EDDY GULCH LATE-SUCCESSIONAL RESERVE FUELS / HABITAT PROTECTION PROJECT

WILDLIFE AND HABITAT REPORT

Prepared by
Brian Williams and Stephanie Martin

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1.1 Introduction

This section covers all wildlife species of special interest and their habitat that would potentially be affected by the Eddy Gulch Late-Successional Reserve (LSR) Project. The Eddy Gulch LSR Project is an ecosystem-based approach for maintaining and conserving late-successional forest ecosystems, which serve as habitat for late-successional-forest dependent species. This resource report discloses potential effects on species of special interest that occur in the project Assessment Area, the most notable is the northern spotted owl (NSO) and its designated Critical Habitat protected through the *Endangered Species Act* (ESA). Additional species that are addressed in the document include species listed as Sensitive by Region 5 of the Forest Service, Survey and Manage (S&M) Species under the Northwest Forest Plan (NWFP), and Management Indicator Species (MIS) designated in the Klamath National Forest Land and Resource Management Plan (Klamath LRMP).

1.1.1 Project Location

The Eddy Gulch LSR Project Assessment Area is located on the Salmon River and Scott River Ranger Districts, Klamath National Forest, in southwestern Siskiyou County. The LSR is located mostly west of Etna Summit, south of North Russian Creek and the town of Sawyers Bar, east of Forks of Salmon, and north of Cecilville. The LSR is about 61,900 acres in size, making it one of the largest LSRs on the Klamath National Forest. The LSR encompasses much of the area between the North and South Forks of the Salmon River, as well as headwaters of Etna Creek. Elevations range from 1,100 feet to about 8,000 feet. The terrain is generally steep and dissected by sharp ridges and streams. There are a few private inholdings in the LSR and along the main Salmon River and other stream corridors adjacent to the LSR.

The legal description for the Eddy Gulch LSR includes the following (all Mount Diablo Meridian):

T38N, R11W, Sections 2–5, 8–10, and 17–19;
T38N, R12W, Sections 1–3, 9–16, and 22–24;
T39N, R10W, Sections 2–10, 15–21, and 29–31;
T39N, R11W, Sections 1–18, 20–29, and 32–36;
T39N, R12W, Sections 11–14, 23–25, and 36;
T40N, R10W, Sections 3–5, 8–11, and 13–35;
T40N, R11W, Sections 24–27 and 34–36;
T41N, R10W, Sections 2–5, 8–17, 20–24, 26–29, and 31–34; and
T42N, R10W, Sections 28–29 and 32–35.

1.1.2 Terms

Eddy Gulch LSR — the entire 61,900-acre LSR.

Assessment Area — the 37,239-acre portion of the Eddy Gulch LSR west of Etna Summit where various treatments are proposed. All inventoried roadless areas that occur in the LSR were excluded from planning efforts and are therefore not part of the Assessment Area.

Treatment Unit — the acres proposed for some type of on-the-ground treatment under a particular alternative.

Analysis Area — the area around treatment units considered in the effects analysis (the analysis area may be larger than the LSR Assessment Area). The analysis area varies by resource.

1.2 Summary of the Alternatives

Chapter 2 in the environmental impact statement (EIS) for the Eddy Gulch LSR Project presents more information about the three alternatives, and Appendix A in the EIS contains project maps.

1.2.1 Alternative A: No Action

The no-action alternative is described as continuation of the current level of management and public use—this includes road maintenance, dispersed recreation (hunting, fishing, camping, and hiking), mining, watershed restoration projects, and the modeled wildfire. The timeframe for analysis is considered to be 20 years. Given the fuel hazard in the Eddy Gulch LSR and current predictions of climate change, it is assumed at least one wildfire will escape initial attack during the 20-year period and burn under 90th percentile weather conditions (defined as 10 percent of the days in the historical weather database that had lower fuel moisture and higher wind speeds compared to the rest of the days) (refer to the Eddy Gulch LSR EIS). An analysis of a wildfire for three days that escaped initial attack in the Eddy Gulch LSR Project Assessment Area indicates that fire would burn 7,200 acres. Of those 7,200 acres, 1,355 acres (19 percent) would be surface fire; 5,065 acres (70 percent) would be a passive crown fire; and 780 acres (11 percent) would be an active crown fire. These crown fires would result in extensive tree mortality, approaching 100 percent, over 81 percent of the total burned area.

1.2.2 Alternative B: Proposed Action

The Klamath National Forest proposes 25,969 acres of treatments to protect late-successional habitat and communities. Three primary treatment types were identified in the Assessment Area: Fuel Reduction Zones (FRZs), Prescribed Burn Units (Rx Units), and Roadside (RS) treatments along emergency access routes, which are described below.

- **FRZs**—strategically located on ridgetops to increase resistance to the spread of wildfires. The FRZs would be wide enough to capture most short-range spot fires, and ground, ladder, and crown fuels would be reduced so as to change crown fires to surface fires within the treated areas. The FRZs would provide safe locations for fire-suppression personnel to take fire-suppression actions during 90th percentile weather conditions, and they serve as anchor points for additional landscape-level fuel treatments, such as underburning.

    - ***Proposed Action.*** Construct 16 FRZs totaling 8,291 acres to increase resistance to wildfires. The 8,291 acres includes 931 acres in 42 M Units (thinning units) and 7,383 acres in fuel reduction areas (outside the M Units) to reduce ground and ladder fuels.

- **Rx Units**—a series of landscape-level treatments (ranging from 250 to 4,300 acres in size) designed to increase resilience to wildfires by reducing ground and ladder fuels. Most of these treatments would occur on south-facing aspects where fuels dry faster, and treatments would support the role of the FRZs.
    - ***Proposed Action***. ***Implement*** 17,524 acres of Rx Units to increase resiliency to wildfires.
- **RS treatments**—along 60 miles of emergency access routes identified in the Salmon River Community Wildfire Protection Plan (CWPP) (SRFSC 2007) and designed to facilitate emergency access for residents to evacuate and for suppression forces to safely enter the LSR in the event of a wildfire.
    - ***Proposed Action*.** Treat 44 miles of emergency access routes in FRZs and Rx Units (treatments would be similar to the FRZ or Rx Unit the route passes through) and 16 miles (with 154 acres of treatments) of RS treatments outside of FRZs and Rx Units—a total of 60 miles of RS treatments along emergency access routes.

Proposed Temporary Roads and Landings

The construction of new temporary roads and the use of former logging access routes are proposed to access treatment units.

- Approximately 1.03 miles (5,433 feet) of new temporary roads would be used to access all or portions of seven M Units. All of these temporary roads would be closed (ripped and mulched, as needed) following thinning.
- Approximately 0.98 mile (5,177 feet) of former logging access routes would be re-opened (vegetation removed and bladed) to access all or portions of five M Units. These routes would be water-barred and closed immediately after thinning is completed.
- Five short spurs, each less than 100 feet long, would be bladed for tractor or cable yarding operations in two units.
- Existing landings would be used (no new landings are proposed).

1.2.3 Alternative C: No New Temporary Roads Constructed

Alternative C responds to public concerns regarding the environmental and economic effects of constructing new temporary roads. Alternative C is similar to the Proposed Action but approximately 1.03 miles (5,443 feet) of new temporary roads identified in the Proposed Action would not be constructed. As a result, no fuels treatments would occur in portions of seven M Units. This reduces the total acres of treatments in M Units from 931 acres under Alternative B to 832 acres in Alternative C. Fuels treatments could not be carried out in those M Units because of excessive treatment costs, high existing dead crown fuel loadings, and potential heat damage to the overstory if these untreated units were prescribed burned.

