Appendix D: (part 1): Biological Assessment for the Browns Project Revised Draft Environmental Impact Statement (Alternative 3)

United States Department of Agriculture
Forest Service – Pacific Southwest Region
Trinity River Management Unit
Shasta-Trinity National Forest
Trinity County, California

Prepared by:

Thomas Quinn, Wildlife Biologist
Trinity River Management Unit
Shasta-Trinity National Forest
Contact person, phone (530) 623-1758

Reviewed by:

S. Kelly Wolcott, Wildlife Program Coordinator
Shasta-Trinity National Forest
Supervisor's Office
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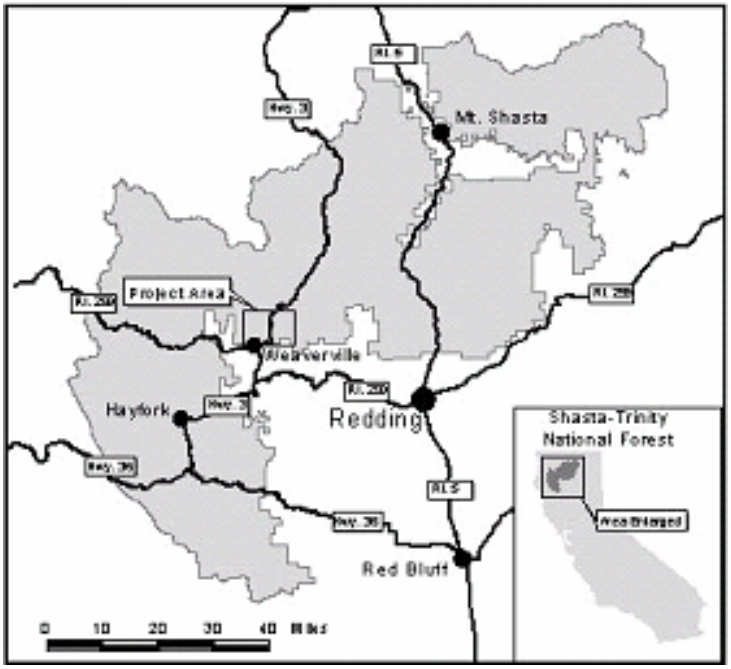


Browns Project EIS 2001 ROD Compliance Review: Survey & Manage Wildlife Species

Shasta-Trinity National Forest

Project Name: Brown's Project EIS **Prepared By:** Becky Rogers
Project Type: Fuel Reduction (Commercial Thinning) & Restoration **Date:** March 23, 2006
Location: T34N, R10W, sections 23 & 24 (road work only); T34N, R9W, and sections 16, 17, 18, 20, 21, 22, 27, 28, 29, 32, 33 & 34 (Mt. Diablo Meridian) **S&M List Date:** December 2003

Table A: Survey & Manage Species Known and Suspected in the Browns Project Vicinity.

Species listed below were compiled from the 2003 Annual Species Review (IM-OR-2004-034) and Survey Protocol For Survey And Manage Terrestrial Mollusk Species Version 3.0 (Duncan et al. 2003).

Species (terrestrial mollusks)	S&M Category	Survey Triggers			Survey Results			Site Management
		Within Range of the Species?	Project Contains Suitable habitat?	Project may negatively affect species/habitat?	Surveys Required?	Survey Date (month/year)	Sites Known or Found?	
Klamath Shoulderband (*Helminthoglypta talmadgei*)	D	Yes	Yes	No	[1]No	April -May 2000	0	None
Pressley Hesperian (*Vespericola Pressleyi*)	A	Yes	[2]Yes	No	Yes	April -May 2000	0	None

[1] Pre-Disturbance surveys for the Klamath shoulderband are not necessary in order to meet management objectives. Until high priority sites can be determined, manage all known sites. Nonetheless, In the years 2000 and 2001 surveys completed in the project area and vicinity following the *Survey Protocol for Terrestrial Mollusk Species from the Northwest Forest Plan Draft Version 2.0* (Furnish et al. 1997) revealed no S&M species requiring special management consideration or protection

[2] The Pressley Hesperian inhabits conifer and / or hardwood forest habitat in permanently damp areas within 200 meters of seeps, springs and stable streams. During cold and dry periods, woody debris and rock refugia near water are used by this species (pg. 44, *Survey Protocol for Survey and Manage Terrestrial Mollusk Species v3.0*, 2003). Field surveys revealed no permanently damp areas within the areas proposed for treatment in the two action alternatives. Furthermore, protocol mollusk surveys were completed in April and May 2000 and no *Vespericola pressleyi* were located.

Statement of Compliance. Pre-disturbance surveys and management of known sites required by protocol standards to comply with the *2001 Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines* (as the 2001 ROD was amended or modified as of March 21, 2004) were completed for the Brown's Project. There are no known Survey and Manage species within the Brown's Project area.

Therefore, based on the preceding information (refer to Table A above) regarding the status of surveys and site management for Survey & Manage wildlife species, it is my determination that the Brown's Project complies with the provisions of the *2001 Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines* (as the 2001 ROD was amended or modified as of March 21, 2004). For the foregoing reasons, this contract is in compliance with the 2001 ROD as stated in Point (3) on page 14 of the January 9, 2006, Court order in Northwest Ecosystem Alliance et al. v. Rey et al.

Joyce Andersen
District Ranger
Trinity River Management Unit
Shasta -Trinity National Forest

Date 4/17/06

I. Introduction

The purpose of this biological assessment is to present the likely effects of the actions proposed in Alternative 3 in the Browns Project Draft Environmental Impact Statement to federally listed threatened, endangered or proposed species. This document is prepared in accordance with current policy and follows the standards established in Forest Service Manual direction (FSM 2670.32). A separate biological assessment addresses listed fish species.

The northern spotted owl represents the late seral assemblage Management Indicator Species (MIS) for this project because late seral (old-growth/late-successional) is the only habitat type that would be measurably affected. This document represents the MIS analysis for the late seral assemblage for this project.

The species considered in this document are:

Endangered

- none

Threatened

- bald eagle (Haliaeetus leucocephalus)
- northern spotted owl (Strix occidentalis caurina)
- marbled murrelet (Brachyramphus marmoratus)
- California red-legged frog (Rana aurora draytoni)

Proposed

- none

Species Dropped from Further Analysis _____

The following species will not be further discussed except in the determinations section (VII) for the following reasons:

Long-term monitoring and survey efforts have revealed no **bald eagle** activity areas (i.e., nesting, roosting, or winter roosting/concentration areas) within or near the project area. The project area does not lie proximate to eagle foraging areas (e.g., lakes, rivers, larger creeks) and I do not expect eagles to occur in the vicinity. Consequently, this species will not be further discussed except in the determinations section.

The project area lies well outside the known or expected ranges of the **marbled murrelet** (Ralph et al. 1995) and the **California red-legged frog** (USDI 2002).

II. Consultation to Date

Dr. Danielle Chi (Wildlife Biologist, U.S. Fish and Wildlife Service, USFWS, Red Bluff Field Office) and Ron Clementsen (Forest Plan Program Leader, U.S. Fish and Wildlife Service, USFWS, Red Bluff Field Office) have visited the project area. I provided drafts of this document to Danielle Chi on July 2, 2004 and March 3, 2005; this final version incorporates her comments. The Shasta-Trinity

National Forest accessed the most recent a list of endangered, threatened, or proposed species that may occur in the project area vicinity (i.e., Trinity County) from the USFWS web site dated February 24, 2005 (http://arcata.fws.gov/specieslist/speciesreport.asp).

On March 30, 2005 Danielle Chi, Ron, Laura Finley (Wildlife Biologist, Endangered Species Program, U.S. Fish and Wildlife Service, Yreka Field Office), Kelly Wolcott (Forest Wildlife Biologist, Shasta-Trinity National Forest) and I met to discuss cumulative effects related to the Browns Project and forest management on private lands in the project area vicinity. Laura Finley provided maps and brief descriptions of all the private timber harvest plans (THPs) for projects in the owl action area for which the Yreka FWS office provided "technical assistance." Our inspections of 2003 aerial photographs of the THP areas indicated that the THP projects had been implemented and are accounted for (85% ground verified) in the Browns Project Hydrology report completed by Jim Fitzgerald (hydrologist, Shasta-Trinity National Forest). The meeting further revealed that the definition of spotted owl habitat used in the THP process is very much more broad than the definition used in this document. Areas considered suitable owl habitat on private land during the THP process would largely barely qualify as connectivity habitat using the definitions of owl habitat used in this document. In this light, the description of cumulative effects on private property related to owl habitat is accurate.

III. Current Management Direction

The Shasta-Trinity National Forest (STNF) is currently operating in full compliance with the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (ROD; USDA Forest Service and USDI Bureau of Land Management, 1994). The Regional Forester approved the STNF Land and Resource Management Plan (Forest Plan or LRMP) on April 28, 1995 and it became effective as of June 5, 1995. The Northwest Forest Plan ROD was incorporated into the Forest Plan.

The Forest Plan adopts the recovery plan for the bald eagle (USDI 1986) and the ROD as the Federal contribution to the recovery of the northern spotted owl. The STNF expects the network of areas withdrawn from active timber management (e.g., wilderness, late-successional reserves, riparian reserves, and administratively withdrawn areas) along with standards and guidelines related to snag, log, and hardwood retention to provide habitat adequate to maintain viable well-distributed populations of federally listed or proposed species.

IV. Description of Proposed Action

Location of Proposed Actions

The project is located northwest of the town of Weaverville in Trinity County California within the Weaverville 5th Field Watershed (see cover sheet map). The legal locations (all within Mt. Diablo

Meridian in Trinity County) are within two townships: T34N, R10W, Sections 23 and 24 (road work only); T34N, R9W, and Sections 16, 17, 18, 20, 21, 22, 27, 28, 29, 32, 33, and 34.

Purpose and Need for Action

The Federal Register identifies Weaverville as a Community at Risk (CAR) and the project area is within an area the Forest Service wishes to manage under guidelines for an established "Wildland-Urban Interface" (WUI). Approximately 70 percent of the proposed activities lie within the Weaverville WUI that was the focus of project development in a cooperative effort between the Trinity County Resource Advisory Council (RAC), the Trinity County Fire Safe Council, and the Forest Service. The basic purpose and need of the Browns Project is reflected in the four objectives included in the Cohesive Strategy to Protect and Sustain Resources in Fire-Adapted Ecosystems (approved by Forest Service Chief Mike Dombeck on October 13, 2000):

- Improve the resilience and sustainability of forests and grasslands at risk.
- Conserve priority watersheds, species and biodiversity.
- Reduce wildland fire costs, losses and damages.
- Better ensure public and firefighter safety.

For the purpose of this strategy, risk conditions were assigned "condition class" descriptors to represent relative risk of intense resource damage from fire. The existing Condition Class of the project area is mostly "Class 3, relatively high risk" with a lesser portion of "Class 2, moderate risk." The desired condition is "Class 1" representing a low relative risk. Therefore, the primary purpose of this project is to move "Class 2&3" areas toward "Class 1" conditions.

A third purpose is to maintain or improve water quality (goals #39 and #40 for Water, LRMP page 4-6) since this watershed provides anadromous fish habitat and serves as a domestic water supply to Weaverville.

Summary of Proposed Actions

A Forest Service interdisciplinary team developed specific proposals included within the project that include timber harvest, fuels treatments and road management (construction, reconstruction, and obliteration/decommissioning). The team designed the project to provide protection of other resources in accordance with management direction described for the Weaverville/Lewiston Management Area (Area 7) as identified in the Shasta-Trinity National Forests Land and Resource Management Plan (LRMP).

Mature Conifer Stand Thinning (754 acres)

Mature conifer stands would be thinned to levels expected to maintain and enhance growth and vigor of conifer species while leaving stand attributes such as large predominant conifers, snags and hardwoods for wildlife habitat needs (Table 1). Trees targeted for removal would be the least vigorous individuals in the suppressed, intermediate and occasionally the codominant crown positions. A variety of activity fuels and natural fuels treatments would follow (Table 1) to leave the resultant

timber stands in an improved fuels condition class. All predominant (i.e., legacy) conifers would remain. Trees in the codominant crown position would be removed where stand densities are excessive and removal is expected to contribute to the development of late-successional fire-resistant conditions. Residual crown closure would be 40-50% in areas with leave trees averaging less than 24" dbh and 60-80% in areas with larger (over 24" dbh) trees. Thinning within the smaller diameter stands is "more aggressive" because the younger (i.e., smaller) conifers will respond (i.e., grow) faster to having more site resources available (mainly water). Within riparian reserves, stand densities would be maintained at a minimum 60% canopy closure regardless of tree size.

Group Regeneration Areas (39 acres)

Small (roughly 1 to 2 acres) areas would be harvested (cleared) using a combination of cable and tractor yarding systems followed by a variety of activity fuels treatments (Table 1). These harvest units are located in areas of heavy existing fuel loadings, where the current stands are understocked, in areas where cable harvesting impacts to proposed thinning stands are expected to be greatest (immediately below the expected cable yarder setup) and to provide landings. Landings are critical for handling and storing the large amount of woody material (fuel) produced by whole-tree yarding of large numbers of relatively small diameter trees within the adjacent thinning areas. These areas would be decompacted (see below) and planted with conifers following the thinnings and fuels treatments.

Table 1. Summary of Timber Stand and Activity Fuels Treatments

Timber Stand Treatment:	
Mature Stand Thinning	754 ac.
Tractor yarding	571 ac.
Cable yarding	183 ac.
Regeneration Harvest (total of 21 1 to 2-acre group regeneration areas)	39 ac.
Tractor yarding	26 ac.
Cable yarding	13 ac.
Treatment of Activity Fuels within Timber Treatment Areas[1]:	
Whole Tree Yard (all areas)	793 ac.
Lop and Scatter	674 ac.
Tractor Pile/Burn	26 ac.
Roadside Pile/Burn	81 ac.
Burn Concentrations	674 ac.
Broadcast Burn	13 ac.
Dozer Line Construction (tractor units only)	11 miles
Hand Line Construction	7 miles

[1] Total fuels treatment exceeds the harvest acres because more than one treatment may occur on the same acre.

Road Construction/Reconstruction

Interdependent project activities include approximately 4.6 miles of road construction, 3.6 miles of road reconstruction and 3.7 miles of temporary roads to access the intermediate harvest areas. Road reconstruction would involve a combination of blading, rocking or culvert replacement within the confines of the existing disturbed roadbed. Temporary roads would lie within proposed thinning units with the precise location determined by the sale administrator. They will not cross drainages or Riparian Reserves and will be rehabilitated after use (see below).

Temporary Road & Landing (regeneration units) Rehabilitation

These interdependent actions would minimize potential for erosion and to improve site productivity. Temporary roads and landings (i.e., regeneration units) will be subsoiled to a depth of 18 inches or more. Subsoiling will be performed when the soils are dry, with a winged-subsoiler, forest cultivators or disks. Soil will be loosened across the entire treatment area to achieve a soil condition where 85% of the soil would pass through a 2" opening. Waterbarring and outsloping of a skid trail is not necessary, as the intent of subsoiling is to loosen the soil and attain a permeable soil condition where runoff will not occur. Waterbarring of a skid trail should be avoided unless sections are so steep that there is a potential for surface runoff prior to revegetation. Access to temporary roads will be blocked after subsoiling.

All roads adjacent to thinning or regeneration units would be used to haul timber. The haul routes to the nearest main highway (i.e., State Highway 3) would be relatively short (Map 1).

Road Decommissioning/Obliteration

This interrelated action would involve approximately 32 miles of existing classified and unclassified roads. This mitigation measure is critical to project success related to water quality and will be implemented using dollars generated by KV (funds generated by the timber sale aspect), Forest Service (FS) engineering and watershed restoration funds, and non-FS sources (e.g., water quality grants). Road decommissioning entails removing culverts, ripping and outsloping road surfaces, and tank trapping. Other activities may occur depending on site conditions. The goal is to control surface runoff, erosion, and mass failure leaving the road unavailable for future use. The condition of these roads will be monitored long-term as part of effectiveness monitoring.

Additional Design Criteria (Mitigation Measures)

The team developed these interdependent actions to reduce or avoid impacts to forest resources. Below are those that closely relate to wildlife issues:

- Limited Operating Periods (LOPs) would be implemented to avoid direct adverse impacts to the northern spotted owl. From February 1 through July 10, all noise- and smoke-generating activities will be prohibited **within ¼ mile** of suitable nesting/roosting habitat. In addition, all vegetation removal/cutting/burning will be prohibited through September 15 **within** suitable nesting/roosting habitat. These LOPs may be lifted if surveys using currently accepted

protocols indicate specific areas are not occupied by breeding owls or with the mutual consent of the U.S. Fish and Wildlife Service and the U.S. Forest Service.

- Retain existing large (>19 inches diameter at breast height) snags and down logs within thinning units. Snags felled for safety reasons would be left on site as logs.
- Maintain an average of 5 tons of logs per acre with a preference to have 4 to 6 logs per acre at the largest available diameter.
- Retain all hardwoods that have a reasonable chance of surviving and thriving after stand treatments.
- Riparian Reserves of intermittent and ephemeral streams that display annual scour will have a minimum 150 foot Riparian Reserve based upon the average maximum height of 200-year-old trees for the site. There is one inner gorge greater than 150 feet from the defined channel of intermittent or ephemeral streams in unit 13 that will require a Riparian Reserve greater than 150 feet in width.
- Riparian Reserves of fish bearing streams that display annual scour will have a 300 foot Riparian Reserve based upon twice the average maximum height of 200-year-old trees for the site. There are no inner gorges or flood plains in the project area greater than 300 feet from the defined channel of fish bearing streams.
- Thinning may occur in the Riparian Reserves up to the inner gorge, or to 50 feet from the defined channel if no inner gorge exists, for the purpose of enhancing Riparian Reserve timber stand health and treating hazardous fuels. Thinning and fuels treatment will not reduce crown cover to less than 60% within Riparian Reserves.

V. Existing Environment

This document analyzes spotted owls and owl habitat at five spacial scales.

Spatial Scales

- The 54,000-acre **Weaverville 5th Field Watershed** encompasses the project area and the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (Northwest Forest Plan ROD) establishes the 5th field watershed as an appropriate context for landscape-level analyses (Map 2). The watershed is used to analyze the Standard & Guideline (S&G) "Provide for Retention of Old-Growth Fragments Where Little Remains" (ROD page C-44).
- The 28,246-acre **Action Area** represents a 1.3-mile buffer around all the areas proposed for treatment. This area should include any ***potential*** current or future owl activity centers (e.g., nest sites) that would be affected by habitat loss or modification related to the Browns Project (Maps 1 and 3).
- The spotted owl **home range** represents a 1.3-mile buffer around the one known owl activity center (state ID# TR150) where existing habitat would be affected (Maps 1 and 3). TR395 is

not analyzed because only 2.7 acres of NR habitat would be slightly degraded approximately 1.25 miles from the activity center with poor habitat conditions linking the two areas. That is to say, these owls, if they still occupy the 1998 area, do not likely use the habitat that would be affected.

- The spotted owl **territory** represents a 0.7-mile buffer around the one known owl activity center (state ID# TR150) where existing habitat would be affected (Maps 1 and 3). TR395 is not analyzed because no actions are proposed within 0.7 miles of the activity center.
- The **project area** includes only the areas that would be directly impacted by the proposed actions (e.g., thinning units, regeneration units or roadbeds). Thus, Alternative 1 (no action) has no "project area." The project area overlays the other four areas and is used in the context of analyzing effects to those areas.

Land Allocations and Critical Habitat

All actions proposed in the Browns project lie within the Hayfork Adaptive Management Area. As such, the area's main assigned biological role in the overall strategy for maintaining viable populations of species associated with late-successional and old-growth (LSOG) forest ecosystems (as described in the FSEIS, the subsequent ROD, and the Forest Plan) is to provide connectivity between large areas set aside for these species (late-successional reserves, LSRs) while maintaining at least 15 percent of federal forest land in LSOG conditions. Connectivity does not necessarily mean that set-aside late-successional and old-growth areas have to be physically joined in space. However, conditions between these areas must be compatible with the movement of LSOG associated species, such that they are both capable of moving through these habitats and inclined to do so.

Late-Successional Reserve RC-334, that largely overlays Designated Spotted Owl Critical Habitat Unit (CHU) CA-33, lies just to the north of the project area (Map 1). About 755 acres of CHU CA-33 lie within the action area. No actions are proposed within this CHU. LSR RC-334 is "insufficient" in that it currently has less than desirable habitat conditions; thus, adjacent areas may be more than "normally" important for maintaining owl populations.

