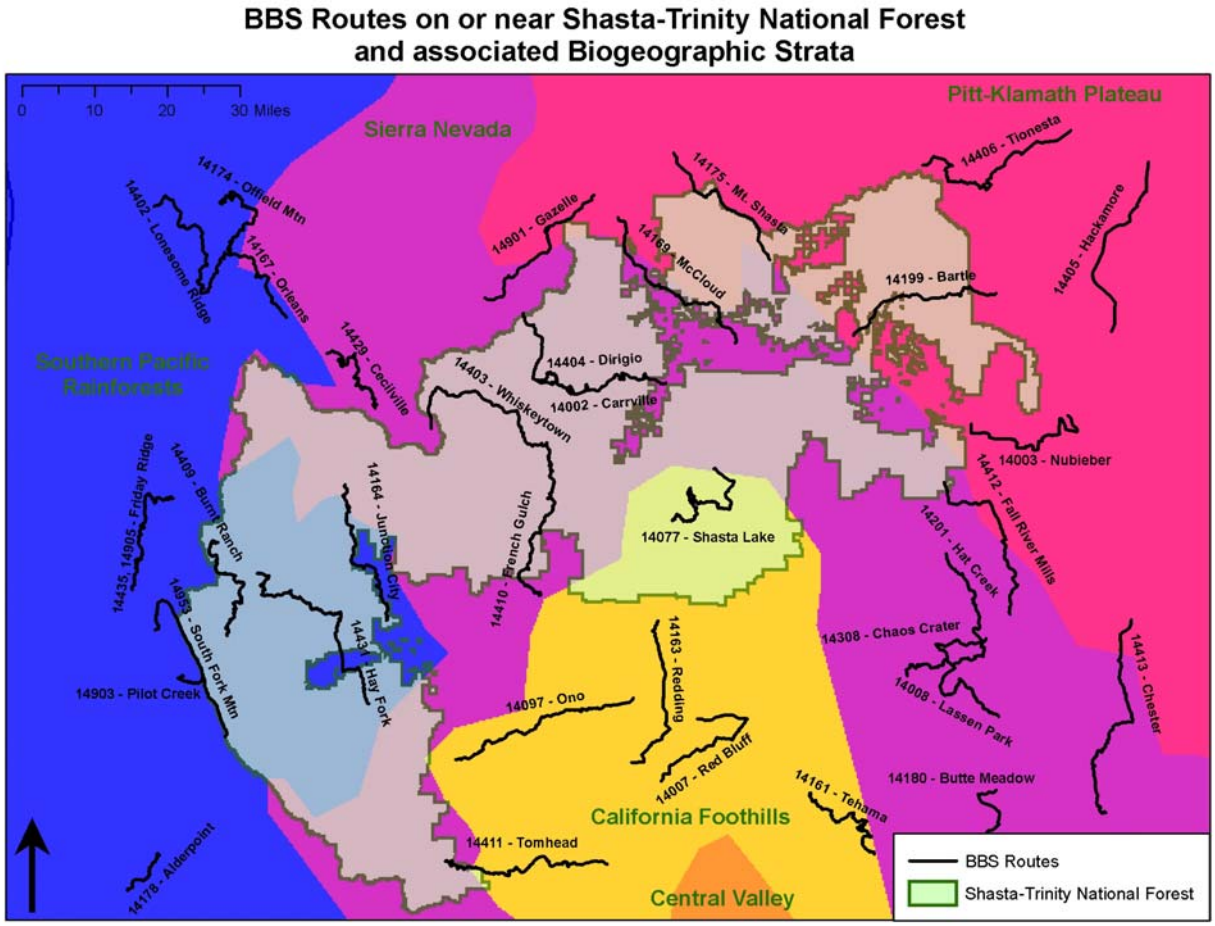
Species Population Trend Monitoring:

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.



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 - Decommissioning	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).