Under Alternative C, the FRZs would continue to total 8,291 acres; however, 99 acres in M Units would remain untreated. The total number of acres treated by tractor yarding would remain at 361 acres; however, the acres of cable yarding would be reduced from 570 acres under Alternative B to 471 acres under Alternative C. Reducing acres of M Units treated would also reduce the number of acres treated in two Rx Units because excessive fuels remaining in M Units would preclude safely burning portions of the two Rx Units. Six-foot-wide control lines would be constructed around the perimeter of those untreated areas to keep prescribed burns out of those portions of Rx Units. There would be no changes in the miles of emergency access routes treated, transportation plan, or resource protection measures.

1.3 Significant Issue

Public and agency comments received during collaboration and scoping efforts did not identify any significant issues related to wildlife habitat. The only significant issue was in regard to construction of new temporary roads to access some of the treatment units. Alternative C was developed in response to public concerns regarding the environmental and economic effects of constructing new temporary roads.

1.4 Regulatory Framework

The Proposed Action meets the applicable Standards and Guidelines identified in the Klamath LRMP for Management Areas 5 and 10 and other forestwide standards and guidelines, as well as the Management Guidelines for biological diversity, aquatic conservation, and wildlife, as reviewed in Chapter 4 of the LRMP. Additional federal and state guidance that apply to the project are described below.

1.4.1 Regional Forester’s Sensitive Species

The Regional Forester (Region 5) maintains a list of plant and animal species that need special management attention and depend on National Forest habitats. The list was created in 1984 and updated in October 2007. The list is maintained to ensure sensitive species are considered in management decisions and that activities do not lead to federal listing of those species as threatened or endangered.

1.4.2 Final Recovery Plan for Northern Spotted Owl 2008

The 2008 Recovery Plan (USFWS 2008a) identifies criteria and actions needed to stop the NSO’s decline, reduce threats, and return the species to a stable, well-distributed population in Washington, Oregon, and California. The plan describes reasonable actions and criteria that are considered necessary to recover the NSO. The primary threats facing the NSO, as identified in the Recovery Plan, are current and past habitat loss due to harvest and stand-replacing fire and competition from the barred owl. The plan describes 34 recovery actions to address these threats. The Eddy Gulch LSR Project is consistent with the Recovery Plan and incorporates two of its high-priority actions: management of Mapped Owl Conservation Areas (MOCAs) on west-side forests for the highest amount of quality habitat (Recovery Action 5), and management for more fire-resilient and fire-resistant forests in the Klamath Province (Recovery Action 8). MOCAs in the fire-prone Klamath Provinces[1] are considered an interim strategy until a landscape-management strategy is developed and adopted (USFWS 2008a).

1.4.3 Endangered Species Act of 1973

Under the ESA, the U.S. Secretary of the Interior and the U.S. Secretary of Commerce jointly have the authority to list a species as threatened or endangered (16 USC 1533[c]). Pursuant to the requirements of ESA Section 7, an agency reviewing a proposed project within its jurisdiction must determine whether any federally listed threatened or endangered species may be present in a project area and determine whether the proposed project will have a likely affect on listed species. In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species listed under the ESA or result in the destruction or adverse modification of Critical Habitat designated or proposed for such species (16 USC 1536[3], [4]). The United States Fish and Wildlife Service (USFWS) was consulted to ensure the Eddy Gulch LSR Project complies with the ESA. A Wildlife Biological Assessment/Biological Evaluation (BA/BE) was prepared for the Eddy Gulch LSR Project.

1.4.4 Migratory Bird Treaty Act (16 USC Sec. 703, Supp. I, 1989) and the Migratory Bird Conservation Memorandum of Understanding

On December 12, 2008, a Memorandum of Understanding (MOU) was signed by the U.S. Department of Agriculture Forest Service and the USFWS to promote the conservation of migratory birds. For the Klamath National Forest, the migratory bird species of management concern are those bird species listed under the ESA as Threatened or Endangered, those species designated by the Regional Forester as Sensitive Species, and those species listed under Standard and Guideline 8-21 through 8-34 of the Klamath LRMP (USFS 1995) as MIS for project level assessment. The species are listed in Table 1 below in the Scope of the Analysis Section."

Per MOU item D3a. The MOU recognizes that, "Within the National Forest System, conservation of migratory birds focuses on providing a diversity of habitat conditions at multiple spatial scales..." At the Forest scale, the land allocations in the Klamath LRMP are designed to maintain a variety of habitat types, which would provide habitat for migratory birds that may use the project area at some point during the year. "Land allocations and management direction are designed to maintain species, community and genetic diversity. Diversity will be provided through a mixture of vegetative types and seral stages" (USFS 1995). The designations and standards and guidelines for LSR and Riparian Reserve land allocations are designed to ensure the viability of species that use late-seral and aquatic habitats. A General Forest land allocation is intended to provide for early and mid seral habitats, which are also needed by some migratory bird species. At the project level, the Klamath LRMP identified standards and guidelines to address the diversity of major biological communities and priority habitat (such as snags and riparian vegetation) found on the Forest and identified guidance for assessing effects on priority habitat for MIS.

1. The Northwest Forest Plan (NWFP) area is divided into 12 physiographic processes to group areas with common biological and physical processes. The California Klamath Province includes most of the Klamath, Trinity, and Mendocino National Forests, lying generally west of Interstate-5 and east of the crest of the coast range (USDA, USDI 1994a; A-3).

In balance, the long-term benefits are of greater conservation value to the species than the short- and long-term adverse effects.

Per MOU item D3b. The Purpose and Need for the Eddy Gulch LSR Project does not specifically address restoration and enhancement of the composition, structure, and juxtaposition of migratory bird habitats in the Project Assessment Area; however, there are benefits to the migratory bird species of management concern as described under item 3a.

Per MOU item D3c. The project does not result in “take;” “take” is defined in 50 CFR § 10.12 and means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.

Per MOU item D3d. This Eddy Gulch LSR Project is not likely to have an adverse effect on migratory bird populations as summarized and further described in the Eddy Gulch LSR Project Biological Assessment / Biological Evaluation (contained in the Project Record) and the MIS report, which is included as Appendix B of this Wildlife and Habitat Report.

1.5 Methodology

1.5.1 Analysis Methods and Assumptions

Wildlife species of special interest and their associated habitats were analyzed using a combination of field assessments, aerial photos, and Geographic Information System (GIS) habitat maps based on the 1995 vegetation dataset or the stream dataset supplied by the Klamath National Forest. The 1995 dataset is the best available information on the vegetation in the Eddy Gulch LSR. Field assessments conducted by wildlife biologists and silviculturists concluded that, in general, the trend since development of the 1995 vegetation data set has been continued forest growth and accumulation of hazardous fuels.

Northern Spotted Owl

Definitions of NSO nesting/roosting, foraging, and dispersal habitat for the NSO were translated into a model (USFS 1999:App. G) for use with the timber type vegetation data layer described in the 1995 Klamath LRMP (USFS 1995). This model (Klamath NSO Habitat Layer, updated in 1998) was used to estimate the amount of suitable habitat available for NSOs in the Eddy Gulch LSR and in the project Assessment Area (private lands were excluded in order to be consistent with the forestwide LSR assessment [USFS 1999, p. 2-25]). The NSO habitat suitability model may slightly underestimate the amount of currently suitable nesting/roosting and foraging habitat because of recent forest growth. The habitat model was used to analyze the habitat in and around NSO home ranges. Most of the west side of the Assessment Area has been extensively surveyed for NSOs for the past 22 years (Franklin unpubl. data), and most of the remaining area was surveyed in 2007–2008 (Herrera 2008). The NSO habitat model was also used for other forest-dependent species such as the northern goshawk and Pacific fisher.