Connectivity

Connectivity habitat is defined as conifer stands meeting at least "11-40" conditions (i.e., an average of at least 11 inches DBH and at least 40 percent canopy closure) (Thomas et al. 1990). Functional connectors are defined as those that lead to outside dispersal habitat leading to main drainages, had at least marginally suitable dispersal habitat, not less than 200 feet wide (generally over 300 feet wide), with gaps no more than 400 feet (generally less than 200 feet). This definition was based upon the habitat capability models for fisher and marten (Freel 1991). Field reviews suggest the following size class/canopy closures generally provide connectivity habitat in the watershed: 4G, 4N, 4P, 4S, 3G, 3N, 3P, 3S, 2G and 2N (see Attachment 1 for habitat code descriptions).

Based upon habitat mapping (Map 2), aerial photograph interpretation, and field reviews, connectivity through the action area appears to be relatively discontinuous. The main reasons for this are intensely managed private timber industry land, private residential land (including the town of

Weaverville) along with naturally occurring harsh, sparsely vegetated areas. The Oregon Fire removed approximately 240 acres of connectivity habitat in 2001 roughly three miles east of the project area.

Late-Successional and Old-Growth Habitat (LSOG) _____

Northern Spotted Owl (MIS)

Species Account

Northern spotted owl

No owl surveys have been conducted for this project. Our records include only one known activity center in the watershed that lies just to the west of thinning unit #9E. This owl activity center (state ID# TR150, Maps 1 & 3) is based upon an owl pair last surveyed and confirmed in 1992 (see Table 2, page 18 for current habitat conditions within the territory and home range). A 100-acre LSR has been established around this activity center comprised of the best available contiguous habitat. In 1998, Sierra Pacific Industries reported an owl pair just inside the southern action area boundary (state ID# TR395, Maps 1 and 2). Habitat conditions, the territorial nature of the owl, topography and distance from known activity centers suggest that the action area could still support TR150 and one additional owl pair centered in the block of high quality NR habitat at the northern boundary of the action area. Habitat conditions on private property in the action area suggest that owls may be using pockets and stringers of habitat but the general tentative owl centers remain as described above.

Spotted Owl Population Trend

Courtney et al. (2004, Table 2) report the most current estimated rate of population change (PC) for the northern spotted owl where a stable population is indicated by PC = 1, a declining population by PC < 1, and an increasing population by PC > 1. PC ranged from 0.896 to 1.005 and was <1.0 on 12 of 13 range-wide study areas. However, in only four of these 12 were 95% confidence intervals for PC < 1. Evidence for owl population decline was weak on the three study areas closest to the Browns Project Area (i.e., Klamath, NW California and Hoopa study areas).

The wealth of information on the demography of the northern spotted owl is unique. For no other threatened or endangered species do we have such extensive information on population trends and the factors affecting them. The demographic studies reported here are among the most significant achievements in conservation biology. Yet, the information is still far from complete, and inadequate to make critical assessments. While northern spotted owl populations appear to be in decline, it is not possible to determine whether this decline is greater than that predicted at the time of the NWFP (Courtney et al. 2004).

Table 2. Estimated rate of population change (PC) for Northern Spotted Owls, with standard error and 95% confidence interval (as reported in Courtney et al. 2004, Table 8.5)

	PC[1]	Standard Error	95% Confidence Interval	
			Lower	Upper
California				
NW California	0.985	0.013	0.959	1.011
Hoopa	0.980	0.019	0.943	1.017
Simpson	0.970	0.012	0.947	0.993
Oregon				
Coast Ranges	0.968	0.018	0.932	1.004
H.J. Andrews	0.978	0.014	0.950	1.005
Warm Springs	0.908	0.022	0.866	0.951
Tyee	1.005	0.019	0.967	1.043
Klamath	0.997	0.034	0.930	1.063
S. Cascades	0.974	0.035	0.906	1.042
Washington				
Wenatchee	0.917	0.018	0.882	0.952
Cle Elum	0.938	0.019	0.910	0.976
Rainer	0.896	0.055	0.788	1.003
Olympic	0.956	0.032	0.839	1.018

[1]A stable population is indicated by PC = 1, a declining population by PC < 1, and an increasing population by PC > 1.

Competitors & Predators

No known northern goshawk, barred owl or great horned owls sightings occur in the action area.

West Nile Virus

West Nile virus occurs in the project area general vicinity based upon positive lab test results of roughly 18 dead birds found throughout Trinity County (personal communication with Peter Hedtke; Trinity County Environmental Health Division of the Building and Development Services Department). None of the birds analyzed were spotted owls.

Habitat Account

The spotted owl is associated with late-successional and old-growth conifer forest LSOG) (Thomas et al. 1990). The distribution of LSOG stands throughout the landscape is an important component of ecosystem diversity and plays a significant role in providing for biological diversity and structural diversity. LSOG patches outside of reserves can be ecologically significant in functioning as refugia for a host of old-growth associated species, particularly those with limited dispersal capabilities. LSOG stands provide areas of relatively high quality habitat for dispersing individuals (e.g., northern spotted owl, fisher, marten, etc.).

The project area lies within the Weaverville 5th Field Watershed. Attachment 1 includes the *15% Late-Successional and Old-Growth Retention Analysis and Recommendations for the Weaverville 5th*

Field Watershed (15% document) that presents habitat definitions, assumptions used and an analysis of current forest conditions related to LSOG habitat.

Spotted Owl Habitat Definition

This assessment analyzes owl habitat using the LMP-90 GIS database (Forest Service land) and the *Remote Sensing Lab Database* (***RSL database***; Bureau of Land Management land) within the watershed and the definitions presented in the 15% document. The relationship between owl habitat and the LMP-90 database is synopsized below.

Table 3. Spotted Owl Habitat Related to LSOG analysis presented in Attachment 1

Nesting/Roosting (NR)	4G & 4N (relatively high quality), and 3G (relatively moderate quality)
Foraging (F)	3N
Capable (potential)	all remaining Federal Forest Land

There is a clear distinction between old-growth and late-successional habitat. Late-successional is defined simply as conifer stands at least 80 years old regardless of other stand attributes such as level of decadence or canopy closure. Old-growth is a subset of late-successional and is defined as a forest stand usually at least 180-220 years old with moderate to high canopy closure; a multilayered, multispecies canopy dominated by large overstory trees; a high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulations of wood, including large logs on the ground (ROD page F-4). Old-growth (4N/G) provides “high quality” owl nesting/roosting habitat. Younger densely to moderately canopied late-successional stands provide “moderate” quality owl nesting/roosting habitat (3G) and foraging habitat (3N) respectively.

The amount of NRF habitat within the five spacial scales analyzed is included in Table 4 (page 16) and displayed on Maps 2 and 3. Note that the amount of habitat in the project area is captured in the amount of habitat that would be affected (i.e., the proposed action).

VI. Effects of the Proposed Action

Actions Not Further Analyzed

The interrelated and interdependent actions listed below will not be further analyzed for the following reasons:

- **Road reconstruction** would occur within existing Forest Service system roadbeds and would have no effect on existing owl habitat.
- **Temporary road construction** would occur within proposed thinning units and their widths would be comparable to the leave tree spacing. Therefore, the effects are lumped in with the effects of thinning.

- **Dozer and handlines** would occur within proposed harvest units and would have little effect on retained vegetation or habitat components. Therefore, the effects are lumped in with thinning/regeneration effects.
- **Activity fuels treatments** (including burning), **decompacting temporary roads or regeneration units**, and **road decommissioning** would not affect owl habitat.
- For all these actions the LOP (page 6) avoids direct impacts to owls due to noise or smoke related to the proposed actions.

Direct Effects (Mortality, Harm, Failed Breeding Attempts, Displacement)

The limited operating periods included in the design criteria (page 6) for this project minimize direct effects to the spotted owl by avoiding disturbances during critical periods of the breeding season or when young owls are not mobile enough to readily move from a disturbance. Additionally, the obliteration or decommissioning of about 32 miles of roads would reduce human (vehicle) disturbance in the area. No actions are proposed within the high-quality NR (old-growth) stand where activity center TR150 lies (Map 2). Direct impact to activity center TR395 are unlikely given that the nearest proposed activity lies about 1.25 miles away (slightly degrading 2.7 acres of NR habitat).

The response of individual owls or pairs to the proposed habitat alteration is speculative without intrusive radio or color-coded tagging and monitoring. The majority of the stands proposed for thinning are very dense, to the point of likely limiting effective foraging by spotted owls. Resident owls may remain in the area or return shortly after the disturbance and then benefit from having these thinned stands available for more effective foraging habitat given that higher quality NR habitat will remain largely intact (2 acres removed) in adjacent areas providing nest sites. Owls are capable and willing to (re)occupy suitable habitat in areas affected by timber harvest activities and many successful owl nest sites occur in landscapes where adjacent timber harvesting has occurred (personal observation). Conversely, resident owls acclimated to current conditions may relocate to other areas permanently or for up to 30 years until stands recover to predisturbance canopy cover levels. If resident owls relocate, other dispersing or nonterritorial (floater) owls may opportunistically move in and occupy NR habitat in the project area or vicinity.

Indirect Effects (i.e., Habitat)

Connectivity

Only regeneration units and road construction would take existing connectivity habitat below 11-40 conditions. The small size of the harvest units (2 acres and roughly 300 feet at their widest) and the narrow impacts from the roads (roughly 30 feet wide) would not likely reduce the free movement of owls through Forest Service portions of the action area. Additionally, proposed thinning prescriptions in mature conifer stands would result in a long-term ($\geq$30 years) net increase in owl high quality LSOG habitat in the long-term (i.e., high quality connectivity habitat; Figures 1 through 3). Private

residential property and heavily managed private timberland in the action area will likely continue to limit connectivity in the action area.

Standard and Guideline

"**Provide for Retention of Old-Growth Fragments Where Little Remains**"
(Management Indicator Species, MIS: Northern Spotted Owl)

The proposed actions would remove a total of 2 acres and temporarily degrade an additional 59 acres of old-growth habitat (high quality owl nesting/roosting habitat) due to proposed road construction and thinning (Table 4). Immediately after implementation, old-growth would comprise 10.19 percent of federal forest land (FFL) in the watershed (down from the current 11.20 percent). When moderately to densely canopied late-successional stands (i.e., 3N and 3G) are included, the watershed would contain well above 15 percent LSOG (Attachment 1, Figure 3).

The **ecologically based rational** for causing these effects to old-growth is as follows: The roads are needed to access areas of dense conifers identified as needing thinning to meet the stated purpose and need for this project to reduce the risk of large-scale catastrophic fire (that would likely impact existing old-growth). The regeneration units were located to give cable access to these thinning areas and to function as landings to handle the large amount of woody material (fuel) produced by whole-tree yarding of large numbers of relatively small diameter trees within the adjacent thinning areas. Understory thinning within selected old-growth stands would reduce ladder fuels and reduce the probability of fire reaching the crowns of the large predominant trees and increase the probability of retaining existing viable hardwoods to retain vertical structure. Stands with old-growth characteristics would increase in the long-term (Figures 1-3).

Effects to Spotted Owl Nesting/Roosting (NR) and Foraging (F) Habitat

Short-Term (<30 years)

Alternative 3 would affect owl habitat in the short-term in four general ways:

- **Reduction in overall canopy closure**: A moderate to dense canopy closure moderates environmental extremes (e.g., temperature, rain/snow fall, etc.). This effect is related to thinning, regeneration, and new road construction.
- **Simplification in vertical structure**: Multiple canopy levels provided by understory conifers and hardwoods provide lower (cooler) roost sites in the hot summer months and provide perch sites for foraging and eating. This effect is related to thinning, regeneration, and new road construction.
- **Reduction in smaller diameter (<24" dbh) snags and logs**: Snags can provide owl nest sites and both snags and logs provide habitat for owl prey species. Few large (>24"dbh) would be removed by the proposed fuels treatments. My experience suggests that spotted owls would not likely use snags less than 24"dbh for nest sites.

- **Reduction in potential nesting opportunities**: Larger decadent (broken-topped) conifers and snags provide typical nest sites for spotted owls. This effect is related to regeneration, and new road construction (i.e., removal, see effects intensity below) within existing NR habitat. The proposed thinning and riparian prescriptions target larger conifers and snags for retention.

The proposed actions would affect approximately 545 acres of existing NRF habitat and 251 acres of connectivity habitat. Effects to existing NRF habitat are analyzed at four spatial scales (described above) and three categories of intensity (see below). Table 4 presents the amount (acres) of each habitat type that would be affected segregated by the intensity and spatial scales. Map 2 displays the proposed actions related to NRF habitat at the action area (and owl territory/home range) scale.

Effects Intensity

- **Removed** indicates the habitat would no longer function as LSOG at any level resulting from *regeneration prescriptions* and *road construction*. Long-term experience with similar treatments indicates that regenerated areas should recover to connectivity habitat conditions in roughly 35 to 40 years after the first commercial thinning. Foraging habitat and nesting/roosting habitat conditions should develop in roughly 80 years and 100+ years respectively.
  - 2 acres high quality NR (4G)
  - 15 acres moderate quality NR (3G)
  - 10 acres F (3N)

- **Downgraded** indicates a temporary reduction (about 30 years) owl nesting/roosting habitat down to foraging habitat resulting from *thinning prescriptions* within existing moderate quality nesting/roosting habitat. There would be a reduction in overall canopy closure from and existing 70-90% down to approximately 40-60% and a reduction in smaller diameter ($\leq$19" diameter at breast height) recruitment snags and logs (live trees that will provide for snags and logs into the future). The retention of large predominant (legacy) conifers, larger snags (>19") and viable hardwoods would maintain snags and decadent conifers large enough to provide owl nest sites and contribute to vertical structure. Visual estimates based upon field reviews indicate that the LRMP S&G of 1.5 snags and 5 tons of course woody material (i.e., logs) would be met at a 40-acre average. Thinning within existing owl foraging habitat would maintain foraging habitat conditions.
  - 275 acres moderate quality NR (3G down to 3N)

- **Degraded** indicates some habitat components (e.g., smaller snags, canopy closure $\geq$ 60%, and vertical structural complexity) may be somewhat reduced but the habitat would continue to function at the current level resulting from *thinning* within high quality NR (4G) and foraging habitat (3N) and *riparian reserve prescriptions* within NRF habitat. The retention of large predominant (legacy) conifers, larger snags (>19") and viable hardwoods would maintain snags and decadent conifers large enough to provide owl nest sites and contribute to vertical structure.

- 59 acres high quality NR (4G)
- 22 acres moderate quality NR (3G)
- 162 acres F (3N)

Long-Term (≥30 years) Effects to NRF Habitat

The thinning (including riparian reserve) prescriptions within existing NRF habitat and other conifer stands not currently NRF (Map 3) would result in a net increase of forest stands with old-growth (NR) characteristics after about 30 years in all four landscapes analyzed (Figures 1-3). For example, in approximately 30 years Alternative 3 would result in a net increase of old-growth to 12.25 percent of FFL in the watershed. Thirty years is used as a temporal timeframe because we expect the original canopy closure to be regained or exceeded by then within thinned areas.

The proposed thinning within the overcrowded conifer stands would improve the health of these forest areas by making more water, nutrients, and sunlight and growing space available to the remaining trees (conifers as well as hardwoods). In addition, the smaller trees that would be removed act as fuel ladders because their crowns are closer to the ground and allow flames to move into the canopy that could lead to loss of NRF habitat. Long-term experience with thinning conifer stands indicates that within about 30 years the thinned (degraded) old-growth would have recovered and thinned late-successional stands (including stands that are currently below owl foraging habitat conditions) would have redeveloped a moderate to dense canopy closure. The conifers would have developed larger, fuller crowns with larger lateral branches. These trees would ultimately provide recruitment for larger snags and logs. Small diameter (<19” dbh) snags and logs would be rare because of the past removal of smaller diameter recruitment trees. Understory hardwoods would have persisted in the stands adding to vertical structural complexity. Most of the preexisting large snags and logs would still be present.

NOTE: The decisions made in the Browns EIS at this time would not dictate ultimate stand development. We anticipate reevaluating the thinned stands in about 30 years.

Table 4. Browns Project Alternative 3 effects (acres) to spotted owl habitat within the Weaverville 5th Field Watershed, the spotted owl "action area" and within the home range and territory of the one known owl activity center (state ID# TR150) that would experience effects to existing habitat.

		Old-Growth (high quality NR habitat)		Dense (3G) Late-Successional (moderate quality NR habitat)		Mod. Dense (3N) Late-Successional (foraging habitat)	
Analysis Area	**Effects to Habitat**	**Existing Available Habitat**	**Acres Affected**	**Existing Available Habitat**	**Acres Affected**	**Existing Available Habitat**	**Acres Affected**
Watershed	Removed	**2,300**	2	**5,131**	15	**3,813**	10
	Downgraded		0		275		0
	Degraded		59		22		162
	TOTAL		61		312		172
Owl Action Area	Removed	**814**	2	**2,136**	15	**527**	10
	Downgraded		0		275		0
	Degraded		59		22		162
	TOTAL		61		312		172
Owl Home Range	Removed	**245**	1	**1,183**	12	**288**	10
	Downgraded		0		222		0
	Degraded		26		18		162
	TOTAL		27		252		172
Owl Territory	Removed	**138**	0	**315**	3	**18**	0
	Downgraded		0		88		4
	Degraded		10		7		1
	TOTAL		10		98		5

Figure 1. Current owl habitat conditions (Alternative 1, no action), conditions from just after implementing Alternative 3 through about 30 years and conditions after about 30 years within the Spotted Owl Action Area. We expect no significant changes in habitat conditions in 30+ years with Alternative 1.

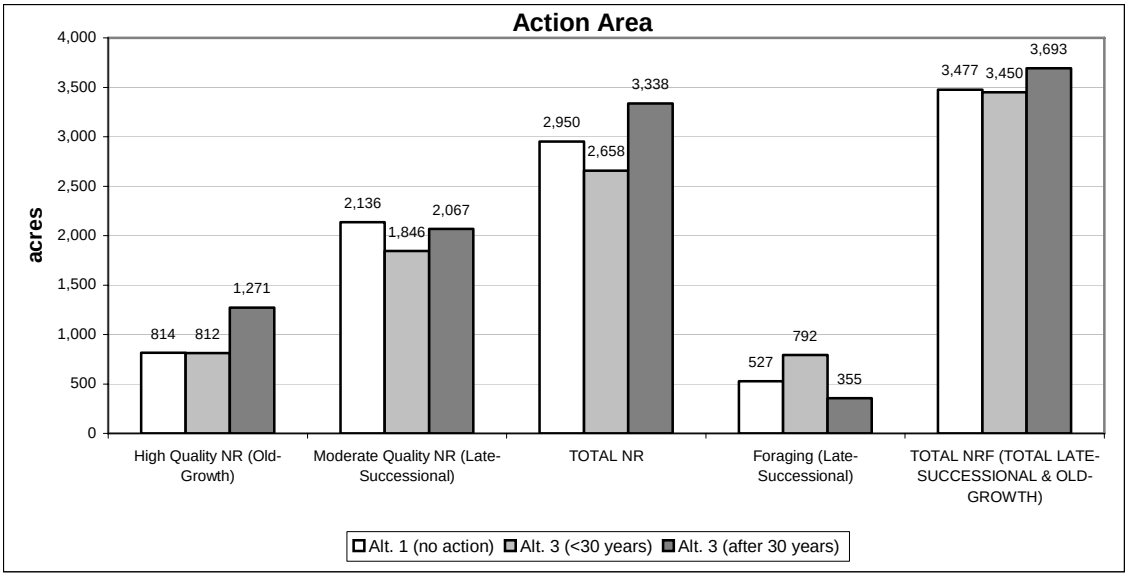


Figure 2. Current owl habitat conditions (Alternative 1, no action), conditions from just after implementing Alternative 3 through about 30 years and conditions after about 30 years within the Spotted Owl Home Range (state ID TR150). We expect no significant changes in habitat conditions in 30+ years with Alternative 1.