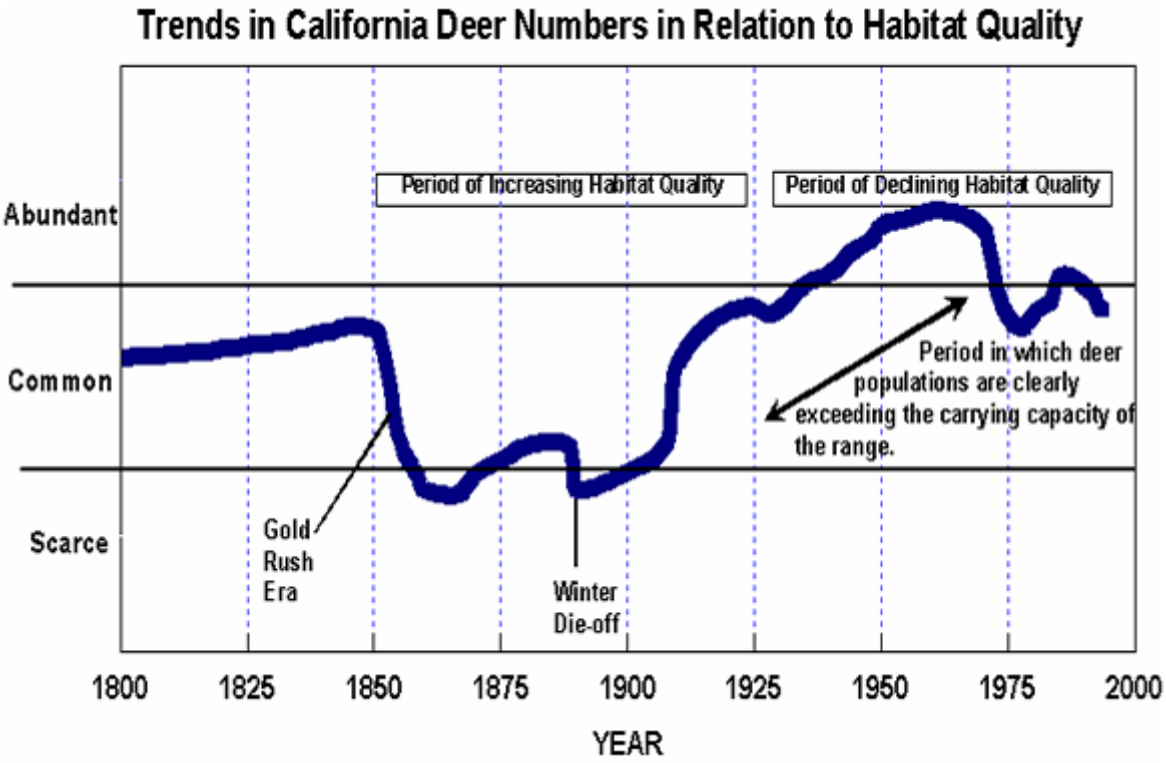
Table 12: Net shifts in late-seral and early seral habitat assemblages

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.

References Cited:

1. Beardsley, Debby and Warbington, Ralph. Old growth in northwestern California National Forests. Portland, Oregon: USDA Forest Service, Pacific Northwest Research Station; 1996a Jun(PNW-RP-491).
2. Giles Jr., Robert H. Wildlife Management. 1st ed. San Francisco, CA: W.H. Freeman and Company; 1978. 416 .
3. Oliver, Chadwick D. and Larson, Bruce C. Forest Stand Dynamics. 1st ed. McGraw-Hill; 1990. 467 p. (Biological Resource Management Series.
4. Pravosudov, V. V. and Grubb, Jr. TC. White-breasted Nuthatch. In: A. Poole and F. Gill, Editors. The Birds of North America. Philadelphia : Academy of Natural Sciences & The American Ornithologists Union; 1993.
5. Sauer, John R. and Droege, Sam, Editors. Survey designs and statistical methods for the estimation of avian population trends [Biological Report]. Washington, DC: Fish and Wildlife Service; 1990 Jan(; 90 (1)).
6. USDA, 1995. Shasta-Trinity National Forest Land and Resource Management Plan, U.S. Forest Service, 376 pp.
7. USDA, 2006. Pilgrim Vegetation Management Project Environmental Impact Statement (EIS), U.S. Forest Service.