Pacific Fisher

The Klamath National Forest has independently surveyed and is working with the FWS to survey fisher and fisher habitat. For example,

- Camera station surveys were conducted on the Happy Camp, Scott River, and Salmon River Ranger Districts in the early 1990s. There has been a re-survey of areas surveyed in the 1990s in the vicinity of the Collins Baldy and Mt. Ashland LSRs (in conjunction with Timber Products and the FWS).

- This is the fourth year of participating in a cooperative fisher genetic survey to determine preliminary population estimates for an area in northern Siskiyou County (in conjunction with Timber Products, California Department of Fish and Game, and the FWS).

- A project to develop a habitat model is called the "Distribution and Habitat Suitability for Fishers in the Eastern Klamath and South Cascades Bioregions in Northern California Study Area." The study area covers approximately 9,800 square kilometers (approximately 6,089 square miles) and includes portions of Siskiyou, Shasta, and Trinity counties in northern California. Public forest lands include wilderness, late successional reserve, and general forest lands of the Klamath, Shasta-Trinity, and Rogue River National Forests. Private holdings vary from large contiguous industrial timberlands to checkerboard patterns and smaller private individual holdings. According to the FWS, the survey protocol is consistent with previous sampling and modeling efforts and ongoing development of landscape habitat models being conducted at USDA Pacific Southwest Research Station. The project used a robust Primary Survey Unit design associated with Forest Inventory and Analysis grid cells. For the project, the current model for the Klamath Region (Carroll et al. 2005) will be used as a launching point in development of a model for the eastern Klamath and southern Cascades bioregion. Information from previous survey efforts, which used other protocols, will be used to evaluate the final FWS model. Jeffrey Dunk, from Humboldt State University, is currently under agreement with the FWS to conduct the habitat modeling and analysis in cooperation with Bill Zielinski, at Pacific Southwest Research Station.

- Another project, which began in October 2009 in the vicinity of the Mt. Ashland Fuels Reduction Project on the Klamath National Forest, is part of a regional study to assess changes in fisher movement patterns and habitat selection between pre- and post-treatment monitoring, at both individual and local population scales and to evaluate the short-term impact of treatments. According to the FWS, this study will be combined with other replicates of the study into a regional analysis on the impacts of treatment alternatives on fishers. The study will be used to generate recommendations on how managers can achieve fuel reduction objectives while minimizing impacts on fishers.

The project's wildlife BA/BE, along with this report, provides further details and background on individual species.

1.5.2 Scope of the Analysis

Analysis Area

The Eddy Gulch LSR Project Assessment Area encompasses the 37,239 acres of the LSR that were *considered* for treatment, including two USFWS priority protection areas and a portion of a third protection area (refer to Chapter 2, Section 2.5.1.4 of the Eddy Gulch LSR Project EIS). The area analyzed for most wildlife species includes only 25,696 acres in the Assessment Area that are actually *proposed* for treatment (the treatment units that include FRZs, Rx Units, and RS treatments along emergency access routes) and is thus referred to as the analysis area. However, the analysis area for wildlife and habitat extends beyond the Assessment Area for species that occur outside that area and that may be indirectly affected by the proposed treatments. These species include the NSO, northern goshawk, fisher, and some aquatic species. For each NSO activity center, the estimated home range (1.3-mile radius) was analyzed, and in many cases, this home range radius fell outside of the Assessment Area. A similar analysis was done for goshawks using a 1-mile radius. The analysis area for Pacific fisher includes the treatment units, as well as a 1.5- to 2.0-mile buffer that would contain one or more Pacific fisher home ranges. The analysis area for some aquatic species extended to the North and South Forks of the Salmon River adjacent to the Assessment Area, if it was reasonable that project effects could be detected beyond the Assessment Area. The species listed in Table 1 were identified by the Klamath National Forest or the USFWS as having the potential to occur in or near the Eddy Gulch LSR and in habitats either present on the LSR or with the potential to occur on the LSR.

Table 1. Wildlife species of special interest with the potential to occur in or near the Eddy Gulch LSR, Siskiyou County, CA.

Common Name	Status[a]	Preferred Habitat	Potential Presence in Assessment Area[b]
Federally Listed or Candidate Species			
NSO (*Strix occidentalis caurina*)	FT, CH	Prefers old-growth or late-successional forests but can also occur in managed forest with dense structure.	*Occurs.* Known to occur in the Assessment Area.
Forest Service Sensitive and State-listed Species			
Tehama chaparral (*Trilobopsis tehemana*)	FSS,	Prefers talus, rock outcrops, or caves with subsurface moisture; refugia includes leaf litter, particularly deciduous leaf litter, and woody debris in forested habitat.	*Low*. Suitable habitat exists within the Eddy Gulch LSR; species is not known to occur in the LSR but reportedly occurs on the Salmon River Ranger District (Duncan et al. 2003).
Southern torrent salamander (*Rhyacotriton variegatus*)	FSS	Cold, clear, well-shaded streams, waterfalls and seepages, particularly those running through talus and under rocks all year. Found from sea level to 4,500–5,000 feet.	*Unknown*. Suitable habitat exists but the Eddy Gulch LSR appears to be at the edge of the species' range.
Cascades frog (*Rana cascadae*)	FSS, MIS	Small streams, ponds, lakes in meadows or open coniferous forest.	*Low*. Occurs near the LSR, but there is only one known pond (private) and no lakes or languid streams in the Assessment Area.
Foothill yellow-legged frog (*Rana boylii*)	FSS	Rocky streams and rivers in various habitats. Usually in streams with abundant boulders and cobbles and with mix of sun and shade.	*Moderate*. The Assessment Area contains suitable habitat, but there are no reported records from the area.
Western pond turtle (*Actinemys marmorata*)	FSS	Slack- or slow-water aquatic habitat with many basking sites. Hatchlings require shallow water habitat with relatively dense submergent or short emergent vegetation in which to forage.	*Moderate*. Turtles may occur in low-gradient streams near the North and South Forks of the Salmon River or in ponds on private property.
Bald eagle (*Haliaeetus leucocephalus*)	FSS, SE	Forages over a variety of open habitats. Nests near tops of large trees in association with open water.	*Low*. There is no high-quality foraging habitat within 2 miles of the Assessment Area, but the lower Salmon Rivers may provide foraging habitat.

Table 1. Wildlife species of special interest with the potential to occur in or near the Eddy Gulch LSR, Siskiyou County, CA (continued).