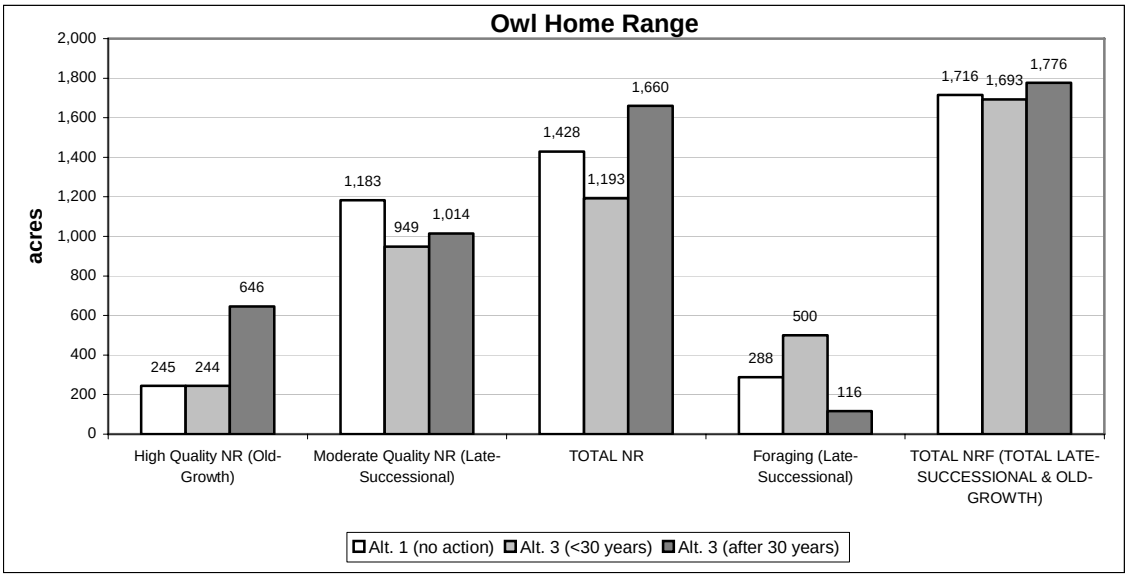
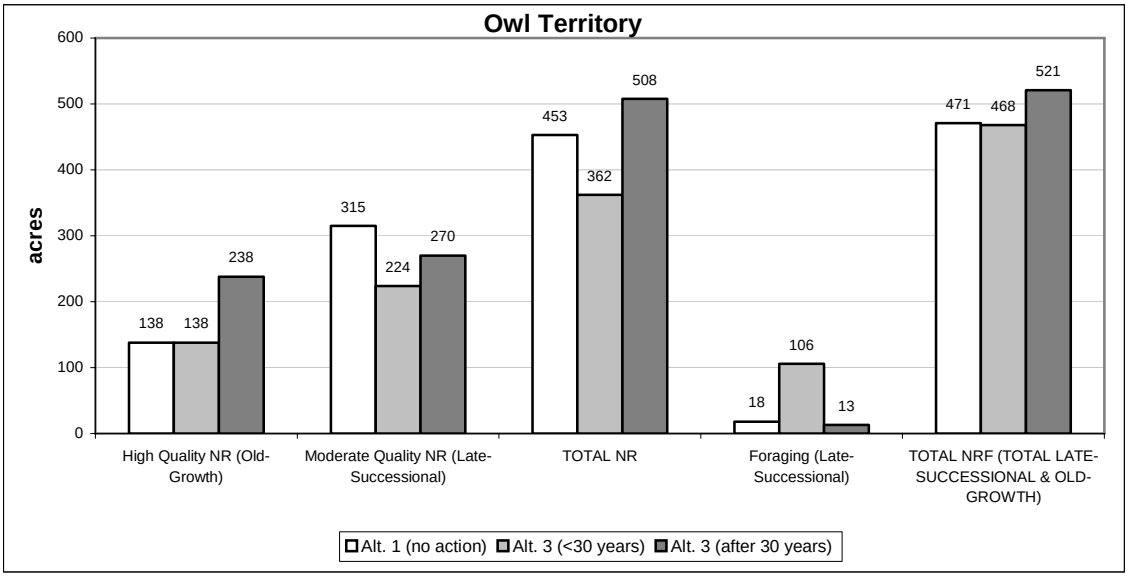


Figure 3. Current owl habitat conditions (Alternative 1, no action), conditions from just after implementing Alternative 3 through about 30 years and conditions after about 30 years within the Spotted Owl Territory (state ID TR150). We expect no significant changes in habitat conditions in 30+ years with Alternative 1.



Competitors & Predators

The probability of predation by great horned owls on spotted owls may be temporarily increased because thinning would provide more open stands that the larger, less maneuverable great horned owl prefers (USDI 1992a).

West Nile Virus

There is no known connection between WNV and forest management practices and there are no known cases of spotted owl mortality due to this disease at this time. Should WNV begin to impact owls in the area, the short-term negative effects related to this project may be compounded.

Cumulative Effects

The 15% document (Attachment 1) presents an analysis of current forest conditions within the Weaverville Watershed (that encompasses the action area) and incorporates past actions that led to those conditions. Mid-mature conifer forest dominates Federal land within the roughly 16,266-acre action area because of historic timber harvest activities and fire. Over time, older conifer forest habitat within the action area will likely be restricted to Federal land (approximately 6,431 acres of NRF and potential/capable habitat). Existing non-conifer areas such as hardwood and shrub dominated habitats and riparian vegetation would remain largely intact on both federal and private lands. The action area includes approximately 8,400 acres of private property that is either intensively managed for timber production or is residential (including the town of Weaverville)(Map 1).

The Browns RAC Categorical Exclusion (CE) Biological Assessment analyzed fuels treatments that lie adjacent to the treatment areas proposed in this EIS. The CE actions have been largely completed. The Red Bluff Fish and Wildlife Service Field Office received the Browns RAC BA on April 21, 2004 and we received the Biological Opinion on April 23, 2004 (refer to 1-12-2004-F-9). Similar fuel treatments are planned for the near future in the action area that would slightly degrade roughly 400 NRF acres.

VII. Determinations

Bald Eagle _____

It is my determination that the proposed actions would have **no effect on the bald eagle** because eagles are not known nor expected to occur within or near the project area.

Northern Spotted Owl _____

It is my determination that the proposed actions **may affect and would likely adversely affect the northern spotted owl** based upon the following rationale: Existing NRF habitat would be reduced, downgraded or degraded in the short-term. The amount and relative quality of NRF habitat would be increased in the long-term (roughly 30 years). Two potential owl pairs may be temporarily ($\leq$30 years) displaced. The probability of large-scale catastrophic loss of owl habitat due to fire would be

reduced. Direct harm or disturbance to breeding activities would be avoided with the LOP. Road decommissioning/obliteration would reduce human (vehicle) disturbance in the action area.

Northern Spotted Owl Critical Habitat _____

It is my determination that the proposed actions **would have no affect designated spotted owl critical habitat** because no designated critical habitat lies within areas proposed for treatment. It is my determination that the proposed actions would have **no effect on the marbled murrelet** or **California red-legged frog** because the project area lies well outside the known or expected ranges of these species.

Marbled Murrelet Critical Habitat _____

It is my determination that the proposed actions would have **no effect on designated marbled murrelet critical habitat** because no designated critical habitat lies within areas proposed for treatment.

VIII. Management Recommendations

None.

IX. Contributors

- Steve Graves, Fuels Officer, Trinity River Management Unit, Shasta-Trinity National Forest.
- Loren Everest, Fishery Biologist, Trinity River Management Unit, Shasta-Trinity National Forest.
- Sam Frink, Silviculturist, Trinity River Management Unit, Shasta-Trinity National Forests.
- Dr. Danielle Chi, Wildlife Biologist, U.S. Fish and Wildlife Service, Red Bluff Field Office.
- Kelly Wolcott, Forest Wildlife Biologist, Shasta-Trinity National Forest.
- Laura Finley, Wildlife Biologist, U.S. Fish and Wildlife Service, Yreka Field Office.

X. Literature

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Appendix D: (part 2): Biological Opinion for the Browns Project Revised Draft Environmental Impact Statement (Alternative 3)

United States Department of Agriculture
Forest Service – Pacific Southwest Region
Trinity River Management Unit
Shasta-Trinity National Forest
Trinity County, California

Prepared by:

Heidi E.D. Crowell
U.S. Fish & Wildlife Service
Contact person, phone (530) 527-3043

Reviewed by:

James G. Smith
U.S. Fish & Wildlife Service
June 7, 2005

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Red Bluff Fish & Wildlife Office
10950 Tyler Road, Red Bluff, California 96080
(530) 527-3043, FAX (530) 529-0292

JUN - 7 2005

In Reply Refer To: 1-12-2005-F-12

J. Sharon Heywood
Forest Supervisor
Shasta-Trinity National Forest
3644 Avtec Parkway
Redding, CA 96002

Subject: Formal Endangered Species Consultation on the Browns Project, Trinity River Management Unit, Shasta-Trinity National Forest

Dear Ms. Heywood:

This correspondence is in reply to your letter, dated April 21, 2005, and received by this office on April 22, 2005, requesting formal consultation on the Browns Project (proposed action), Trinity River Management Unit (TRMU), Shasta-Trinity National Forest (STNF). The attached document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion based on our review of the proposed action and its effects on the Federally threatened northern spotted owl (*Strix occidentalis caurina*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). The biological opinion outlines effects of the proposed action, including our determination that *the proposed action is not likely to jeopardize the continued existence of the northern spotted owl.*

The Service has reviewed the information provided in your biological assessment, and acknowledges the Forest's determination that the proposed action would have *no effect* on the following federally threatened species: bald eagle (*Haliaeetus leucocephalus*), marbled murrelet (*Brachyramphus marmoratus*), and California red-legged frog (*Rana aurora draytoni*). Additionally, the Forest determined the proposed action would have no effect on designated northern spotted owl critical habitat and designated marbled murrelet critical habitat. Therefore, no further action pursuant to the Act is necessary regarding these federally listed entities ***unless new information reveals effects of the proposed action that may affect these species in a manner or to an extent not considered***, or a new species or critical habitat is designated that may be affected by the proposed action.

If you have any questions regarding this letter or the attached biological opinion which addresses effects of the proposed action on the northern spotted owl, please contact Heidi E.D. Crowell of my staff at 530-527-3043.

Sincerely,

James G. Smith
Project Leader

cc: Thomas Quinn, Wildlife Biologist
Trinity River Management Unit, Shasta-Trinity National Forest
P.O. Box 1190
Weaverville Ranger District
Weaverville, CA 96093-1190

Formal Consultation for the Browns Project (1-12-2005-F-12)

Shasta-Trinity National Forest
Trinity River Management Unit

BIOLOGICAL OPINION

Introduction

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) based on our review of the proposed action and its effects on the northern spotted owl (*Strix occidentalis caurina*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

This Biological Opinion (BO) is based on information provided by the following: the Browns Project Biological Assessment (BA) (USDA Forest Service 2005); other documents as referenced; telephone and email correspondence, and a site visit to the project area. Additionally, this BO references information contained in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning documents within the Range of the Northern Spotted Owl (USDA Forest Service and USDI Bureau of Land Management 1994a), A Range-wide Baseline Summary and Evaluation of Data Collected Through Section 7 Consultation for the Northern Spotted Owl and its Critical Habitat: 1994-2001 (USDI Fish and Wildlife Service 2001), and updates to this report conducted as needed by the Service (most recent completed on December, 2004).

Consultation History

Northwest Forest Plan

On October 8, 1993, the Secretaries of Agriculture and Interior (Secretaries) initiated formal consultation on the preferred alternative (Alternative 9) in the Final Supplemental Environmental Impact Statement on Management for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (FSEIS) (USDA Forest Service and USDI Bureau of Land Management 1994b). On February 10, 1994, the Service issued a BO determining that implementation of the preferred alternative was not likely to jeopardize the continued existence or adversely modify critical habitat of any listed species. The Service rendered the BO on Alternative 9 based on the assumption that all proposed projects would be consistent with the Record of Decision (ROD), and noted that all proposed projects conducted pursuant to the FSEIS, that may affect listed species, would be submitted to the Service for section 7 consultation (USDI Fish and Wildlife Service 1994). On April 14, 1994, the Secretaries signed the ROD adopting an amended Alternative 9. The Service subsequently determined that because changes in the amended version of Alternative 9 - herein referred to as the Northwest Forest Plan (NWFP) - were relatively minor, re-initiation of consultation on the ROD was not required. However, the NWFP is programmatic in nature and did not address site-specific activities and their effects on listed species or their designated critical habitats. These specific assessments were deferred to future consultations in which more specific information on baseline conditions and proposed project actions could be incorporated.

Shasta-Trinity National Forest Land and Resource Management Plan

The Service followed up the NWFP range-wide consultation with a consultation addressing the Shasta-Trinity National Forest Land and Resource Management Plan (LRMP)

(USDA Forest Service 1995). The LRMP was prepared to guide natural resource management activities and establish management standards and guidelines for the STNF. On April 26,1995, the Service issued a BO determining that implementation of the LRMP was not likely to jeopardize the continued existence of the northern spotted owl (USDI Fish and Wildlife Service 1995).

Level-One Coordination on the Browns Project

Informal consultation with the Service was initiated in July, 2003. Site visits were made by Service and Forest personnel on July 30, 2003 and March 29, 2004. Several inter-agency meetings and numerous telephone conversations to discuss the project took place between April, 2004 and March, 2005. Early drafts of the BA for the Browns Project were provided by the Forest to the Service for review on July 2 and November 10, 2004, with comments returned by the Service within a week. The Service received the final draft BA on March 3, 2005 for review via email, with comments returned to the Forest on March 9, 2005. See Appendix A for a detailed account of the consultation history for the Browns Project.

The STNF is using a species list obtained from the Fish and Wildlife Service website (http://arcata.fws.gov/specieslist/speciesreport.asp) on February 24, 2005. The STNF has followed processes outlined in the Streamlined Consultation Process and the Service has provided technical expertise where appropriate. A complete administrative record of this consultation is available and on file at the Service's Red Bluff Fish and Wildlife Office in Red Bluff, California.

TABLE OF CONTENTS

1 Description of the Proposed Action

1.1 Project Description

The Browns Project is located northwest of Weaverville in Trinity County, California (see Figure 1). This area occurs within the Weaverville 5th Field Watershed and the California Klamath physiographic province – Eastern Klamath ecozone. The legal locations fall in the Mt. Diablo Meridian within two townships: T34N, R10W, Sections 23 and 24; and, T23N, R9W, Sections 16, 17, 18, 20, 21, 22, 27, 28, 29, 32, 33, and 34. The Browns Project area lies within the Hayfork Adaptive Management Area which serves a role in the overall strategy for maintaining viable populations of species associated with late-successional and old-growth (LSOG) forest ecosystems (as described in the FSEIS, subsequent ROD, and the NWFP). As such, this area serves to provide connectivity between large areas set aside for LSOG species. Approximately 755 acres of designated northern spotted owl critical habitat unit CA-33 (which largely overlays with Late-Successional Reserve RC-334 (Clear Creek)) occur within the action area (see Figure 2). However, none of the proposed actions would occur within the critical habitat unit or the late-successional reserve.

The Trinity River Management Unit is proposing to conduct the Browns Project for the following purposes:

- Improve the resilience and sustainability of the forest;
- Conserve priority watersheds, species, and biodiversity;
- Reduce wildland fire costs, losses, and damages;
- Ensure public and firefighter safety as best as possible; and,
- Maintain or improve water quality for anadromous fish habitat and as a domestic water supply to Weaverville

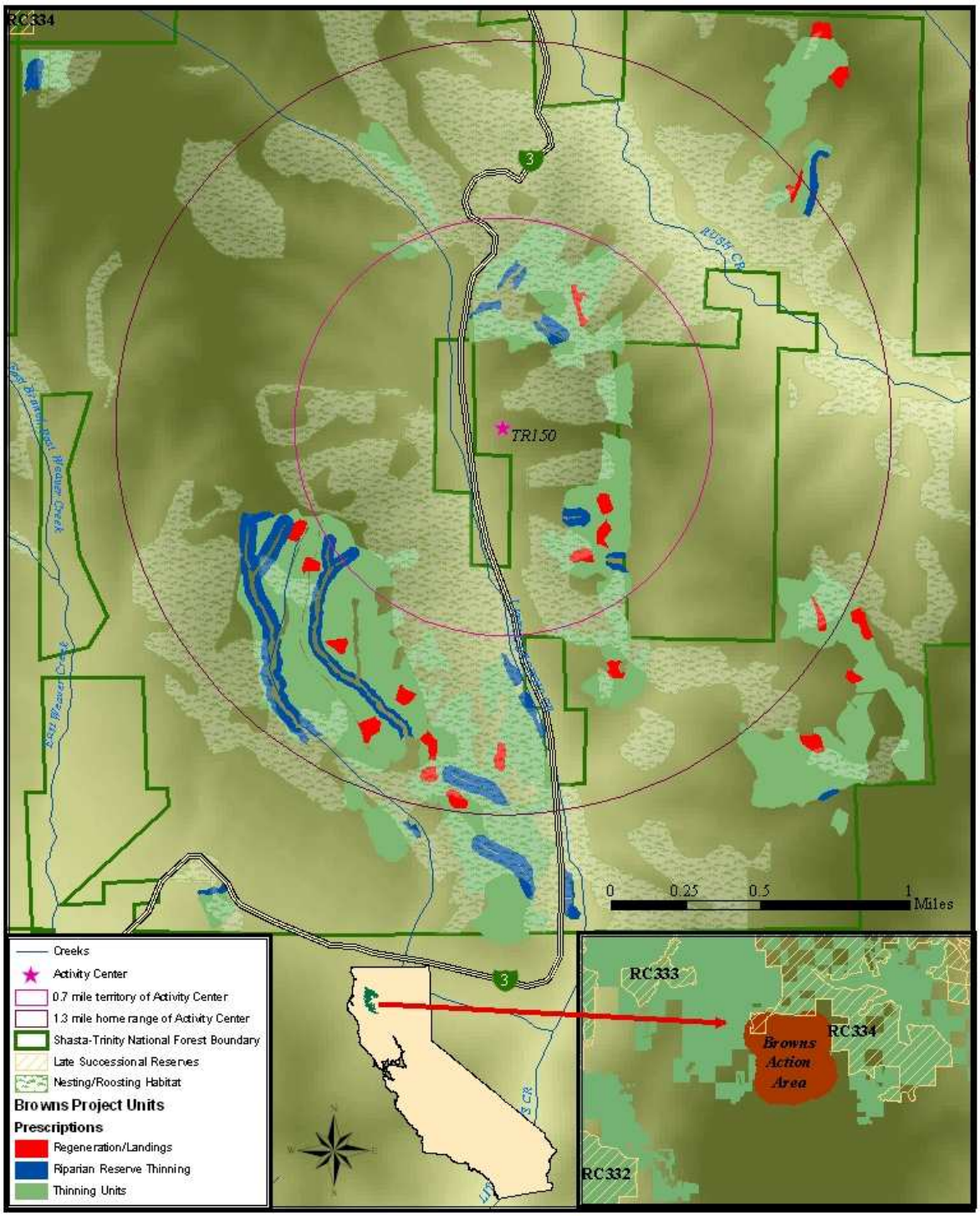
The existing condition class (representing relative risk of intense resource damage from fire) is "Class 3 – relatively high risk" with a lesser portion of "Class 2 – moderate risk". The Forest's desired condition as a result of this project is to move these areas toward "Class 1 – low relative risk".

1.1.1 Mature Conifer Stand Thinning

The project area encompasses 754 acres of mature conifer stands that would be thinned to levels to maintain and enhance growth and vigor of conifer species. However, large predominant conifers[1], snags, and hardwoods would remain in place to provide for wildlife habitat needs. Trees to be removed would be the least vigorous individuals in suppressed, intermediate, and occasionally the codominant crown positions. A combination of activity fuels and natural fuels treatments would follow tree thinning to ensure an improved fuels condition class. Table 1 in the associated BA and Appendix B in this document (and Table 1 in the BA) outlines timber stand and activity fuels treatments per acre, to include yarding, lop and scatter, pile/burn, broadcast burning, dozer lines, and hand lines. Residual crown closure would be 40 to 50 percent in areas with leave trees averaging 24 inches dbh, and 60 to 80 percent in areas with trees over

[1] Predominant conifers are often defined as "legacy trees" that survived the past stand-replacing event (e.g., fire). In the Browns Project area, these trees are generally greater than 40 inches diameter at breast height.

Figure 1. Project and Action area for the Browns Project, Trinity River Management Unit, Shasta-Trinity National Forest.



24 inches dbh. Thinning in the smaller diameter stands would be more aggressive due to smaller conifers responding faster to having increased site resources (e.g., water) available. Additionally, stand densities in riparian reserves would be maintained at a minimum 60 percent canopy closure regardless of tree size.

1.1.2 Group Regeneration Areas

Approximately 39 acres of stands with heavy fuel loadings would be harvested/cleared using a combination of cable and tractor yarding systems, followed by a variety of activity fuels treatments (see Appendix B). These harvest units are located in stands that are currently understocked and where cable harvesting impacts to proposed thinning stands are expected to be greatest. Additionally, these areas would provide landings for handling and storing the fuel material from treatment activities. Following thinning and fuel treatments, these areas would be decompacted[2] and planted with conifers.

1.1.3 Road Construction/Reconstruction

Access to intermediate harvest areas would require approximately 4.6 miles of road construction, 3.6 miles of road reconstruction, and 3.7 miles of temporary road development. Road reconstruction would involve a combination of blading, rocking, or culvert replacement within the confines of the existing disturbed roadbed. Temporary roads would lie within the proposed thinning units with the precise location determined by the sale administrator. Additionally, temporary roads would not cross drainages or Riparian Reserves and would be rehabilitated (see section 1.1.4) after use.

1.1.4 Temporary Road and Landing (Regeneration units) Rehabilitation

Rehabilitation of temporary roads and landing sites is proposed to minimize potential for erosion and to improve site productivity. The "regeneration units" will be subsoiled to a minimum depth of 18 inches when the ground surface is dry to loosen the soil and to attain a permeable soil condition where runoff would not occur. Waterbarring of skid trails would be avoided except on steep sections where there is potential for surface runoff prior to revegetation. Additionally, access to temporary roads would be blocked following subsoiling to prevent further use or damage.

1.1.5 Road Decommissioning/Obliteration

Road decommissioning or obliteration is proposed for approximately 32 miles of existing classified and unclassified roads. This portion of the proposed action is planned to specifically improve water quality using money generated by KV (i.e., funds generated by fuel sold as part of the proposed action), Forest Service engineering and watershed restoration projects, and non-Forest Service sources (e.g., water quality grants). Road decommissioning includes removing culverts, ripping and outsloping road surfaces, and tank trapping. The condition of these decommissioned roads would be monitored long-term to ensure that erosion and mass failure do not occur.

[2] Soil areas used as landings would be decompacted to improve water infiltration, reduce surface runoff, and improve site conditions for growing vegetation. Decompacting involves use of either a ripper (i.e., steel tines that dig into a the ground) or a bladed subsoiler (i.e., tines with "wings" that lift and break up the compacted ground) pulled behind a tractor or dozer.

1.1.6 Conservation Measures

The following interdependent actions will be included in the project design to reduce or avoid impacts to forest resources and wildlife issues:

- Limited Operating Periods (LOPs) would be implemented to avoid direct adverse impacts to northern spotted owls. All noise- and smoke-generating activities would be prohibited within ¼ mile of suitable nesting/roosting habitat between February 1 and July 10. Additionally, all vegetation removal, cutting, or burning would be prohibited through September 15 within suitable nesting/roosting habitat. An LOP may be lifted if specific areas are not occupied by breeding owls as shown through surveys conducted using currently acceptable protocols and mutual consent of the U.S. Fish and Wildlife Service and Forest Service.
- Existing large (i.e., greater than 19 inches diameter at breast height) snags and downed logs would be retained within thinning units. Any snags felled for safety reasons would be left on site as downed woody debris.
- An average of 5 tons of logs per acre would be maintained within the project area.
- All hardwoods that have a reasonable chance of surviving and thriving following stand treatments would be retained.
- Riparian Reserves of intermittent and ephemeral streams that display annual scour would have a minimum 150 foot buffer[3] based on the average maximum height of 200-year-old trees for the site.
- Thinning would occur in Riparian Reserves up to the inner gorge (or to 50 feet from the defined channel if no inner gorge exists) to enhance timber stand health and treat hazardous fuels. Both thinning and fuels treatements would not reduce crown cover below 60 percent in Riparian Reserves.

1.2 Definition of the Action Area

The project action area is defined as all areas to be affected directly or indirectly by the Federal action, including interrelated and interdependent actions, and not merely the immediate area involved in the action (50 CFR §402.02). The action area for the Browns Project includes all lands within a 1.3-mile radius of the project site (i.e., 16,266 total acres (See Maps 1 and 2 in BA). These Federal acres fall south of the Clear Creek LSR, which largely overlays designated spotted owl critical habitat unit CA-33. Approximately 755 acres of critical habitat unit CA-33 lie within the action area, although no actions are proposed to occur within this unit or the Clear Creek LSR. Additionally, the Clear Creek LSR currently harbors "less than desirable habitat conditions", as it was found to not likely support 20 pairs of owls due to current habitat conditions (USDI Fish and Wildlife Service 2000). As such, areas adjacent to this LSR may be important for maintaining owl populations.

[3] Unit 13 has one inner gorge greater than 150 feet from the defined channel that would require a buffer greater tha 150 feet in width.

2 Status of the Species[4] – Northern Spotted Owl

2.1 Legal Status

The spotted owl was listed as threatened on June 26, 1990. It was listed due to widespread habitat loss across the entirety of its range and the inadequacy of existing regulatory mechanisms to provide for its conservation (USDI Fish and Wildlife Service 1990b).

2.2 Life History

The spotted owl is one of three subspecies of spotted owls currently recognized by the American Ornithologists' Union (AOU) and is typically associated with old-growth forested habitats throughout the Pacific Northwest (AOU 1957). The taxonomic separation of these three subspecies is supported by genetic (Barrowclough and Gutiérrez 1990), morphological (Gutiérrez et al. 1995) and biogeographic information (Barrowclough and Gutiérrez 1990). More detailed accounts of the taxonomy, ecology, and reproductive characteristics of the spotted owl are found in the 1987 and 1990 U.S. Fish and Wildlife Service Status Reviews (USDI Fish and Wildlife Service 1987, USDI Fish and Wildlife Service 1990a), the 1989 Status Review Supplement (USDI Fish and Wildlife Service 1989), the Interagency Scientific Committee (ISC) Report (Thomas et al. 1990), the Forest Ecosystem Management Assessment Team (FEMAT) Report (Thomas and Raphael 1993), final rule designating the spotted owl as a threatened species (USDI Fish and Wildlife Service 1990b), and Scientific Evaluation of the Status of the Northern Spotted Owl (Courtney et al. 2004).

2.2.1 Physical Description

The spotted owl is a medium-sized owl, approximately 46-48 cm in length and weighs approximately 490-850 g (Gutiérrez et al. 1995) and is the largest of the three subspecies (Gutiérrez et al. 1995). It is dark brown with a barred tail and white spots on the head and breast, and has dark brown eyes that are surrounded by prominent facial disks. Three age classes can be distinguished on the basis of plumage characteristics (Forsman 1981, Moen et al. 1991). The spotted owl superficially resembles the barred owl (*Strix varia*), a species with which it occasionally hybridizes (Kelly et al. 2003). Hybrids exhibit characteristics of both species (Hamer et al. 1994).

2.2.2 Current and Historical Range

The current range and distribution of the spotted owl extends from southern British Columbia through western Washington, Oregon, and California, as far south as Marin County (USDI Fish and Wildlife Service 1990a). The southeastern boundary of its range is the Pit River area of Shasta County, California. The range of the spotted owl is partitioned into 12 physiographic provinces (provinces), based upon recognized landscape subdivisions exhibiting different physical and environmental features (Thomas et al. 1993). These provinces are distributed across the range as follows: 4 provinces in Washington (Washington Cascades East, Olympic Peninsula, Washington Cascades West, Western Lowlands); 5 provinces in Oregon (Oregon Coast Range, Willamette Valley, Oregon Cascades West, Oregon Cascades East, Klamath Mountains); and 3 provinces in California (California Coast, California Klamath, California Cascades). Although the current range of the spotted owl is similar to its historical range where forested habitat still exists (the distribution is relatively contiguous, but influenced by the natural

[4] The Status of the Species report was last updated by the Coordination Team January 5, 2005.

insularity of habitat patches within geographic province, and by natural and man-caused fragmentation of vegetation), the spotted owl is extirpated or uncommon in certain areas (e.g., southwestern Washington). Timber harvest activities have eliminated, reduced or fragmented spotted owl habitat sufficiently to decrease overall population densities across its range, particularly within the coastal provinces where habitat reduction has been concentrated (Thomas and Raphael 1993).

2.2.3 Behavior

Spotted owls are territorial. However, the fact that home ranges of adjacent pairs overlap (Forsman et al. 1984, Solis and Gutiérrez 1990) suggests that the area defended is smaller than the areas used for foraging. Territorial defense is primarily effected by hooting, barking and whistle type calls.

Spotted owls are monogamous and usually form long-term pair bonds. "Divorces" occur but are relatively uncommon. There are no known examples of polygyny in this owl, although associations of three or more birds have been reported (Gutiérrez et al. 1995).

2.2.4 Habitat Relationships

2.2.4.1 Home Range. Spotted owl home range size varies by province. Home range generally increases from south to north, which is likely in response to decreasing habitat quality (USDI Fish and Wildlife Service 1990a). Home range size was linked to habitat type, availability, and abundance of prey (Zabel et al. 1995).

Based on available radio-telemetry data (Thomas et al. 1990), the Service estimated median annual home range size for the spotted owl by province throughout the range of the spotted owl. Because the actual configuration of the home range is rarely known, the estimated home range of a spotted owl pair is represented by a circle centered upon a spotted owl activity center, with an area approximating the provincial median annual home range. For example, estimated home range area varies from 3,340 acres (based on a 1.3-mile radius area) in California to 14,271 acres (based on a 2.7-mile radius circle) in Washington. The Service uses a 0.7-mile radius circle (984 acres) to delineate the area most heavily used (core area) by spotted owls during the nesting season. Spotted owls in northern California focused their activities in core areas that ranged from about 167 to 454 acres, with a mean of about 409 acres; approximately half the area of the 0.7-mile radius circle (Bingham and Noon 1997). Spotted owls maintain smaller home ranges during the breeding season and often dramatically increase their home range size during fall and winter (Forsman et al. 1984, Sisco 1990).

Although differences exist in natural stand characteristics that influence provincial home range size, habitat loss and forest fragmentation caused by timber harvest effectively reduce habitat quality in the home range. A reduction in the amount of suitable habitat reduces spotted owl abundance and nesting success (Bart and Forsman 1992, Bart 1995).

2.2.4.2 Habitat Use. Forsman et al. (1984) report that spotted owls have been observed in the following forest types: Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), grand fir (*Abies grandis*), white fir (*Abies concolor*), ponderosa pine (*Pinus ponderosa*), Shasta red fir (*Abies magnifica shastensis*), mixed evergreen, mixed conifer

hardwood (Klamath montane) and redwood (*Sequoia sempervirens*). Use of these types coincides with appropriate forest structure (see below). In parts of the Oregon Coast Range, spotted owls have been recorded in pure hardwood stands. In California spotted owls are found from near sea level in coastal forests to approximately 2130 m in the Cascades (Gutiérrez 1996). The upper elevation limits at which spotted owls occur decrease gradually with increasing latitude in Oregon and Washington. In all areas, the upper elevation limit at which spotted owls occur correspond to the transition to subalpine forest, which is characterized by relatively simple structure and sever winter weather (Gutiérrez 1996).

Roost sites selected by spotted owls have more complex vegetation structure than forests generally available to them (Barrows and Barrows 1978, Forsman et al. 1984, Solis and Gutiérrez 1990). These habitats are usually multi-layered forests having high canopy closure and large diameter trees in the overstory.

Spotted owls nest almost exclusively in trees. Like roosts, nest sites are found in forests having complex structure dominated by large diameter trees (Forsman et al. 1984, Hershey et al. 1998). Even in forests that have been previously logged, spotted owls select forests having a structure (i.e., larger trees, greater canopy closure) different than forests generally available to them (Folliard 1993, Buchanan et al. 1995, Hershey et al. 1998).

Foraging habitat is the most variable of all habitats used by territorial spotted owls (Thomas et al. 1990). Descriptions of foraging habitat have ranged from complex structure (Solis and Gutiérrez 1990) to forests with lower canopy closure and smaller trees than forests containing nests or roosts (Gutiérrez 1996).

2.2.4.3 Habitat Selection. Spotted owls generally rely on older forested habitats because they contain the structures and characteristics required for nesting, roosting, foraging, and dispersal. These characteristics of older forests include the following: a multi-layered, multi-species canopy dominated by large overstory trees; moderate to high canopy closure; a high incidence of trees with large cavities and other types of deformities; numerous large snags; an abundance of large, dead wood on the ground; and open space within and below the upper canopy for spotted owls to fly (Thomas et al. 1990, USDI Fish and Wildlife Service 1990a). Forested stands with high canopy closure also provide thermal cover (Weathers et al. 2001), as well as protection from predation. Recent landscape-level analyses suggest that a mosaic of late-successional habitat interspersed with other vegetation types may benefit spotted owls more than large, homogeneous expanses of older forests (Zabel et al. 2003, Franklin et al. 2000, Meyer et al. 1998). In redwood forests along the coast range of California, spotted owls may be found in younger forest stands with structural characteristics of older forests (Thomas et al. 1990). However, spotted owls do not generally appear to select for stands of intermediate or younger ages (Solis and Gutiérrez 1990).

In mixed conifer forests of the Eastern Cascades, Washington, 27 percent of nest sites were in old-growth forests, 57 percent in the understory reinitiation phase of stand development, and 17 percent in the stem exclusion phase (Buchanan et al. 1995). In the Western Cascades, Oregon, 50 percent of spotted owl nests were in late-seral/old-growth stands (> 80-yrs-old) and none were found in stands less than 40-yrs-old (Irwin et al. 2000).

Ward (1990) found spotted owls foraged in areas that had lower variance in prey densities (prey were more predictable in occurrence) within older forests and near ecotones of old forest and brush seral stages. Zabel et al. (1995) showed that spotted owl home ranges are larger where flying squirrels (*Glaucomys sabrinus*) are the predominant prey and, conversely, are smaller where woodrats (*Neotoma spp*.) are the predominant prey.

In the Western Washington Cascades, spotted owls used mature/old forests dominated by trees greater than 50 cm diameter at breast height (dbh) with greater than 60 percent canopy closure more often than expected for roosting during the non-breeding season and used young forest (trees 20-50 cm dbh with > 60% canopy closure) less often than expected based on availability (Herter et al. 2002).

2.2.5 Reproductive Biology

Spotted owls exhibit high adult annual survival rates and are relatively long-lived (USDI Fish and Wildlife Service 1992b). Spotted owls do not typically reach sexual maturity until after 2 years (Thomas et al. 1990). Once an adult, females lay an average of 2 eggs per clutch (range 1-4 eggs), although specific spotted owl pairs do not typically nest every year, nor are nesting pairs successful every year (USDI Fish and Wildlife Service 1990a). The small clutch size, temporal variability in nesting success, and somewhat delayed maturation all contribute to the relatively low fecundity of this species (Gutiérrez 1996).

Nest sites are usually located within stands of old-growth and late-successional forest dominated by Douglas-fir *(Pseudotsuga menziesii*), and they contain structures such as cavities, broken tree tops, or mistletoe (*Arceuthobium* spp.) brooms (Forsman et al. 1984, Blakesley et al. 1992, LaHaye and Gutiérrez 1999). In general, courtship and nesting behavior begins in February to March with nesting occurring from March to June; however, timing of nesting and fledging varies with latitude and elevation (Forsman et al. 1984). After young fledge from the nest, they depend on their parents until they are able to fly and hunt on their own. Parental care continues post-fledging into September (USDI Fish and Wildlife Service 1990b), and sometimes into October (Forsman et al. 1984). During this time the adults may not roost with their young during the day, but they respond to begging vocalizations by bringing food to the young (Forsman et al. 1984).

Some spotted owls are not territorial but either remain as residents within the territory of a pair or move among territories (Gutiérrez 1996). These birds are referred to as “floaters.” Floaters have special significance in spotted owl populations because they may buffer the territorial population from decline (Franklin 1992). Little is known about floaters other than that they exist and typically do not respond to calls as vigorously as territorial birds (Gutiérrez 1996).

2.2.6 Dispersal Biology

Natal dispersal of spotted owls from Oregon and Washington typically begins from mid- to late-September, and it is remarkably synchronous across broad areas (Forsman et al. 2002). When data from many dispersing spotted owls are pooled, the direction of dispersal away from the natal site appears random (Miller 1989, Ganey et al. 1998, Forsman et al. 2002). Dispersal direction from individual territories, however, may be non-random in response to the local distribution of habitat and topography (Forsman et al. 2002). Natal dispersal occurs in stages,

with juvenile spotted owls settling in temporary home ranges between bouts of dispersal (Forsman et al. 2002). Median natal dispersal distance is about 10 miles for males and 15.5 miles for females (Forsman et al. 2002, see also Miller 1989, Ganey et al. 1998). Successful dispersal of juvenile spotted owls may depend on their ability to locate unoccupied suitable habitat in close proximity to other occupied sites (Lahaye et al. 2001).

Breeding dispersal occurs among a small proportion of adult spotted owls; these movements were more frequent among females and unmated individuals (Forsman et al. 2002). Breeding dispersal distances were shorter than natal dispersal distances and also are apparently random in direction (Forsman et al. 2002).

Large non-forested valleys are apparent barriers to natal and breeding dispersal; forested foothills between valleys providing the only opportunities for dispersal (Forsman et al. 2002). The degree to which water bodies, such as the Columbia River and Puget Sound, function as barriers to dispersal is unclear. Analysis of genetic structure of spotted owl populations suggests adequate rates of gene flow may occur between the Olympic Mountains and Washington Cascades (across the Puget Trough) and between the Olympic Mountains and the Coast Range of Oregon (across the Columbia River) (Haig et al. 2001). Both telemetry and genetic studies indicate inbreeding is rare.

Dispersing juvenile spotted owls experience high mortality rates, exceeding 70 percent in some studies (USDI Fish and Wildlife Service 1990b, Miller 1989). Leading known causes of mortality are starvation, predation, and accidents (Miller 1989, USDI Fish and Wildlife Service 1990b, Forsman et al. 2002). Parasitic infection may contribute to these causes of mortality (Forsman et al. 2002). In a study on habitat use by dispersing juvenile spotted owls in the Oregon Coast Range, Klamath and Western Oregon Cascades Provinces (Miller et al. 1997), mature and old-growth forest was used slightly more than expected based on availability during the transience phase and nearly twice its availability during the colonization phase. Closed pole-sapling-sawtimber habitat was used roughly in proportion to availability in both phases; open sapling and clearcuts were used less than expected based on availability during colonization.

2.2.7 Food Habits

Spotted owls are mostly nocturnal (Forsman et al. 1984), but they may forage opportunistically during the day (Laymon 1991, Sovern et al. 1994). Composition of prey in the spotted owl's diet varies regionally, seasonally, annually, and locally, which is likely in response to prey availability (Laymon 1988, Duncan and Sidner 1990, Ganey 1992, Verner et al. 1992, Carey 1993, Ward and Block 1995, Forsman et al. 2001). Northern flying squirrels and woodrats are usually the predominant prey both in biomass and frequency (Barrows 1980; Forsman et al. 1984; Ward 1990; Bevis et al. 1997; Forsman et al. 2001, 2004) with a clear geographic pattern of diet, paralleling differences in habitat (Thomas et al. 1990). Northern flying squirrels are generally the dominant prey item in the more mesic Douglas-fir/western hemlock forests characteristic of the northern portion of the range, whereas woodrats are generally the dominant prey item in the drier mixed conifer/mixed evergreen forests typically found in the southern portion of the range (Forsman et al. 1984, Thomas et al. 1990, Ward et al. 1998, reviewed by Courtney et al. 2004). These prey items were found to be co-dominant in the southwest interior of Oregon (Forsman et al. 2001, 2004).

Other prey species (i.e., red tree vole [*Arborimus longicaudas*], red backed voles [*Clethrionomys gapperi*], mice, rabbits and hares, birds, and insects) may be seasonally or locally important (reviewed by Courtney et al. 2004). For example, Rosenberg et al. (2003) showed a strong correlation between annual reproductive success of spotted owls (number of young per territory) and abundance of deer mice (*Peromyscus maniculatus*) ($r^2 = 0.68$), despite the fact they only made up 1.6 ± 0.5 percent of the biomass consumed. However, it is unclear if the causative factor behind this correlation was prey abundance or a synergistic response to weather (Rosenberg et al. 2003). Nonetheless, spotted owls deliver larger prey to the nest and eat smaller food items to reduce foraging energy costs; therefore, the importance of smaller prey items, like *Peromyscus*, in the spotted owl diet should not be underestimated (Forsman et al. 1984, 2001, 2004).

2.2.8 Population Dynamics

The spotted owl is a relatively long-lived organism; produces few, but large young; invests significantly in parental care; experiences later or delayed maturity; and exhibits high adult survivorship. The spotted owl's long reproductive life span allows for some eventual recruitment of offspring, even if recruitment does not occur each year (Franklin et al. 2000).

Annual variation in population parameters for spotted owls has been linked to environmental influences at various life history stages (Franklin et al. 2000). In coniferous forests, mean fledgling production of the California spotted owl (*Strix occidentalis occidentalis*), another closely related subspecies, was higher when minimum spring temperatures were higher (North et al. 2000), a relationship that may be a function of increased prey availability. Across their range, spotted owls have previously shown a pattern of alternating years of high and low reproduction, with highest reproduction occurring during even-numbered years (e.g., Franklin et al. 1999). Annual variation in breeding may be related to weather conditions and fluctuation in prey abundance (Zabel et al. 1995).