Common Name	Status[a]	Preferred Habitat	Potential Presence in Assessment Area[b]
Northern goshawk (*Accipiter gentilis*)	FSS	Mature conifer forest. Nests usually in dense stands with open understory, often near water.	*Occurs.* Known to occur in the Assessment Area.
Peregrine falcon (*Falco peregrines anatum*)		Prominent cliffs or other precipitous features with ledges or other platforms.	*Occurs*. Known from two nesting sites just outside of the Project Area.
FSS and State-listed Species			
Great gray owl (*Strix nebulosa*)	FSS, SE	Mid- to high-elevation mature conifer stands adjacent to meadows with pocket gophers and/or voles.	*Low*. There are no meadows or herbaceous habitats, other than small scattered patches.
Willow flycatcher (*Empidonax traillii brewsteri*)	FSS, SE	Large patches of shrubby willows along streams or in wet meadows, generally over 2,000 feet elevation. Also wet scrub following disturbance.	*Low*. Willow patches may occur in Riparian Reserves, but these are most likely too small or shaded.
Pallid bat (*Antrozous pallidus*)	FSS	Many habitat types, especially open dry habitats with rocky areas for roosting. Uses caves, buildings, hollow trees, rock outcrops, bridges, and many other roost sites.	*High*. Suitable foraging and roosting habitat is widespread.
Townsend’s big-eared bat (*Corynorhinus townsendii*)	FSS	Many habitats but may prefer moist areas. Roosting strongly associated with cave-like features, which may include buildings, tunnels, other man-made structures, usually cool. Sensitive to disturbance.	*Occurs.* Known to occur in caves just outside of the Assessment Area.
American pine marten (*Martes americana sierrae*)	FSS	Late-successional forest, typically in relatively wet high-elevation forests above Ponderosa pine and/or mixed-conifer forests where winter snow is persistent (that is, fir forests above 5,000 feet).	*Moderate*. Most likely to occur at high elevations. Recent surveys detected martens in the Marble Mountain Wilderness.
Pacific fisher (*Martes pennanti pacificus*)	FC[c], FSS	Mature, dense mid-elevation conifer forests with hardwoods, large snags and logs, and small brushy openings with diverse prey.	*Occurs.* Known to occur in the Assessment Area.
California wolverine (*Gulo gulo luteus*)	FSS, ST	Montane regions with persistent spring snowpack and openings in old-growth or mature forests that are isolated from man. Can travel widely.	*Low*. Historical in region, but there are no recent records from this region.
MIS: River and Stream Association			
Tailed frog (*Ascaphus truei*)	MIS	Cool, perennial streams in conifer-dominated habitats; occurs more frequently in mature or late-successional stands, and uses submerged rocks and logs in streams for cover.	*Occurs.* Known to occur in the Assessment Area.
Cascades frog (*Rana cascadae*)	MIS, FSS	Small streams, ponds, lakes in meadows or open coniferous forest.	*Low.* Occurs near the LSR, but there is only one known pond (private) and no lakes or languid streams in the Assessment Area.
American dipper (*Cinclus mexicanus*)	MIS	Along clear, fast-flowing, unpolluted perennial streams and rivers with rock faces, waterfalls, large boulders, or other features that provide similar niches for nesting.	*Occurs.* Known to occur in the Assessment Area.
Northern water shrew (*Sorex palustris*)	MIS	Montane riparian habitats.	*High*. Most likely common along most streams.

Table 1. Wildlife species of special interest with the potential to occur in or near the Eddy Gulch LSR, Siskiyou County, CA (continued).

Common Name	Status[a]	Preferred Habitat	Potential Presence in Assessment Area[b]
Long-tailed vole (Microtus longicaudus)	MIS	Montane riparian, wetlands, grasslands, and wet meadow habitats.	*Moderate*. Likely to be common in suitable habitat, but meadow-like habitats are sparse in the Assessment Area.
MIS: Marsh/Lake/Pond Association			
Western pond turtle (*Actinemys marmorata*)	MIS, FSS	Slack- or slow-water aquatic habitat with many basking sites. Hatchlings require shallow water habitat with relatively dense submergent or short emergent vegetation in which to forage.	*Moderate*. Turtles may occur in low-gradient streams near the North and South Forks of the Salmon River or in ponds on private property.
MIS: Hardwood Association			
Acorn woodpecker (*Melanerpes formicivorus*)	MIS	Hardwood, hardwood-conifer, or conifer habitats with mature oaks and snags.	*High*. Most likely in open oak/conifer habitats at lower elevations and perhaps locally common.
Western gray squirrel (*Sciurus griseus*)	MIS	Mature oak and mixed-conifer habitats, requiring large trees, mast crops, and snags.	*Occurs.* Known to occur in the Assessment Area.
MIS: Snag Association			
Vaux's swift (*Chaetura vauxi*)	MIS	Late-successional coastal forests, but also known to occur in other conifer-dominated forests below the zone of true firs, burned forests, and in towns with no canopy cover as long as large hollow trees or chimneys are available for nesting.	*Moderate*. Suitable habitat is widespread, but Vaux's swifts are generally uncommon and local.
Red-breasted sapsucker (*Sphyrapicus ruber*)	MIS	Montane riparian, montane hardwood-conifer, mixed-conifer, and true fir forests, preferring sites near meadows, clearings, or streams.	*Occurs.* Known to occur in the Assessment Area.
Downy woodpecker (*Picoides pubescens*)	MIS	Riparian deciduous and associated hardwood and conifer habitats and closely associated with riparian softwoods.	*High*. Most likely in riparian-dominated woodlands at lower elevations where it is probably uncommon in the Assessment Area.
Hairy woodpecker (*Picoides villosus*)	MIS	Open to moderately dense stands of mature conifers with snags of sparse to intermediate density; often favors burned stands.	*Occurs.* Known to occur in the Assessment Area.
White-headed woodpecker (*Picoides albolarvatus*)	MIS	Montane coniferous forests up to higher-elevation lodgepole pine and red fir habitats.	*Occurs.* Known to occur in the Assessment Area.
Black-backed woodpecker (*Picoides arcticus*)	MIS	Confined to recently burned lodgepole pine, red fir, or other higher-elevation forests; may occur in unburned forests if adequate prey is present.	*Low*. The Eddy Gulch LSR is on the edge of the species' range, but it could occur in response to large fires.
Pileated woodpecker (*Dryocopus pileatus*)	MIS	Mature conifer or hardwood-conifer habitats near permanent water; most common in late-successional and old-growth mixed-conifer forests with moderate to dense canopy cover and large numbers of snags, stumps, and logs.	*Occurs.* Known to occur in the Assessment Area.
Klamath shoulderband (*Helminthoglypta talmadgei*)	Formerly S&M Cat. D	Talus slopes and rockslides, often in limestone substrates, especially near springs or streams.	*Occurs.* Known to occur in the Assessment Area.

Table 1. Wildlife species of special interest with the potential to occur in or near the Eddy Gulch LSR, Siskiyou County, CA (continued).

Common Name	Status[a]	Preferred Habitat	Potential Presence in Assessment Area[b]
Tehama chaparral (*Trilobopsis tehemana*)	FSS; Formerly S&M, Cat. A	Prefers talus, rock outcrops, or caves with subsurface moisture; refugia includes leaf litter, particularly deciduous leaf litter, and woody debris in forested habitat.	*Low*. Suitable habitat exists within the Eddy Gulch LSR; species is not known to occur in the LSR but reportedly occurs on the Salmon River Ranger District (Duncan et al. 2003).

Notes:

a. Categories of special status recognition used by federal and state agencies. Not all categories imply legal protection.

CH = Critical Habitat
FC = Federal Candidate for Listing
FT = Federal Threatened
FSS = Forest Service Sensitive Species
SE = State (California) Endangered
ST = State (California) Threatened
S&M = Survey and Manage

b. Definitions of Potential to Occur

Unknown: The probability of occurrence is unknown because the Eddy Gulch LSR is near the margin of the species' known distribution; suitable habitat is available, but some species, especially those with limited dispersal capability, are limited by factors (geological history, for example) other than habitat structure.

Low: Some habitat features may occur in the Eddy Gulch LSR, but important habitat features are lacking and habitat is marginal. If the species does occur, it is most likely a transient or occurs in very small numbers.

Moderate: The most important habitat features present in the Eddy Gulch LSR, but most or all of the area lacks at least one important habitat component; or, habitat exists but species is near the edge of its known distribution.

High: Species is expected to occur but has not been documented in the Eddy Gulch LSR. Habitat in Eddy Gulch LSR has all necessary components, species observed elsewhere in similar habitats.

Occurs: Species documented or known to occur in the Assessment Area.

c. On April 8, 2004, the USFWS determined that fisher populations in California, Oregon, and Washington warrant protection under the ESA but that listing under the act is "precluded by the need to take other listing actions of higher priority" (USFWS 2004). Candidate Notice of Review published December 6, 2007, in *Federal Register*, Vol. 72, No. 234 gave this species a listing priority of 6.