A variety of factors may regulate spotted owl population levels. These factors may be density-dependent (e.g., habitat quality, habitat abundance) or density-independent (e.g., climate). Interactions may occur among factors. For example, as habitat quality decreases, density-independent factors may have more influence on variation in rate of population growth, which tends to increase variation in the rate of growth (Franklin et al. 2000). A consequence of this pattern is that at some point, lower habitat quality may cause the population to be unregulated and decline to extinction (Franklin et al. 2000).

2.3 Threats

2.3.1 Reasons for Listing

The spotted owl was listed as threatened throughout its range "due to loss and adverse modification of suitable habitat as a result of timber harvesting and exacerbated by catastrophic events such as fire, volcanic eruption, and wind storms" (USDI Fish and Wildlife Service 1990a). More specifically, significant threats to the spotted owl included the following: low populations, declining populations, limited habitat, declining habitat, distribution of habitat or populations, isolation of provinces, predation and competition, lack of coordinated conservation measures, and vulnerability to natural disturbance (USDI Fish and Wildlife Service 1992b). These threats were characterized for each province as severe, moderate, low, or unknown.

Declining habitat was recognized as a severe or moderate threat to the spotted owl in all 12 provinces, isolation of provinces within 11 provinces, and declining populations in 10 provinces. Consequently, these three factors represented the greatest concern range-wide to the conservation of the spotted owl. Limited habitat was considered a severe or moderate threat in nine provinces, and low populations a severe or moderate concern in eight provinces, suggesting that these factors are a concern throughout the majority of the range. Vulnerability to natural disturbances was rated as low in five provinces. The degree to which predation and competition might pose a threat to the spotted owl was unknown in more provinces than any of the other threats, indicating a need for additional information. Few empirical studies exist to confirm that habitat fragmentation contributes to increased levels of predation on spotted owls. However, great horned owls (*Bubo virginianus*), an effective predator on spotted owls, are closely associated with fragmented forests, openings, and clearcuts (Johnson 1992, Laidig and Dobkin 1995). As mature forests are harvested, great horned owls may colonize fragmented forests, thereby increasing spotted owl vulnerability to predation.

2.3.2 New Threats

At the time of listing there was recognition that catastrophic wildfire posed a threat to the spotted owl (USDI Fish and Wildlife Service 1990a). New information suggests that fire may be more of a threat than was previously thought. In particular, the rate of habitat loss in the relatively dry East Cascades and Klamath provinces has been greater than expected (see Habitat Trends). Furthermore, we now recognize that our ability to protect spotted owl habitat and viable populations of spotted owls from these large fires through risk-reduction endeavors is largely uncertain (Courtney *et al.* 2004).

Barred Owls

Since listing of the spotted owl, new information suggests that hybridization with the barred owl is less of a threat (Kelly and Forsman 2004) and competition with the barred owl is a greater threat than previously anticipated (Courtney et al. 2004). Since 1990, the barred owl has expanded its range south into Marin County, California and the central Sierra Nevada Mountains, such that it is now roughly coincident with the range of the spotted owl (Courtney et al. 2004). Further, notwithstanding the likely bias in survey methods towards underestimating actual barred owl numbers (Courtney et al. 2004), barred owl populations appear to be increasing throughout the Pacific Northwest, particularly in Washington and Oregon (Zabel et al. 1996, Dark et al. 1998, Wiedemeier and Horton 2000, Kelly et al. 2003, Pearson and Livezey 2003, Anthony et al. 2004). Barred owl numbers now may exceed spotted owl numbers in the northern Washington Cascades (Kuntz and Christopherson 1996) and British Columbia (Dunbar et al. 1991) and appear to be approaching spotted owl numbers in several other areas (e.g., Redwood National and State Parks in California [Schmidt 2003]). Barred owl populations in the Pacific Northwest appear to be self-sustaining, based on current density estimates and apparent distribution (Courtney et al. 2004).

Barred owls apparently compete with spotted owls through a variety of mechanisms: prey overlap (Hamer et al. 2001), habitat overlap (Hamer et al. 1989, Dunbar et al. 1991, Herter and Hicks 2000, Pearson and Livezey 2003), and agonistic encounters (Leskiw and Gutiérrez 1998, Pearson and Livezey 2003). New information on encounters between barred owls and spotted owls comes primarily from anecdotal reports which corroborate initial observations that barred

owls react more aggressively towards spotted owls than the reverse (Courtney et al. 2004). There is also limited circumstantial evidence of barred owl predation on spotted owls (Leskiw and Gutiérrez 1998, Johnston 2002). Information collected to date indicates that encounters between these two species tend to be agonistic in nature, and that the outcome is unlikely to favor the spotted owl (Courtney et al. 2004).

Although barred owls were initially thought to be more closely associated with early successional forests than spotted owls (Hamer 1988, Iverson 1993), recent studies indicate that barred owls are capable of utilizing a broader range of habitat types relative to spotted owls (Courtney et al. 2004). The only study comparing spotted owl and barred owl food habits in the Pacific Northwest indicated that barred owl diets overlapped strongly (>75 percent) with spotted owl diets (Hamer et al. 2001). However, barred owl diets were also more diverse than spotted owl diets, including species associated with riparian and other moist habitats, as well more terrestrial and diurnal species.

Evidence that barred owls are causing the displacement of spotted owls is largely indirect, based primarily on retrospective examination of long-term data collected on spotted owls. Correlations between local spotted owl declines and barred owl increases have been noted in the northern Washington Cascades (Kuntz and Christopherson 1996, Herter and Hicks 2000, Pearson and Livezey 2003), on the Olympic peninsula (Wiedemeier and Horton 2000; Gremel 2000, 2003), in the southern Oregon Cascades (e.g., Crater Lake National Park [Johnston 2002]), and in the coastal redwood zone in California (e.g., Redwood National and State Parks [Schmidt 2003]). Spotted owl occupancy was significantly lower in spotted owl territories where barred owls were detected within 0.8 km (0.5 mi) of the spotted owl territory center than in spotted owl territories where no barred owls were detected (Kelly et al. 2003). Kelly et al. (2003) also found that in spotted owl territories where barred owls were detected, spotted owl occupancy was significantly lower ($P < 0.001$) after barred owls were detected within 0.8 km of the territory center; occupancy was "only marginally lower" ($P = 0.06$) if barred owls were located more than 0.8 km from spotted owl territory centers. In the Roseburg study area, 46 percent of spotted owls moved more than 0.8 km, and 39 percent of spotted owls were not relocated again in at least 2 years after barred owls were detected within 0.8 km of the territory center. Observations provided by Gremel (2000) from the Olympic National Park are consistent with those of Kelly et al. (2003); he documented significant displacement of spotted owls following barred owl detections "coupled with elevational changes of northern spotted owl sites on the east side of the Park" (Courtney et al. 2004). Pearson and Livezey (2003) reported similar findings on the Gifford Pinchot National Forest where unoccupied spotted owl sites were characterized by significantly more barred owl sites within 0.8-km, 1.6-km, and 2.9-km from the territory center than in occupied spotted owl sites.

At two study areas in Washington, investigators found relatively high numbers of territories previously occupied by spotted owls that are now apparently not occupied by either spotted or barred owls (e.g., 49 of 107 territories in the Cascades [Herter and Hicks 2000]; 23 of 33 territories in the Olympic Experimental State Forest [Wiedemeier and Horton 2000]). Given that habitat was still present in these vacant territories, some factor(s) may be reducing habitat suitability or local abundance of both species. For example, weather conditions could cause prolonged declines in abundance of both species (Franklin et al. 2000). Because spotted owls

have been anecdotally reported to give fewer vocalizations when barred owls are present, it is possible that these supposed vacant territories are still occupied by spotted owls that do not respond to surveys. Likewise, survey protocols for spotted owls are believed to under-detect barred owls (Courtney et al. 2004). Thus, some proportion of seemingly vacant territories may be an artifact of reduced detection probability of the survey protocol. Nonetheless, previously occupied territories apparently vacant of both *Strix* species suggests that factors other than barred owls alone are contributing to declines in spotted owl abundance and territorial occupancy (Courtney et al. 2004).

Two studies (Kelly 2001, Anthony et al. 2004) attempted to determine whether barred owls affected fecundity of spotted owls in the long-term demographic study areas. Neither study was able to clearly do so, although the Wenatchee and Olympic demographic study areas showed possible effects (Anthony et al. 2004). However, both studies described the shortfalls of their methods to adequately test for this effect. Iverson (2004) reported no effect of barred owl presence on spotted owl reproduction, but his results could have been influenced by small sample size (Livezey *in review*). Barred owls had a negative effect on spotted owl survival on the Wenatchee and Olympic study areas and possibly an effect on the Cle Elum study area (Anthony et al. 2004). Olson et al. (*in press*) found a significant (but weak) negative effect of barred owl presence on spotted owl reproductive output but not on survival at the Roseburg study area (Courtney et al. 2004).

Regarding interactions between barred and spotted owls, the uncertainties associated with methods, analyses, and possible confounding factors (e.g., effects of past habitat loss, weather) warrant caution in interpretation of the patterns emerging from the data and information collected to date (Courtney et al. 2004). Further, data are currently lacking that would allow accurate prediction of how barred owls will affect spotted owls in the southern, more xeric, portion of the range (i.e., California and Oregon Klamath regions). In spite of these uncertainties, the preponderance of the evidence gathered thus far is consistent with the hypothesis that barred owls are playing some role in spotted owl population decline, particularly in Washington and portions of Oregon and the northern coast of California (Courtney et al. 2004).

Courtney et al. (2004) compared the size differences between barred owls and spotted owls in the Pacific Northwest to size ratios of coexisting *Strix* owl species, including that of the Mexican spotted owl (*Strix occidentalis lucida*) and the barred owl in the southwest U.S. and Mexico. This analysis was conducted to explore the potential for eventual coexistence of, or niche partitioning by, barred owls and spotted owls based primarily on differences in size. Results of this analysis indicated that the difference in size between the spotted owl and barred owl in the Pacific Northwest was only 17.5 percent, lower than ratios calculated for all other assemblages examined. The SEI panel concluded that this difference may be too slight to permit "coexistence by dint of size and size-related ecology alone" (Courtney et al. 2004).

Wildfire

At the time of listing there was recognition that catastrophic wildfire posed a threat to the spotted owl (USDI Fish and Wildlife Service 1990a). New information suggests fire may be more of a threat than previously thought. In particular, the rate of habitat loss in the relatively dry East

Cascades and Klamath provinces has been greater than expected (see Habitat Trends). Furthermore, we now recognize that our ability to protect spotted owl habitat and viable populations of spotted owls from these large fires through risk-reduction endeavors is largely uncertain (Courtney et al. 2004).

In 1994, the Hatchery Complex wildfires burned 17,603 ha in the Wenatchee National Forest, eastern Cascades, Washington, affecting six spotted owl activity centers (Gaines et al. 1997). Spotted owl habitat within a 2.9 km radii of the activity centers was reduced by 8 to 45 percent (mean = 31%) due to direct effects of the fire and by 10 to 85 percent (mean = 55%) due to delayed mortality of fire-damaged trees and insect caused tree mortality. Spotted owl habitat loss was greater on mid to upper slopes (especially south-facing) than within riparian areas or on benches (Gaines et al. 1997). Direct mortality of spotted owls was assumed to have occurred at one site. Data were too sparse for reliable comparisons of site occupancy or reproductive output between sites affected by the fires and other sites on the Wenatchee National Forest.

Two wildfires burned in the Yakama Indian Reservation, eastern Cascades, Washington, in 1994, affecting home ranges of two radio-tagged spotted owls (King et al. 1997). Although the amount of home ranges burned was not quantified, spotted owls were observed using areas that received low and medium intensity burning. No direct mortality of spotted owls was observed even though thick smoke covered several spotted owl site centers for a week.

West Nile Virus

West Nile virus (WNV) has been identified as a potential threat of unknown magnitude to the spotted owl (Courtney et al. 2004). WNV has killed millions of wild birds in North America since it arrived in 1999 (McLean et al. 2001, Caffrey 2003, Marra et al. 2004). Mosquitoes are the primary carriers (vectors) of the virus that causes encephalitis in humans, horses, and birds. Mammalian prey may also play a role in spreading WNV among predators, like spotted owls. Owls and other predators of mice can contract the disease by eating infected prey (Garmendia et al. 2000, Komar et al. 2001). Recent tests of tree squirrels (which includes flying squirrels) from Los Angeles County, California, found over 70 percent were positive for WNV (R. Carney, *pers. comm.* 2004, cited in Courtney et al. 2004). One captive spotted owl in Ontario, Canada, is known to have contracted WNV and died.

Health officials expect that WNV will eventually spread throughout the range of the spotted owl (Courtney et al. 2004), but it is unknown how WNV will ultimately affect spotted owl populations. Susceptibility to infection and mortality rates of infected individuals vary among bird species, even within groups (Courtney et al. 2004). Owls appear to be quite susceptible. For example, breeding screech owls (*Megascops asio*) in Ohio experienced 100 percent mortality (T. Grubb, *pers. comm.*, cited in Courtney et al. 2004). Barred owls, in contrast, showed lower susceptibility (B. Hunter, *pers. comm.*, cited in Courtney et al. 2004). Some level of innate resistance may occur (Fitzgerald et al. 2003), which could explain observations in several species of markedly lower mortality in the second year of exposure to WNV (Caffrey and Peterson 2003). Wild birds also develop resistance to WNV through immune responses (Deubel et al. 2001). The effects of WNV on bird populations at a regional scale have not been large, even for susceptible species (Caffrey and Peterson 2003), perhaps due to the short-term and patchy

distribution of mortality (K. McGowan, *pers. comm.*, cited in Courtney et al. 2004) or annual changes in vector abundance and distribution.

Courtney et al. (2004) offer competing propositions for the likely outcome of spotted owl populations being infected by WNV. One proposition is that spotted owls can tolerate severe, short-term population reductions due to WNV, because spotted owl populations are widely distributed and number in the several hundreds to thousands. An alternative proposition is that WNV will cause unsustainable mortality, due to the frequency and/or magnitude of infection, thereby resulting in long-term population declines and extirpation from parts of the spotted owl's current range.

Sudden Oak Death

Sudden oak death was recently identified as a potential threat to the spotted owl (Courtney et al. 2004). This disease is caused by the fungus-like pathogen, *Phytopthora ramorum,* that was recently introduced from Europe and is rapidly spreading. At the present time, sudden oak death is found in natural stands from Monterey to Humboldt Counties, California, and has reached epidemic proportions in oak (*Quercus* spp.) and tanoak (*Lithocarpus densiflorus*) forests along approximately 300 km of the central and northern California coast (Rizzo et al. 2002). It has also been found near Brookings, Oregon, killing tanoak and causing dieback of closely associated wild rhododendron (*Rhododendron* spp.) and evergreen huckleberry (*Vaccinium ovatum*) (Goheen et al. 2002). It has been found in several different forest types and at elevations from sea level to over 800 m. It poses a threat of uncertain proportion because of its potential impact on forest dynamics and alteration of key habitat components (i.e., hardwood trees); especially in the southern portion of the spotted owl's range (Courtney et al. 2004).

Inbreeding Depression, Genetic Isolation, and Reduced Genetic Diversity

Inbreeding and other genetic problems due to small population sizes were not considered an imminent threat to the spotted owl at the time of listing. Recent studies show no indication of reduced genetic variation and past bottlenecks in Washington, Oregon, or California (Barrowclough et al. 1999, Haig et al. *in press*, Henke et al. *unpublished*). However, in Canada, the breeding population is estimated to be less than 33 pairs and annual population decline may be as high as 35 percent (Harestad 2004). It is possible (but not necessarily the case) that the Canadian populations may be more adversely affected by issues related to small population size including inbreeding depression, genetic isolation, and reduced genetic diversity (Courtney et al. 2004). Low and persistently declining populations throughout the northern portion of the species range (see "Population Trends" below) may be at increased risk of losing genetic diversity.

2.4 Conservation Needs of the Spotted Owl

The conservation needs of the spotted owl address three primary threats: declining populations, declining habitat, and isolation of provinces. These needs are centered on the following biological principles: 1) presence of large blocks of habitat to support clusters or local population centers of spotted owls (e.g., 15 to 20 breeding pairs); 2) habitat conditions and spacing between local populations of spotted owls to facilitate survival and movement; and 3) managing habitat across a variety of ecological conditions within the spotted owl's range to reduce risk of local or widespread extirpation (USDI Fish and Wildlife Service 1992b).

2.5 Conservation Strategy

Since 1990, various efforts have addressed the conservation needs of the spotted owl and attempted to formulate conservation strategies based upon these needs. These efforts began with the ISC's Conservation Strategy (Thomas et al. 1990); they continued with the designation of critical habitat (USDI Fish and Wildlife Service 1992a), the Draft Recovery Plan (USDI Fish and Wildlife Service 1992b), and the Scientific Analysis Team report (Thomas et al. 1993), report of the Forest Ecosystem Management Assessment Team (Thomas and Raphael 1993); and they culminated with the NWFP (USDA Forest Service and USDI Bureau of Land Management 1994a). Each conservation strategy was based upon the reserve design principles first articulated in the ISC's report, which are summarized as follows.

1. Species that are well distributed across their range are less prone to extinction than species confined to small portions of their range.

2. Large blocks of habitat, containing multiple pairs of the species, are superior to small blocks of habitat with only one to a few pairs.

3. Blocks of habitat that are close together are better than blocks far apart.

4. Habitat that occurs in contiguous blocks is better than habitat that is more fragmented.

5. Habitat between blocks is more effective as dispersal habitat if it resembles suitable habitat.

2.5.1 Federal Contribution to Recovery

The NWFP is the current conservation strategy for the spotted owl on Federal lands. It is designed around the conservation needs of the spotted owl and based upon the designation of a variety of land-use allocations whose objectives are either to provide for population clusters (i.e., demographic support) or to maintain connectivity between population clusters. Several land-use allocations are intended to contribute primarily to supporting population clusters: Late-Successional Reserves (LSRs), Managed Late-Successional Areas (MSLAs), Congressionally Reserved Areas (CRAs), Managed Pair Areas and Reserve Pair Areas. The remaining land-use allocations [Matrix, Adaptive Management Areas (AMAs), Riparian Reserves (RRs), Connectivity Blocks, and Administratively Withdrawn Areas (AWAs)] provide connectivity between habitat blocks intended for demographic support.

The range-wide system of LSRs set up under the NWFP captures the variety of ecological conditions within the 12 different provinces to which spotted owls are adapted. This design reduces the potential for extinction due to large catastrophic events in a single province. Multiple, large LSRs in each province reduce the potential that spotted owls will be extirpated in any individual province and reduce the potential that large wildfires or other events will eliminate all habitat within a LSR. In addition, LSRs are generally arranged and spaced so that spotted owls may disperse to two or more adjacent LSRs. This network of reserves reduces the likelihood that catastrophic events will impact habitat connectivity and population dynamics within and between provinces.

Although FEMAT scientists predicted that spotted owl populations would decline in the Matrix over time, populations were expected to stabilize and eventually increase within LSRs, as habitat conditions improved over the next 50 to 100 years (Thomas and Raphael 1993, USDA Forest Service and USDI Bureau of Land Management 1994a and 1994b).

2.5.2 Conservation Efforts on Non-Federal Lands

FEMAT noted that limited Federal ownership in some areas constrained the ability to form an extensive reserve network to meet conservation needs of the spotted owl. Thus, non-Federal lands were an important contribution to the range-wide goal of achieving conservation and recovery of the spotted owl. The Service's primary expectations for private lands are for their contributions to demographic support (pair or cluster protection) to and/or connectivity with NWFP lands. In addition, timber harvest within each state is governed by rules that may provide protection of spotted owls and/or their habitat to varying degrees.

- *Washington*: In 1993, the State Forest Practices Board adopted rules (Forest Practices Board 1996) that would "contribute to conserving the spotted owl and its habitat on non-Federal lands" based on recommendations from a Science Advisory Group which identified important non-Federal lands and recommended roles for those lands in spotted owl conservation (Hanson et al. 1993, Buchanan et al. 1994). Spotted owl-related Habitat Conservation Plans (HCPs) in Washington generally provide both demographic and connectivity support as recommended in these reports and the draft recovery plan (USDI Fish and Wildlife Service1992b).

- *Oregon*: The Oregon Forest Practices Act provides for protection of 70-acre core areas around known spotted owl nest sites, but it does not provide for protection of spotted owl habitat beyond these areas (ODF 2000). In general, no large-scale spotted owl habitat protection strategy or mechanism currently exists for non-Federal lands in Oregon. The four spotted owl-related HCPs currently in effect address relatively few acres of land; however, they will provide some nesting habitat and connectivity over the next few decades.

- *California*: In 1990, State Forest Practice Rules (FPRs), which govern timber harvest on private lands, were amended to require surveys for spotted owls in suitable habitat and to provide protection around activity centers (CDF 2001). Under the FPRs, no timber harvest plan (THP) can be approved if it is likely to result in incidental take of Federally-listed species, unless authorized by a Federal HCP. The California Department of Fish and Game initially reviewed all THPs to ensure that take was not likely to occur; the Service took over that review function in 2000. Several large industrial owners operate under Spotted Owl Management Plans that have been reviewed by the Service; the plans specify basic measures for spotted owl protection. Three HCPs, authorizing take of spotted owls, have been approved. Implementation of these plans will provide for spotted owl demographic and connectivity support to NWFP lands.

2.6 Current Condition

The current condition of the species incorporates the effects of all past human and natural activities or events that have led to the present-day status of the species and its habitat (USDI Fish and Wildlife and USDC National Marine Fisheries Service 1998).

2.6.1 Range-wide Habitat and Population Trends

Habitat Trends. The Service has used information provided by the Forest Service, Bureau of Land Management, and National Park Service to update the habitat baseline conditions on Federal lands for spotted owls on several occasions since the spotted owl was listed in 1990. The estimate of 7.4 million acres used for the NWFP in 1994 (USDA Forest Service and USDI Bureau of Land Management 1994a) was believed to be representative of the general amount of spotted owl habitat on these lands. This baseline was used to track relative changes over time in the subsequently defined analyses. The Service acknowledges that in 2005 a new definition of suitable spotted owl habitat has been proposed and mapped throughout the range of the spotted owl as a result of the NWFP's effectiveness monitoring program (Davis and Lint, *in press*). However, this new habitat map is not yet available for use in tracking individual actions; therefore, the following analyses indicate changes to the baseline condition established in 1994. Additionally, there are no reliable estimates of spotted owl habitat on other land ownerships; consequently, consulted-on acres can be tracked, but not evaluated in the context of change with respect to a reference condition on non-Federal lands.

Range-wide Analysis 1994 – 2001.

In 2001, the Service conducted an assessment of habitat baseline conditions, the first since implementation of the NWFP (USDI Fish and Wildlife Service 2001). This range-wide evaluation of habitat, compared to the FSEIS, was necessary to determine if the rate of potential change to spotted owl habitat was consistent with the change anticipated in the NWFP. In particular, the Service considered habitat effects that were documented through the section 7 consultation process since 1994. In general, the analytical framework of these consultations focused on the reserve or connectivity goals established by the NWFP land-use allocations (USDA Forest Service and USDI Bureau of Land Management 1994a), with effects expressed in terms of changes in suitable spotted owl habitat within those land-use allocations. The Service determined that actions and effects were consistent with the expectations for implementation of the NWFP from 1994 to June, 2001 (USDI Fish and Wildlife Service 2001).

Range-wide Analysis 1994 – 2004 (first decade of the NWFP).

This section updates the information considered in USDI Fish and Wildlife Service (2001), relying particularly on information in documents the Service produced pursuant to section 7 of the Act and information provided by NWFP agencies on habitat loss resulting from natural events (e.g., fires, windthrow, insect and disease).

In 1994, about 7.4 million acres of suitable habitat were estimated to exist on Federal lands (Appendix D; Table 1). As of April 12, 2004, the Service had consulted on the proposed removal of 595,165 acres[5] of spotted owl habitat range-wide (Appendix D; Table 2), of which

[5] This estimate includes values from NSO consultation effects tracker (database) as of 3/12/04 (-591,914 acres) and two other sources of information that had not yet been incorporated into the database: 1) updates to project effects reported by the agencies (+29,500 acres); and 2) effects authorized in the 1-15-03-F-511 BO (-32,751 acres).

189,855 acres[6] occurred on Federal lands managed under the NWFP (Appendix D; Tables 3 and 4). Federal lands were expected to experienced an approximate 2.6 percent decline in suitable habitat due to all management activities (not just timber harvest) over the past decade (based upon Table 4 in Appendix D), with about 167,134 acres[7] (approximately 2.3 percent) being removed from timber harvest (Appendix D; Table 1). These anticipated changes in suitable spotted owl habitat were consistent with the expectations for implementation of the NWFP.

Most management-related habitat loss was concentrated in the Oregon physiographic provinces (Appendix D; Tables 3 and 4). In particular, the percentage of habitat to be removed from the Oregon Klamath Mountains province was relatively high (approximately 10 percent) in comparison to other provinces, most of which were characterized by less than a 4 percent decrease in habitat (based on Table 4 in Appendix D). Habitat removed from the Oregon Klamath Mountains province and the two Oregon Cascades provinces made up 43 percent and 36 percent of the habitat loss range-wide, respectively, since 1994. In summary, habitat loss in Washington accounted for 9.22 percent of the range-wide loss, but it only resulted in a loss of 1.25 percent of available habitat on Federal lands in Washington (Appendix D; Table 3). In Oregon, habitat loss accounted for 74.32 percent of the range-wide losses, but only 3.65 percent of available habitat on Federal lands in Oregon. Loss of habitat on Federal lands in California accounted for 16.47 percent of the losses range-wide, but only 2.52 percent of habitat on Federal lands in California.

Since 1994, habitat lost due to natural events was estimated at approximately 168,301 acres range-wide (Appendix D; Table 4). About two-thirds of this loss was attributed to the Biscuit Fire that burned over 500,000 acres in southwest Oregon (Rogue River basin) and northern California in 2002. This fire resulted in a loss of approximately 113,451 acres of spotted owl habitat, including habitat within five LSRs.

There was little available information regarding spotted owl habitat trends on non-Federal lands. Yet, we do know that internal Service consultations conducted since 1992, have documented the eventual loss of 407,849 acres of habitat on non-Federal lands. Most of these losses have yet to be realized because they are part of large-scale, long-term HCPs.

Since this analysis for the first decade (1994 – 2004) of the NWFP was conducted, the Forest Service and Bureau of Land Management have reported revised estimates of fire impacts and that not all proposed and consulted-on effects occurred on the landscape. Together these reports reduce the anticipated habitat loss since 1994. Therefore the analysis above represents a worst-case assessment. In addition, at the time of this assessment, we had no empirical information on increases in spotted owl habitat (on any ownership) resulting from habitat that had developed through vegetative succession (i.e., ingrowth). The revised 2005 baseline assessment indicates

[6] This estimate includes values from NSO consultation effects tracker (database) as of 3/12/04 (-591,914 acres) and two other sources of information that had not yet been incorporated into the database: 1) updates to project effects reported by the agencies (+29,500 acres); and 2) effects authorized in the 1-15-03-F-511 BO (-32,751 acres).

[7] Includes 164,134 acres as reported in Table 1 of the NSO consultation effects tracker as of 3/12/04 and 3,000 acres of the1-15-03-F-511 BO intended to occur during the first decade that had not yet been entered in the database.

approximately 1 million acres of younger forests may have grew into suitable habitat since 1994 range-wide (Davis and Lint, *in press*).

Range-wide Analysis from 2004 (first decade) to the Present

This section updates the information considered in the first decade of the NWFP (April 13, 1994 – April 12, 2004) to the present writing of this Biological Opinion. In 1994, about 7.4 million acres of suitable habitat were estimated to exist on Federal lands (Appendix D; Table 1). As of April 12, 2004, the Service had consulted on the removal 595,165 acres of spotted owl habitat range-wide (Appendix D; Table 2), of which 189,855 acres occurred on Federal lands managed under the NWFP (Appendix D; Tables 3 and 4). From April 12, 2004, to the present, the Service has consulted on the removal or downgrading of 40,393 acres of spotted owl habitat range-wide on Federal lands managed under the NWFP (Appendix D; Table 5). This amount of habitat loss (1.3 percent) is consistent with the expectations for timber management under the NWFP for the second decade of implementation.

2.6.1.2 *Spotted owl Numbers, Distribution, and Reproduction Trends*.

There are no estimates of the historical population size and distribution of the spotted owl within preferred habitat, although spotted owls are believed to have inhabited most old-growth forests throughout the Pacific Northwest prior to modern settlement (mid-1800s), including northwestern California (USDI Fish and Wildlife Service 1989). According to the final rule listing the spotted owl as threatened (USDI Fish and Wildlife Service 1990a), approximately 90 percent of the roughly 2,000 known spotted owl breeding pairs were located on Federally managed lands, 1.4 percent on State lands, and 6.2 percent on private lands; the percent of spotted owls on private lands in northern California was slightly higher (Forsman et al. 1984, USDA Forest Service 1988, USDI Fish and Wildlife Service 1989, Thomas et al. 1990).

Gutiérrez (1994), using data from 1986-1992, tallied 3,753 known pairs and 980 singles throughout the range of the spotted owl (Appendix D; Table 5). At the time the NWFP was initiated (July 1, 1994), there were 5,431 known locations of, or site centers of spotted owl pairs or resident singles: 851 sites (16 percent) in Washington, 2,893 (53 percent) in Oregon, and 1,687 (31 percent) in California (USDI 1995). The actual population of spotted owls across the range was believed to be larger than either of these counts because some areas were, and remain, unsurveyed (USDI Fish and Wildlife Service 1992b, Thomas et al. 1993).

Because existing survey coverage and effort are insufficient to produce reliable population estimates, researchers use other indices, such as demographic data, to evaluate trends in spotted owl populations. Analysis of demographic data can provide an estimate of the rate and direction of population growth [i.e., lambda (λ)]. A λ of 1.0 indicates a stationary population (i.e., neither increasing nor decreasing), a λ less than 1.0 indicates a declining population, and a λ greater than 1.0 indicates a growing population.

In January 2004, at the spotted owl demographic meta-analysis workshop, two meta-analyses were conducted on the rate of population change using the reparameterized Jolly-Seber method (λ_{RJS}); 1 meta-analysis for all 13 study areas and 1 meta-analysis for the 8 study areas that are part of the Effectiveness Monitoring Program of the NWFP (Anthony et al. 2004). Data were analyzed separately for individual study areas, as well as simultaneously across all study areas

(true meta-analysis). Estimates of λ_{RJS} ranged from 0.896-1.005 for the 13 study areas, and all but 1 (Tyee [TYE]) of the estimates were <1.0 suggesting population declines for most areas (Anthony et al. 2004) (Appendix D; Figure 1). There was strong evidence that populations on the Wenatchee (WEN), Cle Elum (CLE), Warm Springs (WSR), and Simpson (SIM) study areas declined during the study, and there also was evidence that populations on the RAI (Rainer), OLY (Olympic), COA (Oregon Coast Range), and HJA (HJ Andrews) study areas were decreasing (Appendix D; Figure 1). Precision of the λ_{RJS} estimates for RAI and OLY were poor and not sufficient to detect a difference from 1.00. However, the estimate of λ_{RJS} for RAI (0.896) was the lowest of all of the areas. Populations on TYE, KLA (Klamath), CAS (South Oregon Cascades), NWC (NW California), and HUP (Hoopa) appeared to be stationary during the study, but there was some evidence that the CAS, NWC, and HUP were declining (λ_{RJS} <1.00). The weighted mean λ_{RJS} for all of the study areas was 0.963 (SE = 0.009, 95% CI = 0.945-0.981), suggesting that populations over all of the study areas were declining by about 3.7 percent per year from 1985-2003. The mean λ_{RJS} for the 8 demographic monitoring areas on Federal lands was 0.976 (SE = 0.007, 95% CI = 0.962-0.990) and 0.942 (SE = 0.016, 95% CI = 0.910-0.974) for non-Federal lands, an average of 2.4 versus 5.8 percent decline, respectively, per year. This suggests that spotted owl populations on Federal lands had better demographic rates than elsewhere, but interspersion of land ownership on the study areas confounds this analysis.

The number of populations that have declined and the rate at which they have declined are noteworthy, particularly the precipitous declines on the four Washington study areas (WEN, CLE, RAI, OLY) (estimated at 30 to 50 percent population decline over 10 years) and WSR in Oregon (Anthony et al. 2004). Declines in adult survival rates may be an important factor contributing to declining population trends. Survival rates declined over time on 5 of the 14 study areas: 4 study areas in Washington, which showed the sharpest declines, and 1 study area in the Klamath province of northwest California (Anthony et al. 2004). In Oregon, there were no time trends in apparent survival for four of six study areas, and remaining areas had weak non-linear trends. In California, two study areas showed no trend, one showed a slight decline, and one showed a significant linear decline (Anthony et al. 2004). Like the trends in annual rate of population change, trends in adult survival rate showed clear declines in some areas, but not in others.

British Columbia has a small population of spotted owls. This population is relatively isolated and is apparently declining sharply and is absent from large areas of apparently-suitable habitat (Courtney et al. 2004). Breeding populations have been estimated at fewer than 33 pairs and may be declining as much as 35 percent per year (Harestad et al. 2004). The amount of interaction between spotted owls in Canada and the U.S. is unknown (Courtney et al. 2004). The Canadian population has reached the point where it is now vulnerable to stochastic demographic events, that could cause further declines and perhaps extirpation and conditions are not likely to improve in the short term (Courtney et al. 2004, pgs. 3-26 to 3-27).

3 Environmental Baseline for the Browns Project

The environmental baseline is an account of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem within the action area (USDI Fish and Wildlife Service and USDC National Marine Fisheries Service 1998). The environmental baseline represents a "snapshot" in time of the current condition, and provides the context for the analysis of potential effects of the proposed action on the species. As stated in Section 1.2, the action area for the Browns Project consists of approximately 16,266 acres.

3.1 Conservation Needs of the Northern Spotted Owl in the Action Area

The northern portion (i.e., approximately 755 acres) of the action area for the Browns Project fall within the Clear Creek LSR and critical habitat unit CA-33. As such, the LSR's primary purpose with respect to conservation needs of the northern spotted owl is to provide for population clusters of spotted owls (USDA Forest Service and USDI Bureau of Land Management1994a).

3.2 Current condition – Habitat and Population Trends in the Action Area

3.2.1 Habitat Trends

For the purposes of this BO, the following habitat definitions apply (See Appendix C): high quality nesting/roosting (NR) habitat includes those stands that are classified as 4G and 4N; moderate quality NR refers to 3G stands; foraging (F) habitat refers to 3N stands; and, habitat that provides for dispersal only includes 4P/S stands.

The 16,266-acre action area includes approximately 2,950 acres of spotted owl NR habitat, 527 acres of F habitat, with approximately 2,954 acres of Forest Service land capable of growing to at least foraging habitat conditions (See Map 2 of BA). Additionally, approximately 8,400 acres of private land within the action area is either intensively managed for timber production or is residential, to include the city of Weaverville.

Habitat conditions on private property within the action area suggest that northern spotted owls could potentially use small pockets of habitat. However, information revealed in private timber harvest plans and discussions with Fish and Wildlife Service biologists suggest that the majority of areas considered suitable northern spotted owl habitat on private lands within the action area would most often barely qualify as connectivity habitat according to the definitions used in this BO and the associated BA.

3.2.2 Spotted Owl Numbers, Distribution, and Reproduction Trends

Based on the BA, two owl activity centers overlap with the action area. However, one of these (i.e., TR395, last confirmed presence reported in 1998) was not analyzed by the Forest Service because only 2.7 acres of NR habitat would be slightly degraded approximately 1.25 miles from the activity center. Additionally, poor habitat conditions occur between the activity center and the proposed slightly degraded area. Therefore, if northern spotted owls still occupy the area, they likely do not use the habitat that is proposed for degradation. The other owl activity center (i.e., TR150, last confirmed presence reported in 1992) is surrounded on the north, east, and south by proposed stand treatments. However, no actions are proposed within the 138 acres of high-quality NR habitat that lies within the 0.7 mile buffer of the activity center territory (see Map 2 of BA).

No northern spotted owl surveys have been conducted for the Browns Project. Current habitat conditions, owl territoriality, and geographic and topographic features indicate that the action area could harbor one additional northern spotted owl pair, possibly utilizing a block of NR habitat that occurs at the northern boundary of the action area.

4 Effects of the Browns Project

This section presents an analysis of the direct and indirect effects of the Browns Project, including interrelated and interdependent actions, on the northern spotted owl. Implementation of the project as proposed in the BA will involve the following: *timber harvest, fuels treatments, road management (i.e., construction, reconstruction, and obliteration/decommissioning), and temporary road and landing rehabilitation*. The degree to which any of these activities affect the northern spotted owl is presented with respect to modification of suitable habitat, disturbance from human-generated noise, visual stimuli, smoke, and direct injury and/or mortality. Additionally, these effects are then discussed with respect to the conservation needs of the owl within the action area and within the larger conservation strategy established for the owl by the NFWP: 1) protection of large blocks of habitat to provide for clusters of breeding pairs of northern spotted owls; 2) distributed across a variety of ecological conditions; and, 3) connected by habitat within the intervening matrix to support survival and movement across the landscape between reserves.

4.1 Habitat Modification

Forest management activities can modify suitable spotted owl habitat to varying degrees, leading to direct and indirect effects on spotted owls at both site-specific and more landscape-level scales as discussed below.

4.1.1 Scientific Basis for Effects

4.1.1.1 Site-Specific Effects. Forest management activities, whether intended to address silvicultural needs or to facilitate other actions (e.g., mining, recreation, etc.) have the potential to reduce availability of spotted owl nest and roost sites. As reported in Section 2.2.5, spotted owls do not construct their own nests, but depend upon existing structures such as cavities and broken tree tops, characteristics associated with stands in later seral stages of development. Silvicultural prescriptions (e.g., regeneration prescriptions) or management activities that specifically target the oldest, most decadent trees in the stand for economic purposes, or require removal of hazard trees and snags to address human safety concerns, are likely to result in loss of nesting opportunities for spotted owls by removing the trees that contain those structures (Blakesley et al. 1992). Further, prescriptions designed to reduce or remove ladder fuels or release co-dominant individuals can simplify vertical structure in the forest understory, where spotted owls perch for hunting or roosting (Forsman et al. 1984).

Intermediate timber harvest and fuels reduction activities can contribute to changes in structure, diversity, and habitat microclimate by reducing overall canopy closure within a stand. Northern spotted owls prefer to nest and roost in older forests (USDI Fish and Wildlife Service 1990b, Blakesley et al.1992) presumably because they provide protection under most weather conditions (Forsman et al. 1984, North et al. 2000). During periods of rain, snow, or cold, Forsman et al. (1984) found northern spotted owls roosting significantly higher in the forest overstory than

during hot weather, when northern spotted owls were commonly found roosting low in the forest understory. Weathers et al. 2001 documents physiological limitations that corroborate results of laboratory work and field studies which determined low heat tolerance of spotted owls compared to typical birds.

Various forestry activities that remove large trees, snags, and downed wood can affect prey composition and/or availability by altering characteristics of the habitat upon which prey species depend. Because the amount of standing dead (i.e., snags) and down material present on the forest floor is positively correlated with densities of some northern spotted owl prey species, removing these materials or temporarily disturbing material on the forest floor may contribute to declines in northern spotted owl prey, at least on a localized, short-term basis (Williams et al. 1992, Bevis et al. 1997). It may also be possible for prey species to be adversely affected by incidental loss of hardwoods, hazard trees, or snags during harvest. Because availability of large prey species, particularly dusky-footed woodrat and northern flying squirrels, has been shown to be important for spotted owl reproductive success (Barrows 1985, Zabel et al. 1995), activities that reduce prey populations could lower spotted owl recruitment and individual fitness.

4.1.1.2 Landscape-Scale Effects. Any individual or suite of site-specific effects discussed above could change the habitat function that a forested stand provides for owls. For the purpose of the following discussion, the degree of change to habitat function has been categorized using the following terms: removal, downgrade, and degrade. The term *removal* represents a complete loss of habitat function following an effect (i.e., an area that functioned as NR, F, or dispersal habitat for northern spotted owls before the effect, no longer provides any habitat function for spotted owls after the effect). *Downgrade*, a subset of the term *removal*, refers to a reduction in the function of habitat (i.e., an area that functioned as NR habitat before an effect, provides only F or dispersal habitat following the effect). This term could be used also to signify a change in function from foraging to dispersal as well. *Degrade*, to be distinguished from *downgrade*, indicates a reduction in habitat quality, but not habitat function following the effect (i.e., an area that functioned as F habitat prior to the effect, still provides such function after the effect, but perhaps is more limited due to a temporary reduction in prey base).