Analysis Period

The analysis period extends approximately 20 years, which is the anticipated maximum duration of the effectiveness of the proposed fuel reduction activities. The timeframe for the effects analysis is 5 years for short-term effects and up to 30 years for long-term effects on wildlife habitat. The western slope of the Klamath Mountain in the Klamath National Forest has a relatively high rate of vegetation establishment and growth due to high annual precipitation and productive soils. Within this timeframe (up to 20 years following treatment), vegetation, and thus habitat, would have sufficient opportunity to increase in canopy cover, basal area, and tree density to a point where subsequent treatments may need to be considered for wildlife habitat protection.

1.5.3 Definitions for Terms Used in this Resource Section

Basal Area — A measure of stand density that defines the area of a given stand that is occupied by the cross-section of tree trunks and stems at their base.

Coarse Woody Debris (CWD) — Large woody material (fallen dead trees, as well as the remains of larger branches) that are at least 15 inches in diameter and 10 feet long. Ideally, these logs are well distributed across the treatment unit or landscape and represent the various decomposition classes.

Activity Center — The point that best describes the focal area of use by a resident single or pair. This can be based on locations of adults, nests, roosts, or young.

NSO Home Range — An area defined by a 1.3-mile radius around a NSO activity center within which owls forage, nest, and roost.

NSO Core Area — An area defined by a 0.5-mile radius around a NSO activity center that owls use most often, especially during the nesting season.

1.5.4 Intensity of Effects Definitions

"Intensity" refers to the severity of effects or the degree to which the action may adversely or beneficially affect a resource. The intensity definitions used in this analysis are described below.

Negligible. An action would result in no observable or measurable effects on individual survival or on native wildlife populations, their habitats, or the natural processes sustaining them. Occasional individual responses to disturbance could be expected but without interference to reproduction or other factors affecting survival.

Minor. An action would result in detectable effects on individuals or in small, short-term changes to populations, but it would not be expected to cause any measurable long-term effects on native species, their habitats, or the natural processes sustaining them.

Moderate. An action would result in detectable effects on native wildlife populations, their habitats, or the natural processes sustaining them. Key ecosystem processes may experience disruptions that would be outside the natural range of fluctuation (but would return to natural conditions). Sufficient habitat would remain functional to maintain viability of native wildlife populations.

Major. An action would result in large effects on native wildlife populations, their habitats, or the natural processes sustaining them. Key ecosystem processes would be disrupted for long periods or permanently.

1.5.5 Measurement Indicators

The affected environment for each species is described in terms of the amount and type of habitat present on the Klamath National Forest, and effects are estimated in terms of habitat amount and/or quality. The amount and type of habitat are described in terms of

- acres of habitat or miles of streams;
- canopy closure;
- basal area;
- large trees (diameter at breast height [dbh] of over 24 inches);
- snags (over 15 inches dbh);
- large CWD (over 15 inches dbh and longer than 10 feet); and
- hardwoods (presence of).

However, not all features will be used to describe habitat conditions for all species.

1.6 Affected Environment (Existing Conditions)

Approximately 45,220 acres of the 61,900-acre Eddy Gulch LSR (73 percent) are capable of producing late-successional habitat (USFS 1999, Table 2.38). Currently, at least 18,780 acres (or about 42 percent of the capable late-successional habitat [USFS 1999]) are vegetated by late-successional habitat. The combined acres vegetated by late-successional and mid-successional forest total 35,710 acres (or about 79 percent of the capable late-successional habitat). Relative to other LSRs in the Klamath National Forest, the Eddy Gulch LSR ranks moderate for both the proportion of late-successional and combined mid-successional/late-successional forested habitat (USFS 1999, 2:49).

The USFWS identified four priority protection areas (described in Section 2.5.1.4 of Chapter 2 and Map A-3 in Appendix A of the EIS), which contain large blocks of high-quality NSO habitat, provide for small clusters of NSO populations within the Eddy Gulch LSR, or are important on a landscape connectivity scale.

The Eddy Gulch LSR (except the Etna side) is within Key Watersheds, identified in the Klamath LRMP as important for providing high-quality cold water for at-risk fish stocks (USFS 1995). Important to meeting Key Watershed objectives are 8,624 acres of Riparian Reserves, primarily comprised of steep headwater channels and moderate- to low-gradient mid-reaches whose function is largely influenced by riparian vegetation and large wood recruitment. The Riparian Reserves include lands adjacent to all permanently flowing streams, constructed ponds and reservoirs, wetlands, lakes and natural ponds, seasonally flowing or intermittent streams, floodplains, and unstable and potentially unstable land (USDA, USDI 1994b). The Riparian Reserves are important to the terrestrial ecosystem, as well, because they serve as habitat or movement corridors for terrestrial species such as the Pacific fisher.

Past disturbance and fire suppression have created many of the dense stand conditions observed in the Eddy Gulch LSR today. Many of the dense stands have an unnaturally high proportion of shade-tolerant species, such as white fir, and have begun to experience significant density-related mortality. This mortality, over-stocked stands, and ladder fuels contribute to excessive fuel hazards, which in turn, increase the probability of high-intensity wildfires. Management of excessive fuel hazards will be important if late-successional habitat is to be maintained or increased. Because many of the stands in the LSR originated after mining-related disturbance in the late 1800s, much of the forested habitat in the LSR tends toward the “late-successional” condition. Remnant old-growth stands that survived the mining era in the Eddy Gulch LSR are primarily found in the upper Murphy Gulch (Bacon Rind area), upper Matthews Creek, upper Callahan Gulch, lower West Shadow Creek, and upper East Fork of Whites Gulch.

Currently, 30 percent of the LSR is characterized by late-successional forest. Much of the remaining forest contains mid-successional stands that regenerated during the fire suppression era. There are also plantations scattered throughout the landscape (Maps 4-8a and 4-8b). Many of the early to mid-successional stands contain a high density of trees with a dbh less than 10 inches, and little understory development (such as CWD or brushy areas) or are in a transitional understory development as the stand increase in average dbh (up to 18 inches dbh). Although larger late-successional trees still occur in some of these early successional stands, other structural components, such as CWD and large snags, are lacking.

Historically, fires in the Klamath Mountains were frequent and generally of low to moderate or mixed severity (Agee 1993; Taylor and Skinner 1998, 2003; Odion et al. 2004). Fire exclusion and other management activities in the Klamath National Forest over the last 100 years have led to changes in the frequency and intensity of wildfires (Taylor and Skinner 2003). Fire suppression, in particular, has caused changes in stand structures and fuel accumulation that, while generally contributing stand structural elements such as snags and downed wood used by late-successional forest-related species, has led to larger and more intense wildfires in the Klamath National Forest than what occurred historically.

The severity of historical fire regime patterns in the region played an important role in defining the stands in the landscape (Skinner et al. 2006). These fires were frequent and burned at low to severe intensity in the Klamath Mountains Bioregion (northwestern California and southwestern Oregon), resulting in more open stands. The lower slopes experienced the lowest-severity fires, while the upper third of slopes experienced the highest-severity fires. With such a mosaic of different successional stands across the landscape, there was more spatial complexity (Taylor and Skinner 1998, 2003). The late-successional stands would have been unevenly distributed across the landscape.

Vegetation on the landscape became more homogeneous over time as fire suppression became more effective. The forests today are less spatially complex with denser canopy cover. They provide a higher concentration of shade-tolerant species and a greater concentration of fuels (Skinner 1995; Taylor and Skinner 2003; Skinner et al. 2006). Such current forest components provide for more intense, high-severity fires, which differs from the historical patterns (Skinner et al. 2006), suggesting that current stands are less sustainable than they might have been historically.

1.6.1 Federally Listed Species

1.6.1.1 Northern Spotted Owl

The NSO is the only terrestrial wildlife species listed under the ESA that occurs or has habitat in the Eddy Gulch LSR. Currently, the primary range-wide threats to NSO are habitat loss from timber harvest, habitat loss from fire (or other natural events such as insects and disease), and barred owls (*Strix varia*), which have expanded into the range of NSO (USFWS 2008a).

Fire is now considered a greater threat to NSO habitat on federal lands than timber harvest or other management activities, especially in the relatively dry Klamath Province of Oregon and California, where loss of NSO habitat from fire has exceeded habitat loss from timber harvest since 1994 (USFWS 2008a). Recognition of the threat of fire stimulated the USFWS to identify recovery actions unique to the Klamath Province, including developing a strategy to achieve sustainable, fire-resilient and fire-resistant forests (Recovery Action 8) and the creation of a Dry Forest Landscape Work Group (Recovery Action 9) that will reexamine the effectiveness of the LSR system in the dynamic landscapes of the Klamath Province (USFWS 2008a).

Barred owls have displaced NSOs from many areas and are largely responsible for the alarming 7.1 percent annual decline of NSOs in Washington (Lint 2005). Whether the NSOs will be able to persist in areas with barred owls is unknown, but evidence to date suggests that NSOs are more likely to persist in, or be displaced into, drier areas, steep slopes, or higher elevations because barred owls prefer riparian areas with gentler terrain (Gutiérrez et al. 2007; USFWS 2008a). Individual barred owls were first detected in the Assessment Area in 2003 and have been occasionally detected (J. Rockweit, pers. comm. 2008), but so far, none of the NSOs tracked by Franklin's demographic study group have been displaced by barred owls, and no barred owl pairs have been observed in the Assessment Area (J. Rockweit, pers. comm. 2008). These factors suggest that the Eddy Gulch LSR, compared with other LSRs, may be relatively inhospitable to barred owls and an important refugium for NSOs.

NSOs inhabit older forests because they contain the necessary structures for nesting, roosting, foraging, and dispersal (Forsman et al. 1984; Gutiérrez 1996; LaHaye and Gutiérrez 1999). The habitat features that support *nesting and roosting* include:

- a multilayered, multispecies canopy with overstory trees larger than 30 inches dbh;
- moderate to high canopy closure (60 to 90 percent);
- a high incidence of trees with large cavities or other types of deformities (such as broken tops, mistletoe infections, and other evidence of decadence) (White 1996; LaHaye and Gutiérrez 1999);
- numerous large snags and an abundance of fallen trees and CWD;
- sufficient open space below the canopy for NSOs to fly (Thomas et al. 1990); and
- basal area in nest stands that may often exceed 200 square feet/acre (Solis and Gutiérrez 1990).

Table 2 compares the minimum habitat requirements (considered by the USFWS 2008b to be necessary for supporting nesting/roosting in interior northern California) with current conditions in the project Assessment Area. The minimum habitat requirements are based on research (Franklin et al. 2000) and observational studies (USFWS 2008b) in the Klamath Mountains and California Cascades physiographic provinces.

The nesting/roosting habitat currently occupied by NSOs in the Assessment Area has features consistent with those described in Table 2 (second column), but there are no *quantitative* data for occupied nesting/roosting stands in the Eddy Gulch LSR. The mid- to late-successional Douglas-fir stands sampled for this project (see Table 2 [fourth column] and Table 3) were mostly along ridges and not necessarily representative of nesting/roosting habitat that often occurs on the lower third of slopes, within 0.5-mile core areas more frequently used by owls.

Table 2. Minimum NSO habitat requirements compared to current conditions.

Minimum NSO Nesting/Roosting Habitat Requirement[a]	Current Nesting/Roosting Habitat Occupied by NSO in the Assessment Area[a]	Minimum NSO Foraging Habitat Requirement	Current Foraging Habitat Occupied by NSO in the Assessment Area[a]
Basal area ranges from 150 to more than 210 square feet per acre	Average basal area of 266 square feet per acre	Mix of basal areas ranging from 120 to over 180 square feet per acre	Average basal area ranges from 216 square feet per acre in Douglas-fir stands to 355 square feet per acre in red fir stands
8 trees per acre over 26 inches dbh	Average 20 trees per acre	At least 5 trees per acre over 26 inches dbh	Average 5 to 43 trees per acre larger than 24 inches dbh
At least 60 percent canopy cover	Average 72 percent canopy cover	Mix of canopy closures ranging from 60 to 100 percent	Average 58 to 73 percent canopy cover

Note: a. USFWS 2008b.

Table 3. Current stand structure on ridgetops where proposed M Units are located.

SAF Forest Type[a]	CWHR Successional Stage[b]	TPA[c]	TPA >10"	TPA >24"	BA[c]/ac >10"	Average dbh[c] >10"	Canopy Closure (percent)
Douglas-fir	Mid-successional (MS)	441	135	5	192	16.1	73
Douglas-fir	MS/Late-successional (LS)	235	120	20	249	19.5	72
White Fir	MS	299	190	9	302	17.1	61
White Fir	MS/LS	275	124	29	284	20.5	58
Red Fir	LS	613	113	43	350	23.8	59
Mixed-conifer	LS	255	159	28	320	19.2	69

Notes:

a. SAF = Society of American Foresters.

b. CWHR = California Wildlife Habitat Relationship.

c. TPA = trees per acre; BA = basal area; dbh = diameter at breast height.

Foraging habitat generally has attributes similar to those found in nesting/roosting habitat but may not always support successful nesting (USFWS 1992). Although general attributes, such as large trees, are common to foraging habitat across the NSO range, Irwin et al. (2007) suggest that optimal foraging conditions are found when the basal area is between 160 to 320 square feet per acre. The variability is in response to the main species of local prey (northern flying squirrels [*Glaucomys sabrinus*], or woodrats [*Neotoma* spp.]), which are the predominant prey both in biomass and frequency (Forsman et al. 1984; Zabel et al. 1995; Ward et al. 1998; Forsman et al. 2004). Woodrats are generally the dominant prey item in the drier forests typically found in the southern portion of the NSO range (Forsman et al. 1984; Zabel et al. 1995; Sztukowski and Courtney 2004), which includes the Eddy Gulch LSR (J. Rockweit, pers. comm. 2008). Dusky-footed woodrats (*N. fuscipes*) generally reside in brushy habitats (Williams et al. 1992), and densities have been found to be highest in 20- to 30-year-old sapling/bushy pole timber (Sakai and Noon 1993) or, in older forests, typically near riparian areas with fruit- and mast-producing hardwoods (Carey et al. 1999). Forests with little understory appear to be poorly suited for dusky-footed woodrats but are used by flying squirrels. Where wood rats are the primary prey, studies have found that, although NSOs selectively forage in areas with large trees (Call et al. 1992; Irwin et al. 2007), they also selectively forage along forest edges (Zabel et al. 1995; Ward et al. 1998) and riparian areas (Irwin et al. 2007). Canopy cover may not be a strong predictor of foraging habitat (Irwin et al. 2007), but NSOs typically avoid areas with less than 40 percent canopy (Call et al. 1994). Based on research (USFWS 2008a, 2008c) in the Klamath Mountains and California Cascades physiographic provinces, the USFWS (2008b) considers the minimum habitat requirements necessary to support foraging in interior northern California (refer to Table 2 above) to include a combination of stands that contain a mix of basal areas ranging from 120 to over 180 square feet per acre, at least 5 trees per acre over 26 inches dbh, a mix of canopy closures ranging from 60 to 100 percent, and stands that contain a mix of basal areas ranging from 80 to 120 square feet per acre and at least 40 percent canopy closure. The mid- to late-successional stands sampled for this project contained average basal areas that ranged from 216 square feet per acre in Douglas-fir stands to 355 square feet per acre in red fir stands, 58 to 73 percent canopy cover, and from 5 to 43 trees per acre larger than 24 inches dbh (refer to Table 3 above).