Landscape-level changes in habitat availability, distribution, and configuration have implications to individual spotted owl survival and productivity, as well as to spotted owl population dynamics. For example, removal or downgrading of habitat within home ranges, and especially close to the nest site, can be expected to have negative effects on northern spotted owls. Bart (1995) reported a linear reduction in northern spotted owl productivity and survivorship as the amount of suitable habitat within a spotted owl home range declined. In northwestern California, Franklin et al. (2000) found that survivorship of adult owls was greater where greater amounts of older forest were present around the activity center, but also found increased reproductive success where the amount of edge between older and younger forest was relatively high. Based on analysis of radio-telemetry data, Bingham and Noon (1997) reported that a sample of spotted owls in northern California focused their activities in heavily-used “core areas” that ranged in size from about 167 to 454 acres, with a mean of about 409 acres. These core areas, which included 60 to 70 percent of the owl telemetry locations during the breeding season, typically comprised only 20 percent of the area of the wider home range. These studies suggest that habitat removal within core areas could have disproportionately important effects on owls. Other

research has demonstrated that spotted owl abundance and productivity significantly decrease when the proportion of suitable habitat within 0.7 miles of an activity center falls below 500 acres (50 percent of the total 1,000 acres within 0.7 miles) (O'Halloran 1989, Simon-Jackson 1989, Thomas et al. 1990).

Timber harvest that produces relatively open stands (less than 40 percent canopy closure) or patch clear-cuts can fragment forest stands, creating more forest edge, and reducing the area of interior old forest habitat (Lehmkuhl and Ruggiero 1991). Habitat fragmentation has the potential to isolate individual owls or populations of owls by increasing distances between suitable habitat patches and reducing habitat connectivity. Such isolation decreases the likelihood of successful dispersal of juvenile owls (Miller 1989), which in turn could reduce opportunities for genetic exchange between owl populations (Barrowclough and Coats 1985).

Currently there is little empirical data confirming that habitat fragmentation contributes to increased levels of predation on northern spotted owls. However, great horned owls (*Bubo virginianus*), an effective predator on spotted owls, are known to be closely associated with fragmented forest habitats (Johnson 1992). As mature forests are harvested, it is possible that great horned owls could colonize the fragmented forest and possibly increase spotted owl vulnerability to predation events.

4.1.2 Habitat Modification Related Effects of the Browns Project

During implementation of the Browns Project, proposed regeneration prescriptions and road construction would result in the complete removal of 2 acres of high quality N/R habitat, 15 acres of moderate quality nesting/roosting habitat, and 10 acres of foraging habitat. Additionally, thinning prescriptions would result in 275 acres of moderate quality N/R habitat that would be downgraded to foraging habitat conditions. Consequently, the proposed action would significantly alter the stand structure and forest microclimate in the project area to the point that remaining vegetation will neither provide appropriate nest and roost sites in those areas, nor the sufficient thermal cover necessary to protect spotted owls from temperature extremes. In areas where habitat is removed, the stands may remain unsuitable for approximately 80 years for foraging habitat conditions and more than 100 years for N/R habitat conditions. In areas where habitat is downgraded to foraging conditions, there would be a reduction in overall canopy closure from the existing 70 to 90 percent down to approximately 40 to 60 percent canopy closure, and a reduction in smaller diameter (i.e., less than or equal to 19 inches diameter at breast height) recruitment snags and logs. The 2 acres of high quality N/R habitat and 15 acres of moderate quality N/R habitat that are proposed for removal occur within northern spotted owl activity center TR150. However, only 3 acres[8] of the moderate quality N/R habitat proposed for removal occur within the 0.7-mile spotted owl territory. No high quality N/R habitat is proposed for removal within the 0.7 mile territory of owl activity center TR150. A total of 244 acres of high quality N/R habitat would be present within the home range (i.e., 1.3 mile buffer around an activity center) post-implementation of the Proposed Action.

[8] The 3 acres of moderate quality N/R habitat represent 1 percent of the total amount of available moderate quality N/R habitat within the activity center territory. Additionally, these 3 acres represent 0.6 percent of the total available high quality N/R habitat (i.e., 138 acres) and moderate quality N/R habitat (i.e., 315 acres) within the activity center territory.

Proposed actions for the Browns Project would result in temporary degradation of 59 acres of high quality old-growth habitat due to road construction and thinning prescriptions. Immediately following project implementation, high quality N/R habitat would comprise 10.19 percent of Federal Forest Service land in the Weaverville 5th Field Watershed, which would result in a reduction of 1.01 percent from the current conditions[9]. However, when moderate quality N/R habitat (i.e., 3N and 3G stands)[10] is included in this scenario, the watershed would contain well above 15 percent late-successional old growth habitat.

Overall short-term effects to northern spotted owl habitat would occur through reduction of overall canopy closure, simplification in vertical structure, a reduction in smaller diameter (i.e., less than 24 inches diameter at breast height) snags and logs, and a reduction in potential nesting opportunities. Proposed actions would affect a total of 545 acres of existing NRF habitat and 251 acres of connectivity habitat. Table 2 outlines effects to acres of northern spotted owl habitat within the Waverville 5th Field Watershed, and the northern spotted owl activity center TR150 "action area", home range, and territory.

Table 2. Browns Project Effects to acres of northern spotted owl N/R and F habitat within the Weaverville 5th Field Watershed, project action area, and Activity Center TR150.

		High Quality N/R Habitat (Old-Growth; 4G and 4N)		**Moderate Quality N/R Habitat (Dense late-successional; 3G)**		**Foraging Habitat (Moderate Density late-successional; 3N)**	
Analysis Area	**Effects to Habitat**	**Existing Available Habitat**	**Acres Affected**	**Existing Available Habitat**	**Acres Affected**	**Existing Available Habitat**	**Acres Affected**
Water-shed	Removed		2		15		10
	Downgraded		0		275		0
	Degraded		59		22		162
	TOTAL	2,300	61	5,131	312	3,813	172
Owl Action Area	Removed		2		15		10
	Downgraded		0		275		0
	Degraded		59		22		162
	TOTAL	814	61	2,136	312	527	172
Owl Home Range	Removed		1		12		10
	Downgraded		0		222		0
	Degraded		26		18		162
	TOTAL	245	27	1,183	252	288	172
Owl Territory	Removed		0		3		0
	Downgraded		0		88		4
	Degraded		10		7		1
	TOTAL	138	10	315	98	18	5

[9] Current N/R habitat conditions within the Weaverville 5th Field Watershed constitute 11.20 percent of Federal Forest Service land.

[10] A discussion of "high quality nesting/roosting habitat" versus "moderate quality nesting/roosting habitat" is provided in Attachment 1 of the Browns Project Biological Assessment (USDA Forest Service 2005).

Removal and downgrading of 277 acres of N/R habitat would increase the amount of edge along adjacent habitat and would slightly reduce habitat availability in the action area. However, a significant amount of suitable N/R habitat would remain intact within the watershed and activity center home range. The effects of the proposed project do constitute an adverse effect to the species because a primary threat to the northern spotted owl is loss of habitat (See section 2.3). Additionally, removal of habitat is expected to occur within the home range and territory of at least one known activity center. Although no northern spotted owls have been recently detected in the project area, implementation of the Browns Project could potentially displace at least two northern spotted owl pairs[11]. However, due to the limited amount of habitat to be removed in the action area (i.e., 27 acres of NRF habitat within a total available 3,477 acres on Federal property), the Service does not expect that this adverse effect will impede the ability of the action area to provide for the intended conservation needs of the owl.

Connectivity habitat within the Browns Project action area appears to be relatively discontinuous according to Forest Service reviews of aerial photographs, habitat mapping, and field visits (USDA Forest Service 2005). This is likely due to a combination of factors, to include intensely managed/harvested private timber industry land, private residential land, and naturally occurring harsh, sparsely vegetated areas. Additionally, an analysis of fire history in the area reveals that the 2001 Oregon fire removed approximately 240 acres of connectivity habitat approximately 3 miles east of the project area. Within the Browns Project area, only regeneration units and road construction would take existing connectivity habitat below 11-40 conditions. However, harvest units are small in size (i.e., 2 acres and approximately 200 feet at their widest) and impacts from road construction would be narrow (i.e., approximately 300 feet wide). Therefore, these impacts would likely not reduce the free movement of northern spotted owls through Forest Service lands within the action area. The proposed thinning prescriptions in mature conifer stands would ultimately produce net increase in high quality N/R habitat in the long-term (i.e., greater than or equal to 30 years; See Figures 1 through 3 in the BA). Unfortunately, existing residential property and removal of spotted owl habitat through continued timber harvesting practices on private property will continue to limit connectivity for northern spotted owls in the action area.

Additional potential adverse effects from competitors and predators may occur from the Browns Project as a result of proposed thinning activities and road construction (USDA Forest Service 2005). The probability of predation by great horned owls may be temporarily increased because thinning and road construction activities would provide more open stands (USDA Forest Service 2005). These open areas are more favorable to the larger, less maneuverable great horned owl.

4.2 Disturbance

4.2.1 Scientific Basis

Removal of forested areas during thinning treatments, regeneration prescriptions, road construction, and road decommissioning would require use of heavy equipment, power tools, chainsaws, and large vehicles - all of which introduce an increased level of sound and human activity into the environment. The effect of sight- and sound-related disturbance on spotted owls is not well studied. Further, the effects of noise on birds can be difficult to establish due to difficulties associated with quantifying and qualifying characteristics of disturbance (i.e., type,

[11] Two pairs of northern spotted owls are expected to be in the project area based on the known presence of at least one owl activity center, and based on the amount of additional unsurveyed high quality N/R habitat present.

frequency, proximity) and appropriate response variables (i.e., behavior, reproductive success, survival). Additional factors increase the complexity of evaluating effects of disturbance such as the individual bird's tolerance level, ambient sound levels, physical parameters of sound and how it reacts with topographic characteristics and vegetation, and differences in how species perceive noise.

In spite of these challenges, research conducted on a variety of bird species does suggest that disturbance can have a negative impact on reproductive success (Tremblay and Ellison 1979, Anderson 1988, Belanger 1989, Piatt et al. 1990, Henson and Grant 1991). Such studies have shown that disturbance can affect productivity in a number of ways including: interference of courtship (Bednarz and Hayden 1988), nest abandonment (White and Thurow 1985), egg and hatchling mortality due to exposure and predation (Drent 1972, Swensen 1979), and altered parental care (Fyfe and Olendorrf 1976, Bortolotti et al. 1984). The few studies that have examined spotted owl responses to several types of disturbance (helicopters, small chainsaw, hikers) suggest that owl behavior can be disrupted by such stimuli as demonstrated by flushing, altered prey delivery rates, and decreased prey handling behavior (Delaney et al. 1999b, Delaney and Grubb 2001, Swarthout and Steidl 2001, Swarthout and Steidl 2003). Further, spotted owls do exhibit indicators of physiological stress (increased corticosteroids) under some environmental conditions (Wasser et al. 1997). However, not surprisingly, these studies also indicate that owl sensitivity varies with stimulus distance, location (aerial or ground), type, and timing, as well as individual tolerance ((Delaney et al. 1999b, Delaney and Grubb 2001, Swarthout and Steidl 2001, Swarthout and Steidl 2003, Tempel and Guitierrez 2003).

4.2.2 Disturbance-Related Effects Resulting from the Browns Project

Although no northern spotted owls have been recently detected within the action area for the Browns Project, thorough protocol-level surveys have not been conducted throughout the area. Noise-related disturbance to any northern spotted owls present is very unlikely and thus discountable because a limited operating period (LOP) is proposed as part of the proposed action. The LOP would prohibit all activities that create loud noise or smoke (e.g., chainsaws, heavy equipment, etc.) within ¼ mile of spotted owl N/R habitat from February 1 through July 10, unless protocol surveys indicate that nesting owls are not present. With implementation of this LOP, adverse effects to owls resulting from continuous loud noise or smoke is very unlikely and thus discountable.

4.3 Direct Injury or Mortality

4.3.1 Scientific Basis

Forest management activities can result in direct mortality of adults, eggs, or young. Such cases are rare, but direct mortality due to tree-felling has been documented (Forsman et al. 2002). The potential for northern spotted owls to be struck and killed or injured by falling trees during harvesting or exposed to high levels of smoke during prescribed burning is confined to the area relatively close to the nest tree. During timber harvest or prescribed burning, individual adult spotted owls can reasonably be expected to move from the area and avoid injury. However, nesting adult spotted owls tenaciously tending to reproductive activities such as incubation or brooding young may be reluctant to leave the area (Delaney et al. 1999a), and therefore may be vulnerable to such injury.

Young-of-the-year, whether in or out of the nest, may also be vulnerable to the effects of tree falling or smoke inhalation, or might disperse prematurely in response to the disturbance and thus be subject to predation or starvation outside of the nest grove. Potential effects to eggs range from the implications of parental abandonment (Drent 1972, Swensen 1979, White and Thurow 1985) to destruction during tree falling. These types of direct effects are only likely in nesting/roosting habitat during the breeding season when active breeding activities are underway.

4.3.2 Direct Injury or Mortality Related to the Browns Project

As stated in section 4.2.2, although no northern spotted owls have been recently detected within the action area for the Browns Project, thorough protocol-level surveys have not been conducted throughout the area. However, an LOP is included as project design criteria that prohibits all activities involving tree-felling or vegetation removal and/or modification in spotted owl N/R habitat from February 1 through September 15 unless protocol surveys indicate that nesting owls are not present (see Section 1.1.3). With implementation of this LOP, the likelihood of direct injury or mortality of owls is very unlikely and thus discountable.

5 Cumulative Effects of the Browns Project

Cumulative effects are those impacts of future State and private actions that are reasonably certain to occur within the area of the action subject to consultation. Future Federal actions will be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed action.

Approximately 52 percent (i.e., approximately 8,400 acres of the 16,266 acre action area) of the land-base within the action area is under private ownership (see Map 1 and 2 in the BA). These areas are private property that is either intensively managed for timber production or is residential, including the city of Weaverville. There are no future Federal actions planned within the action area other than fuel treatments similar to the Browns RAC consultation (reference #1-12-2004-F-9) that was completed on April 23, 2004. However, any future fuel treatments would be evaluated at a later date should they be proposed. Consequently, cumulative effects of the Brown's Project on the northern spotted owl are anticipated to be discountable.

6 Conclusion

Under Section 7(a)(2) of the Act, federal agencies must ensure that activities are not likely to jeopardize the continued existence of any listed species. Regulations implementing this section of the Act define "jeopardize the continued existence of" as: "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (FR §402.02).

After reviewing the current status of the northern spotted owl, the environmental baseline, the effects of the Proposed Action, and the cumulative effects, it is the Service's biological opinion that implementation of the Browns Project discussed herein is not likely to jeopardize the continued existence of the northern spotted owl. The Service reached this conclusion based on following factors:

1. Removal of 2 acres of high quality N/R habitat, 15 acres of moderate quality N/R habitat, and downgrading of 275 acres of moderate quality N/R habitat will not result in a significant decrease (i.e., only 9.9 percent) in habitat availability within the action area[12], and thus is not anticipated to impair the ability of the action area to provide for owl populations.
2. Proposed habitat removal represents an insignificant decrease in suitable spotted owl habitat range-wide, and does not exceed the amount of suitable habitat expected to be harvested during the first decade of NWFP implementation (i.e., 196,000 acres).

The Browns Project is not anticipated to compromise the conservation and recovery strategy established by the NWFP, or contribute to an appreciable reduction in the likelihood of survival and recovery of the northern spotted owl in the wild by reducing the owl numbers, reproduction, or distribution.

[12] A total of 2,950 acres of high and moderate quality N/R habitat exist within the Browns Project action area. High quality habitat constitutes 814 acres and moderate quality habitat constitutes 2,136 acres.

INCIDENTAL TAKE STATEMENT

1 Introduction

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the taking of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined (50 CFR 17.3) by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service (50 CFR 17.3) as actions that create the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the STNF so that they become binding conditions of any grant or permit issued to the (applicant), as appropriate, in order for the exemption in Section 7(o)(2) to apply. The STNF has a continuing duty to regulate the activity covered by this incidental take statement. If the STNF (1) fails to assume and implement the terms and conditions or (2) fails to require any contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the STNF must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50CFR§402.14(I)(3)]**.**

2 Amount or Extent of Take: Northern Spotted Owl

As described in the Section 4 (Effects of the Action) of the BO, the Browns Project will remove and/or downgrade 292 acres of N/R habitat and 10 acres of F habitat. Because protocol-level surveys have not been conducted in the action area to determine an absence of owls, the Service anticipates that the proposed action could incidentally take northern spotted owls. Based upon the quality, quantity, and distribution of habitat within and adjacent to the project area, the Service estimates that the Browns Project area is likely to provide habitat for two pairs of northern spotted owls. Spotted owls within the project area will also experience an increase in predation risk by great horned owls following project completion due to the creation of more open stand conditions. Consequently, the Service authorizes incidental take in the form of harm or harassment of no more than two pairs of northern spotted owls <u>associated with removal of 2 acres of high quality N/R habitat, removal of 15 acres of moderate quality N/R habitat, downgrading of 275 acres of moderate quality N/R habitat, and removal of 10 acres of F habitat.</u> For the purposes of this Incidental Take Statement, the STNF should consider take exceeded if

more northern spotted owl habitat is removed or downgraded than what is indicated above. ***No direct take of owls during the breeding season is authorized.***

Therefore, the requirements for exemption from the taking provisions of section 9 have been met. Any take of northern spotted owls resulting from incomplete compliance with measures described in the project description (Section 1.1) and management requirements is not covered by the exemption.

3 Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the northern spotted owl.

4 Reasonable and Prudent Measures

Pursuant to 50 CFR 402.14 (I) (ii), reasonable and prudent measures are those the Service considers necessary to minimize the impact of the incidental taking. Impacts of the proposed action largely will be minimized by compliance with the NWFP and measures incorporated into the project design, as described in Section 1.1.6. Consequently, no reasonable and prudent measures are necessary.

5 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of ESA, the Forest Service must comply with the following terms and conditions which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary. As mentioned above, the Service considers the measures of the project as described to be sufficient to minimize take of northern spotted owls. Therefore, no terms and conditions are necessary other than those discussed under Monitoring Requirements below.

6 Monitoring Requirements

In order to monitor the impacts of incidental take, the Federal agency or any applicant **MUST** report the progress of the action and its impacts on the species to the Service as specified in the incidental take statement. The reporting requirements are established in accordance with 50 CFR 13.45 and 18.27 and specified as follows:

- Prior to January 31st of each year for the duration of project implementation, the STNF will provide annual monitoring reports of the estimated take that may have occurred in relation to the amount of take that is identified in this Incidental Take Statement. The report must specify whether pre-project surveys were conducted and the results of those surveys. The Service will subtract from the habitat baselines all acres of northern spotted owl habitat identified to be removed in this BO, unless formally adjusted by the STNF in conjunction with the Service at a later date.

7 Reporting Requirements

Any dead or injured northern spotted owls must be reported to the Service's Law Enforcement Division (916- 979-2987) or the Red Bluff Fish and Wildlife Office as soon as possible, and turned over to the Law Enforcement Division or to a game warden or biologist of the California Department of Fish and Game for care or analysis. The Service is to be notified in writing within three working days of the accidental death of, or injury to, a northern spotted owl or of the finding of any dead or injured northern spotted owls during implementation of the proposed action. Notification must include the date, time, and location of the incident or discovery of a dead or injured northern spotted owl, as well as any pertinent information on circumstances surrounding the incident or discovery. The Service contact for this written information is the Project Leader for the Red Bluff Fish and Wildlife Office at (530) 527-3043.

8 Coordination of Incidental Take with Other Laws, Regulations, and Policies

The incidental take statement provided in this opinion satisfies the requirements of the Act. The Fish and Wildlife Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C.§§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species and the ecosystems upon which they depend. Regulations in 50 CFR S.402.02 define conservation recommendations as Service suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, or regarding development of information.

The Service offers to the STNF the following conservation recommendations:

1) Conduct two-year protocol surveys for owls within the project area prior to project implementation to determine whether spotted owls are present.

2) Design future forest management activities to reduce incidental take of spotted owls and impacts to other listed species and their habitat through continued interagency cooperation and planning with the Service.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects, or benefiting listed species or their habitats, the Service requests notification of the implementation of these conservation recommendations.

RE-INITIATION - CLOSING STATEMENT

This concludes formal consultation on this action. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required when discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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APPENDIX A. Detailed Account of the Consultation History for the Browns Project.

July 30, 2003 – D. Chi (Wildlife Biologist, FWS) and T. Quinn (Wildlife Biologist, TRMU, STNF) met in Weaverville to discuss the Browns Project and to visit the project area.

March 25, 2005 – April 18, 2004 – Forest Service proposed to partition out a portion of the Browns Project for separate consultation (i.e., Browns RAK Fuels Project) due to the immediate availability of funding. During this period, the Service met with Forest Service staff to discuss the Browns RAK Fuels Project, to visit the site, and to complete consultation (See BO for Browns RAK Fuels Project on file at the RBFWO).