Dispersal habitat, at a minimum, consists of stands with adequate tree size and canopy closure to provide protection from avian predators and at least minimal foraging opportunities (USFWS 2008a). Neither stand- nor landscape-level forest attributes have been thoroughly evaluated in terms of facilitating successful dispersal (Buchanan 2004), but dispersing juveniles that use open areas, such as clearcuts, suffer increased mortality if they cannot find cover (Franklin and Gutiérrez 2002). However, based on the movement of radio-tracked owls, openings do not appear to act as barriers to dispersal until they reach the size of large nonforested valleys or large water bodies (Forsman et al. 2002). It is unlikely that there are any limitations to NSO dispersal in the Assessment Area because most of the area is forested with at least 40 percent canopy cover, and adjoining drainages are typically connected by at least narrow patches of forest, even where most of the surrounding vegetation is dominated by nonforest types.

The Eddy Gulch LSR provides approximately 12,577 acres of nesting/roosting habitat and 16,220 acres of foraging habitat, for a total of 28,797 acres (47 percent of the 61,900-acre LSR) of NSO habitat (USFS 1999) (refer to Map A-1 in Appendix A). Habitat acreages are useful, but acreage does not reflect other factors that affect NSO habitat use or their influence on NSO survival or reproduction. The most recent landscape-level analyses found that, in the southern portion of the subspecies' range, highest fitness is achieved where a mosaic of large patches of late-successional habitat are interspersed with other vegetation types that increase the amount of edge habitats (Franklin et al. 2000; Franklin and Gutiérrez 2002; Zabel et al. 2003; Olson et al. 2004). Homogeneous expanses of older forests, while generally supporting greater adult survival than younger forests or small patches of older forests (Franklin et al. 2000; Olson et al. 2004; Dugger et al. 2005), did not support a stable or increasing population (Franklin et al. 2000; Olson et al. 2004; also see Dugger et al. 2005). Franklin et al. (2000) hypothesized that a mosaic of different vegetation and successional stages may offer a stable prey resource for NSOs while providing adequate protection from predators. In the Eddy Gulch LSR, nesting/roosting and foraging habitat are fairly widely distributed in patches that range in size from less than a few acres to more than 500 acres. Although some patches of NSO habitat are isolated by nonhabitat, most patches of nesting/roosting habitat are connected by suitable foraging or dispersal habitat. Overall, the size, distribution, and connectivity of nesting/roosting habitat and foraging habitat vary among NSO territories, but in general, the pattern suggests high habitat fitness potential (Franklin et al. 2000).

The USFWS (Johnson et al. 2006) also used a landscape-level analysis to examine eight abiotic factors to help distinguish 36 activity centers from unused sites in three Klamath National Forest LSRs. The USFWS found that activity centers were associated with basin-like topography, the lower half of slopes, and streams. Additionally, numerous published articles have demonstrated that NSOs prefer using lower-slope or mid-slope sites for foraging, roosting, and nesting, especially as sites are related to drainages or surface water (see Solis and Gutiérrez 1990; Blakesley et al. 1992; Lahaye and Gutiérrez 1999). As might be expected, these abiotic habitat selection features coincide with conditions that favor forest growth and historically were relatively resistant to fire. Most of the activity centers in the Assessment Area are located in areas with similar topographic characteristics; that is, core areas are found no higher than mid-slope and are typically centered on prominent drainages.

Distribution and Population Trends

A total of 23 activity centers have been identified within the boundary of the Eddy Gulch LSR, 20 of which are in or overlapping the project Assessment Area (see Maps A-1a and A-1b in Appendix A of this report). However, scattered sections in the Assessment Area, totaling 10 to 15 percent of the LSR, have not been surveyed, and at least three activity centers have not been surveyed for the past 10 years. The mapped activity centers are widely distributed across the LSR, but almost all occur below 5,500 feet on the lower one-half to two-thirds of the slope and in areas with basin-like topography, consistent with the findings from Johnson et al. (2006). Areas that apparently lack NSOs, but that have physical attributes (such as low-elevation basins) associated with sustainable activity centers, include China Gulch, Counts Gulch, Crawford Creek southwest of Grouse Point, and Butcher Gulch. Butcher Gulch may currently contain sufficient nesting, roosting, and foraging habitat, but the other areas may lack sufficient NSO habitat at this time.

The only portion of the Assessment Area that has been surveyed regularly is the long-term Klamath demographic study area on the west end of the Eddy Gulch LSR. This area has been surveyed annually since at least 1986 and includes five mapped activity centers[2] that are included in the data set analyzed by Franklin et al. (2000) and other demographic analyses, such as the 18-year (1985–2003) estimates of population growth, survivorship, and reproduction (Lint 2005; Anthony et al. 2006). These analyses found that the NSO has experienced a range-wide decline of about 3.7 percent per year, and the northwestern California population has declined about 1.5 percent per

2. The area includes six mapped Klamath National Forest activity centers, but two adjacent activity centers have never been occupied simultaneously, so Franklin's demographic study group considers the area to be occupied by only one pair that may alternate activity centers.

year. Annual adult survival in the northwestern California population was 86.9 percent, and greater than the 85 percent thought to be key to stationary populations (Lint 2005), but has also been declining. Adult females fledged 0.33 young per year, which was slightly less than the range-wide average. The number of young fledged annually in the five activity centers tracked by Franklin in the Eddy Gulch LSR averaged 0.38 over the past 22 years.

USFWS Section 7 Consultation Home Range Assessment

The amount of suitable habitat in a home range has been shown to influence NSO productivity and survivorship (Bart 1995; Franklin et al. 2000; Dugger et al. 2005). Consequently, when evaluating potential project effects on an NSO activity center, the USFWS evaluates the amount and type of habitat within an owl's home range to assess the quality or apparent fitness potential of that activity center. The average home range size varies geographically (USFWS 1990; Zabel et al. 1995), but the estimated annual home range in the Klamath Province is approximately 3,330 acres. For planning purposes, the USFWS (1992, 2008a), uses a 1.3-mile radius circle containing 3,398 acres to estimate the size and amount of home ranges. The portion of the home range that receives disproportionately high use (the core area) during the breeding season is smaller than that used during the remainder of the year (Forsman et al. 1984; Sisco 1990; Glenn et al. 2004; Bingham and Noon 1997; Irwin et al. 2000), so the USFWS also examines habitat within the core area, which is defined by a circle with a 0.5-mile radius (502 acres) from the activity center.

The USFWS has concluded that NSO survivorship and productivity are reduced when the amount of nesting/roosting or foraging habitat within a 0.5-mile core area falls below 80 percent of the area, and the amount of suitable habitat within a home range falls below 40 percent of the area (Simon-Jackson 1989; Thomas et al. 1990; USFWS 1990; D. Johnson, pers. comm. 2008). In the California Klamath Province, this equates to approximately 400 to 1,335 acres of suitable habitat, respectively (USDA, USDI 1990; Thomas et al. 1990; see also Franklin et al. 2000). In 2001 an interagency team of USFWS and Forest Service personnel produced a habitat-based model to predict the probability of NSO occupancy (USFS, USDI 2001), and their modeling results suggest that the probability of occupancy is highest when the ratio of nesting/roosting habitat to foraging habitat within a NSO core area is 2:1. Thus, the USFWS currently considers the minimum amount of NSO habitat to avoid "take" under the ESA to consist of at least 250 acres of nesting/roosting and 150 acres of foraging habitat within a 0.5-mile core area and at least 935 additional acres of foraging habitat within a 1.3-mile home range outside the core area (D. Johnson, pers. comm. Jan. 2009).