April 20, 2004 – D. Chi attended an IDT meeting in Weaverville on the Browns Project. Discussion included NEPA alternatives, 2-acre regeneration units that would serve as landings, the condition of the area proposed for landings, thinning prescriptions in Riparian Reserves, and logging methods.

June 18, 2004 – Telephone conversation between T. Quinn and D. Chi discussing the thinning units and the 2-acre regeneration units.

July 2, 2004 – T. Quinn forwarded a draft BA via email to D. Chi for comment.

June 8, 2004 – D. Chi forwarded comments on the Browns Project BA (7/2/04) to T. Quinn.

November 10, 2004 – T. Quinn forwarded second draft BA via email to D. Chi for comment.

November 12, 2004 – D. Chi forwarded comments on second draft of Browns Project BA (Nov. 11/04) to T. Quinn.

March 3, 2005 – T. Quinn forwarded third draft BA via email to D. Chi for comment.

March 9, 2005 – D. Chi contacted J. Johnson (FWS, YFWO) via telephone regarding any known Timber Harvest Plans on private lands for the Weaverville area. She indicated there was the possibility and referred D. Chi to Laura Finley (FWS, YFWO) for more information. D. Chi forwarded a map of the Browns project area to L. Finley for her review.

March 9, 2005 – D. Chi forwarded comments on third draft of Browns Project BA to T. Quinn. These comments reflected concern regarding the potential for cumulative effects given that the Service had been informed of possible timber harvest activity on non-federal lands in the Weaverville vicinity.

March 24, 2005 – Telephone conversations between T. Quinn, L. Finley, and D. Chi regarding cumulative effects for the Browns Project.

March 29, 2005 – D. Chi, K. Wolcott, T. Quinn, L. Finley, and R. Clementsen met in Redding to examine maps of recent and upcoming THPs that fall within the action area for the Browns Project. They also discussed the differences in the habitat conditions and definitions on Federal lands versus private lands. Participants agreed that the analysis would evaluate effects to habitat as well as cumulative effects based on the Forest Service definition of habitat as it appeared better supported in this case.

APPENDIX B. Summary of Timber Stand and Activity Fuels Treatments for the Browns Project.

TIMBER STAND TREATMENT	**Acres**
Mature Stand Thinning	*754*
- tractor yarding	574
- cable yarding	183
Regeneration Harvest[13]	*39*
- tractor yarding	26
- cable yarding	13
TREATMENT OF ACTIVITY FUELS WITHIN TIMBER TREATMENT AREAS[14]	
- whole tree yard (all areas)	793
- lop and scatter	674
- tractor pile/burn	26
- roadside pile/burn	81
- burn concentrations	674
- broadcast burn	13
- dozer line construction (tractor units only)	11
- hand line construction	7

[13] Total of 21 1- to 2-acres group regeneration areas.
[14] Total fuels treatment exceeds the harvest acres because more than one treatment may occur on the same acre.

APPENDIX C. Shasta-Trinity Timber and Successional Strata Definitions[15].

Table 1. Timber strata definitions used in reference to northern spotted owl habitat determinations. DBH refers to 'diameter at breast height'.

Size Class Definitions		Density class Definitions	
1	1 to 5.9 inches dbh.	S	10 to 19% canopy closure
2	6 to 12.9 inches dbh	P	20 to 39% canopy closure
3	13 to 24.9 inches dbh	N	40 to 69% canopy closure
4	25 to 40.0 inches dbh	G	> or equal to 70% canopy closure
5	> 40 inches dbh	6	two-storied stands

Table 2. Successional stage stratification based upon forest timber type.

Type	Description
Late-successional/Dense	4N, 4G, 5N, 5G: primarily commercial conifer forest. Includes 4P and 5P stands if they contain conifers as a primary component and conifers or black oak as a secondary component.
Late-successional/open	4S, 4P (except as noted above), 5S, 5P (except as noted above): primarily commercial conifer forest.
Mid-successional/dense	3N, 3G, 6 stands: primarily commercial conifer forest. Includes 3P stands if they contain conifers as a primary component and conifers or black oak as a secondary component.
Mid-successional/open	3S, 3P (excepted as noted above): primarily commercial conifer forest.
Early-successional/poles and saplings	2N, 2G and plantations older than 20 yrs: primarily commercial conifer forest. Includes 2S and 2P stands if they contain conifers as a primary and secondary component.
Early-successional/seedlings	1N, 1G and plantations younger than 20 yrs: primarily commercial conifer forest. Includes 1S and 1P stands if they contain conifers as a primary and secondary component.
Other	Includes hardwood stands, non-commerical conifer stands, early-successional S and P stands with conifers as a primary component and hardwoods as a secondary component with shrubs and grasses.

[15] Source: Forest-wide LSR Assessment, Shasta-Trinity National Forest, 1999.

APPENDIX D. Tables and Figure for the Northern Spotted Owl Status of the Species.

Table 1: Aggregate results of all adjusted, suitable habitat (NRF[1]) acres on Northwest Forest Plan (NWFP) lands; range-wide changes by land use allocations from 1994 to March 12, 2004.

	Reserves[2]			Non-reserves[3]			
	LSR	**MLSA**	**CRA**	**AWA**	**AMA**	**Matrix**	**TOTALS**
Evaluation Baseline[4]	3227014	28900	1638652	300219	364268	1838045	7397098
Removed/Downgraded (timber harvest only)[5]	6404	1109	30	749	14510	141332	164134
Removed/Downgraded (all other activities)[6]	1532	0	908	54	458	19518	22470
Consultation Subtotal	7936	1109	938	803	14968	160850	186604
Removed/Downgraded (natural disturbance)[7]	0	0	1861	22	0	2087	3970
Net Changes from Land Exchanges and Ownership Transfers	0	0	0	0	0	0	0
Other Activities Subtotal	0	0	1861	22	0	2087	3970
Total Net Change	7936	1109	2799	825	14968	162937	190574
BASELINE BALANCE[8]	3219078	27791	1635853	299394	349300	1675108	7206524
Degraded[9]	21205	178	2861	410	9350	419374	453378

[1] Nesting, roosting, foraging (NRF) habitat. In California, suitable habitat is divided into two components; nesting-roosting (NR) habitat, and foraging (F) habitat. The NR component most closely resembles NRF habitat in Oregon and Washington. Due to differences in reporting methods, effects to suitable habitat compiled in this, and all subsequent tables include effects for nesting, roosting, and foraging (NRF) for 1994-6/26/2001. After 6/26/2001, suitable habitat includes NRF for Washington and Oregon but only nesting and roosting (NR) for California.

[2] Land-use allocations intended to provide large blocks of habitat to support clusters of breeding pairs.

[3] Land-use allocations intended to provide habitat to support movement of spotted owls among reserves.

[4] 1994 FSEIS baseline (USDA and USDI 1994b).

[5] Includes both effects reported by USFWS (2001) and subsequent effects compiled in the Spotted owl Consultation Effects Tracker (web application and database). Total effects from the timber sale program, presented in the right column, is the value to contrast with the expectation that NWFP implementation would result in removal of 196,000 acres of NRF habitat per decade.

[6] Includes NRF habitat effects from recreation, roads, minerals, and other non-timber programs of work.

[7] Includes effects to NRF habitat resulting from wildfires (not from suppression efforts), insect and disease outbreaks, and other natural causes.

[8] Calculated as (evaluation baseline) – [(total consulted-on changes) + (removed/downgraded as documented through TA process)].

[9] Degraded habitat means that function remains the same, but quality is reduced.

Appendix D, continued

Table 2: Changes to NRF[1] habitat acres from activities subject to section 7 consultations and other causes range-wide from 1994 to March 12, 2004.

Northwest Forest Plan Group / Ownership		Consulted On Habitat Changes[2]		Other Habitat Changes[3]	
		Removed/ Downgraded	Degraded	Removed/ Downgraded	Degraded
Federal - Northwest Forest Plan (NWFP)	Bureau of Land Management	71053	7318	0	0
	Forest Service	99468	419862	3970	3492
	National Park Service	908	2861	0	0
	Multi-agency[4]	15175	23314	0	0
	NWFP Subtotal	186604	453355	3970	3492
Other Management and Conservation Plans	Bureau of Indian Affairs and Tribes	98857	21351	0	0
	Habitat Conservation Plans	295889	14430	0	0
	OMCP Subtotal	394746	35781	0	0
Other Federal Agencies & Lands[5]		241	434	28	70
Other Public & Private Lands[6]		10323	878	30240	20949
TOTAL Changes		591914	490448	34238	24511

[1] Nesting, roosting, foraging habitat. In California, suitable habitat is divided into two components; nesting – roosting (NR) habitat, and foraging (F) habitat. The NR component most closely resembles NRF habitat in Oregon and Washington. Due to differences in reporting methods, effects to suitable habitat compiled in this, and all subsequent tables include effects for nesting, roosting, and foraging (NRF) for 1994-6/26/2001. After 6/26/2001, suitable habitat includes NRF for Washington and Oregon but only nesting and roosting (NR) for California.

[2] Includes both effects reported by USFWS (2001) and subsequent effects compiled in the Spotted owl Consultation Effects Tracker (web application and database).

[3] Includes effects to NRF habitat (as documented through technical assistance) resulting from wildfires (not from suppression efforts), insect and disease outbreaks, and other natural causes, private timber harvest, and land exchanges not associated with consultation. Information from all fires occurring since 1994 is not yet available for entry into the database and thus is not included here but is compiled in Table 4.

[4] The 'Multi-agency' grouping is used to lump a variety of NWFP mixed agency or admin unit consultations that were reported together prior to 6/26/2001, and cannot be split out.

[5] Includes lands that are owned or managed by other Federal agencies not included in the NWFP.~~,~~

[6] Includes lands not covered by Habitat Conservation Plans that are owned or managed by states, counties, municipalities, and private entities. Effects that occurred on private lands from right-of-way permits across Forest Service and BLM lands are included here.

Appendix D, continued

Table 3: Aggregate results of all adjusted, suitable habitat (NRF[1]) acres affected by section 7 consultation for the northern spotted owl; baseline and summary of effects by State, physiographic province and land use function from 1994 to March 12, 2004 (the first decade of the Northwest Forest Plan).

Physiographic Province[4]		Evaluation Baseline[2]			Habitat Removed/Downgraded[3]			% Provincial Baseline Affected	% Range-wide Affected
		Reserves[5]	Non-Reserves[6]	Total	Reserves[5]	Non-Reserves[6]	Total		
WA	Olympic Peninsula	548483	11734	560217	63	24	87	0.02	0.05
	Eastern Cascades	506340	200509	706849	1745	4222	5967	0.84	3.20
	Western Cascades	864683	247797	1112480	249	10890	11139	1.00	5.97
	Western Lowlands	0	0	0	0	0	0	0.00	0.00
OR	Coast Range	422387	94190	516577	279	3954	4233	0.82	2.27
	Klamath Mountains	448509	337789	786298	1357	66605	67962	8.64	36.42
	Cascades East	247624	196035	443659	1813	12216	14029	3.16	7.52
	Cascades West	1012426	1033337	2045763	2826	49633	52459	2.56	28.11
	Willamette Valley	593	5065	5658	0	0	0	0.00	0.00
CA	Coast	47566	3928	51494	181	69	250	0.49	0.13
	Cascades	61852	26385	88237	0	5200	5200	5.89	2.79
	Klamath	734103	345763	1079866	1470	23808	25278	2.34	13.55
Total		4894566	2502532	7397098	9983	176621	186604	2.52	100.00

[1] Nesting, roosting, foraging habitat. In California, suitable habitat is divided into two components; nesting – roosting (NR) habitat, and foraging (F) habitat. The NR component most closely resembles NRF habitat in Oregon and Washington. Due to differences in reporting methods, effects to suitable habitat compiled in this, and all subsequent tables include effects for nesting, roosting, and foraging (NRF) for 1994-6/26/2001. After 6/26/2001, suitable habitat includes NRF for Washington and Oregon but only nesting and roosting (NR) for California.

[2] 1994 FSEIS baseline (USDA and USDI 1994).

[3] Includes both effects reported by USFWS (2001) and subsequent effects compiled in the Northern Spotted Owl Consultation Effects Tracking System (web application and database).

[4] Defined by the NWFP as the twelve physiographic provinces, as presented in Figure 3&4-1 on page 3&4-16 of the FSEIS.

[5] Land-use allocations intended to provide large blocks of habitat to support clusters of breeding pairs

[6] Land-use allocations intended to provide habitat to support movement of spotted owls among reserves.

Appendix D, continued

Table 4: Change in suitable spotted owl habitat from 1994 to March 12, 2004, resulting from Federal management actions and natural events by physiographic province.

Physiographic Province	Forest Plan baseline	CAUSES OF HABITAT LOSS		TOTAL	% change in Province	% of Total Effects
		Mgmt[1]	Natural Events[2]			
Olympic Peninsula	560,217	-87	-299	-386	-.07	0.09
WA East Cascades	706,849	-5,967	-5,754	-11,721	-1.66	2.83
WA West Cascades	1,112,480	-11,139	0	-11,389	-1.02	2.75
Western Lowlands	0	0	0	0	0	0
OR Coast	516,577	-3,278	-66	-3,344	-0.65	0.81
OR Klamath Mountains	786,298	-82,286	-117,622	-199,908	-25.42	48.30
OR Cascades East	443,659	-14,029	-4,008	-73,037	-16.46	17.65
OR Cascades West	2,045,763	-55,055	-24,583	-79,638	-3.89	19.24
Willamette Valley	5,658	0	0	0	0	0
CA Coast	51,494	-250	-100	-350	-0.68	0.08
CA Cascades	88,237	-5,091	0	-5,091	-5.77	1.23
CA Klamath	1,079,866	-12,673	-15,869	-29,032	-2.69	7.01
TOTAL	7,397,098	-189,855	-168,301	-413,896	-5.60	100

[1] Includes 3/12/04 estimates from the NSO consultation effects tracker, and updates to projects submitted by the Federal action agencies and effects reported in the 1-15-03-F-511 Biological Opinion, neither of which have been entered into the NSO consultation effects tracker.

[2] Fires occurring in 2003 were not included here as the data were not yet available.

Appendix D, continued

Table 5: Suitable (NRF[1]) habitat loss on Federal lands from proposed management activities during the second decade (2004 - 2014) of the NWFP and natural events. Baseline and summary of effects by State, physiographic province and land use function from April 12, 2004 to the present.

Physiographic Province[4]		Evaluation Baseline[2]			Habitat Removed/Downgraded[3]			% Provincial Baseline Affected	% Range-wide Affected
		Reserves[5]	Non-Reserves[6]	Total	Reserves[5]	Non-Reserves[6]	Total		
WA	Olympic Peninsula	548483	11734	560217	0	-59	-59	-0.03	0.15
	Eastern Cascades	506340	200509	706849	-1	-4435	-4436	-1.36	10.98
	Western Cascades	864683	247797	1112480	0	-4749	-4749	-0.92	11.76
	Western Lowlands	0	0	0	0	0	0	0.00	0.00
OR	Coast Range	422387	94190	516577	-35	-615	-650	-0.19	1.61
	Klamath Mountains	448509	337789	786298	-4	-11161	-11165	-3.56	27.64
	Cascades East	247624	196035	443659	0	-972	-972	-0.70	2.41
	Cascades West	1012426	1033337	2045763	-100	-16996	-17096	-1.91	42.32
	Willamette Valley	593	5065	5658	0	0	0	0.00	0.00
CA	Coast	47566	3928	51494	0	0	0	0.00	0.00
	Cascades	61852	26385	88237	0	-472	-472	-0.93	1.17
	Klamath	734103	345763	1079866	0	-794	-794	-0.22	1.97
Total		4894566	2502532	7397098	-140	-40253	-40393	-1.29	100.00

[1] Nesting, roosting, foraging habitat. In California, suitable habitat is divided into two components; nesting – roosting (NR) habitat, and foraging (F) habitat. The NR component most closely resembles NRF habitat in Oregon and Washington. Due to differences in reporting methods, effects to suitable habitat compiled in this, and all subsequent tables include effects for nesting, roosting, and foraging (NRF) for 1994-6/26/2001. After 6/26/2001, suitable habitat includes NRF for Washington and Oregon but only nesting and roosting (NR) for California.

[2] 1994 FSEIS baseline (USDA and USDI 1994).

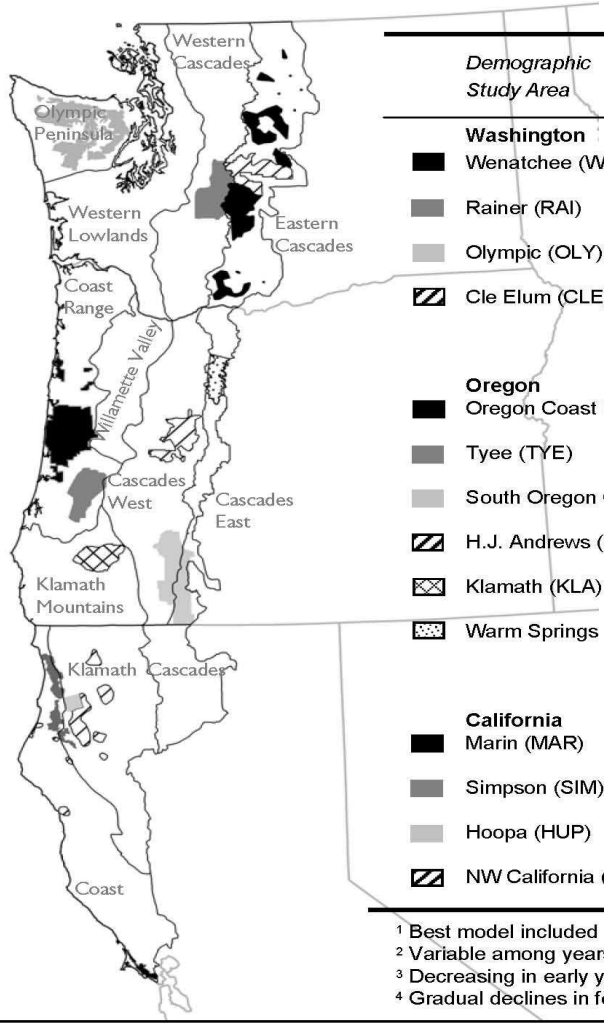
[3] Includes effects compiled in the Northern Spotted Owl Consultation Effects Tracking System (web application and database) from April 2004 to the present.

[4] Defined by the NWFP as the twelve physiographic provinces, as presented in Figure 3&4-1 on page 3&4-16 of the FSEIS.

[5] Land-use allocations intended to provide large blocks of habitat to support clusters of breeding pairs

[6] Land-use allocations intended to provide habitat to support movement of spotted owls among reserves

Appendix D, continued



Demographic Study Area	Land Ownership	# Owls Banded	Fecundity	Apparent Survival	λ_{RJS}	Population Trend Based on $\Delta\lambda$
Washington						
Wenatchee (WEN)	Private	1,200	Stable	Declining	0.917	Declining
Rainer (RAI)	USFS	217	Stable	Declining	0.896	Declining
Olympic (OLY)	NPS & USFS	985	Stable	Declining	0.956	Declining
Cle Elum (CLE)	USFS	724	Declining[1]	Declining?[2]	0.938	Declining
Oregon						
Oregon Coast Range (COA)	USFS & BLM	1,025	Declining?[1]	Stable	0.968	Declining
Tyee (TYE)	BLM & Private	1,032	Increasing	Stable	1.005	Stationary
South Oregon Cascades (CAS)	USFS & BLM	881	Declining	Stable	0.974	Stationary
H.J. Andrews (HJA)	USFS	1,095	Stable?[3]	Stable	0.978	Declining
Klamath (KLA)	BLM & Private	1,147	Stable	Stable	0.997	Stationary
Warm Springs (WSR)	Tribal	381	Stable	Stable	0.908	Declining
California						
Marin (MAR)	NPS	96	Stable	Stable	NA	NA
Simpson (SIM)	Private	1,344	Declining[1]	Stable	0.970	Declining
Hoopa (HUP)	Tribal	279	Increasing	Stable	0.980	Stationary
NW California (NWC)	USFS	1,026	Declining	Declining	0.985	Declining?[4]

[1] Best model included age and even-odd year effects, but a competing model had a negative time effect on productivity.
[2] Variable among years, but with a declining trend.
[3] Decreasing in early years, increase in last 5 years, stable overall.
[4] Gradual declines in fecundity and apparent survival, plus estimates of realized population change suggest a decline in last 8 years.

Figure 1. Physiographic provinces, northern spotted owl demographic study areas, and demographic trends (Anthony *et al.* 2004).