Approximately 28 home ranges of historic and recent activity centers overlap the Eddy Gulch LSR, with fewer than that found within the Assessment Area (Maps A-4d and A-4e). None of the activity centers in the Assessment Area meet or exceed 400 acres of nesting/roosting/foraging habitat within the 0.5-mile core area. However, almost all of the activity centers meet or exceed the 1,335 acres of nesting/roosting and foraging habitat within the 1.3-mile home range. Of the five activity centers that have less than the target 1,335 acres in the home range, only one (KL1047) has an apparent habitat deficit (approximately 16 percent) greater than 10 percent in the 1.3-mile home range.

Managed Owl Conservation Area (MOCA)

The USFWS (Johnson et al. 2006) also used a landscape-level analysis to examine eight abiotic factors to help distinguish 36 activity centers from unused sites in three Klamath National Forest LSRs. The USFWS found that activity centers were associated with basin-like topography, the lower half of slopes, and streams. Additionally, numerous published articles have demonstrated that NSOs prefer using lower-slope or mid-slope sites for foraging, roosting, and nesting, especially as sites are related to drainages or surface water (see Solis and Gutiérrez 1990; Blakesley et al. 1992; Lahaye and Gutiérrez 1999). As might be expected, these abiotic habitat selection features coincide with conditions that favor forest growth and historically were relatively resistant to fire. Most of the activity centers in the Assessment Area are located in areas with similar topographic characteristics; that is, core areas are found no higher than mid-slope and are typically centered on prominent drainages.

Critical Habitat and Critical Habitat Unit (CHU)

The Eddy Gulch LSR occurs within the Scott and Salmon Mountains NSO CHU 25. The Scott and Salmon Mountains CHU subunit 35 includes all of the Eddy Gulch LSR, with the exception of 1,960 acres of private lands. NSO Critical Habitat and CHUs were originally designated by the USFWS in 1992 (USFWS 1992) but revised on August 13, 2008 (USFWS 2008c). They are based on a network of MOCAs.

The Assessment Area occurs within subunit 35 of the Scott and Salmon Mountains NSO CHU 25 (USFWS 2008a). The boundaries of subunit 35 closely align with the USFWS 1992 designation of NSO CHU CA25. Therefore, any analysis conducted herein for subunit 35 would also be applicable to CA25 as designated by the USFWS in 1992.

The goal of established CHUs is to maintain habitat that provides the Primary Constituent Elements (PCEs) that create self-sustaining and interconnected populations of the NSO over time. PCEs are the biological and physical features of critical habitat that are essential to the NSO conservation and recovery. The four PCEs identified in the Recovery Plan (USFWS 2008a) are nesting, roosting, foraging, and dispersal habitat.

Subunit 35 of the Scott and Salmon Mountains CHU, combined with the contiguous habitat in the Marble Mountains Wilderness is expected to support 22 nesting pairs over time (D. Johnson, pers. comm. 2008). Historical surveys indicate that the Eddy Gulch LSR has supported between 19 and 25 NSO activity centers (USFS 1999), which is within or exceeds the Scott and Salmon Mountains CHU subunit 35 objective of 22 pairs. Subunit 35 also helps to connect the Western Klamath-Siskiyou Mountains CHU across the high-elevation habitat in the Salmon-Trinity Alps Wilderness and east to the Shasta-McCloud area of concern. Existing dispersal habitat within and surrounding the Scott and Salmon Mountains CHU subunit 35 exceeds 50 percent (with the possible exception of the Lower South Fork Salmon River, which was estimated to be 48 percent in 1992) (USFS 1999, ch. 2, pg.49). Thus, Subunit 35 appears to be providing intra-provincial connectivity with adjacent Wilderness Areas and other CHUs.

1.6.2 Forest Service Sensitive Species

Tehama Chaparral

Tehama chaparral snails are closely associated with talus, rock outcrops, or caves with subsurface moisture (Weasma 1999; Duncan et al. 2003). When environmental conditions are favorable, they may emerge from their refugia and occur under leaf litter, particularly deciduous leaf litter, and woody debris in forested habitat (Weasma 1999; Duncan et al. 2003). The Tehama chaparral snail is known to occur in only four northern California counties (Siskiyou, Shasta, Tehama, and Butte). The

Tehama chaparral is not known to occur in the Eddy Gulch LSR, but Duncan et al. (2003) includes the Salmon River Ranger District within the species' range.

Klamath Shoulderband

Klamath shoulderband snails prefer stable talus slopes and rockslides in limestone substrates, especially near springs or streams. They have also been found to be associated with deciduous tree species (especially oaks) in mixed hardwood/conifer stands (Dunk et al. 2004). On the more mesic (moderately moist) sites, this species is associated with woody debris or root structures and moss and leaf litter, while rock refugia are used in drier habitats. Partial shading, or a combination of dense shade and an open canopy, is preferred, and the presence of seasonal herbaceous plants or grass may be a limiting factor (Duncan et al. 2003). The Klamath shoulderband has been observed in the Eddy Gulch LSR (CNDDB 2008).

Southern Torrent Salamander

The southern torrent salamander is known to occur from Point Arena, Mendocino County, to the Oregon border (Jennings and Hayes 1994). It is restricted to seeps, small streams, and waterfalls in wet or mesic coastal old-growth habitats; adults are extremely sensitive to desiccation (to remove moisture from). Its known elevational range extends from near sea level to about 5,000 feet (Stebbins 2003). Currently, this salamander is restricted to five counties (Siskiyou, Del Norte, Trinity, Humboldt, and Mendocino) in northwestern California, including the lower Salmon River watershed (NatureServe 2008).

Aquatic or mesic habitat suitable for southern torrent salamanders is widely distributed in the Assessment Area's Riparian Reserves. The status of the salamander in the Assessment Area is unknown, but the west end of the Eddy Gulch LSR is near the eastern limit of the species' known range.

Cascades Frog

Cascades frogs are associated with still or slow-moving montane aquatic habitats to over 7,000 feet elevation (Jennings and Hayes 1994; Stebbins 2003). Cascade frogs are closely restricted to water, which may include marshes, ponds, lakes, ephemeral pools, potholes in meadows, and along small creeks (Stebbins 2003). They are most often found in meadows or in open coniferous forests (Leonard et al. 1993; Stebbins 2003), and sites used for reproduction appear to require direct sunlight for several hours a day (Leonard et al. 1993; Jennings and Hayes 1994). Cascades frogs are particularly vulnerable to population reductions by predatory fish, including salmonids (Jennings and Hayes 1994; Welsh and Pope 2004).

Aquatic habitat suitable for Cascades frogs in the Assessment Area is absent or very limited. No mapped or unmapped ponds, lakes, or marshes have been found on federal land, and there is only one known pond on private land. Almost all streams are characterized by steep gradients or, in low-gradient reaches, have dense shade or contain salmonids. It is unlikely that the Cascade frog occurs in the Assessment Area, but its presence cannot be ruled out. Suitable habitat can be found in still waters adjacent to the Assessment Area, and populations are known to occur in the Trinity Alps, Marble Mountain, and Russian wilderness areas near or adjoining the Eddy Gulch LSR (Jennings and Hayes 1994; Welsh and Pope 2004). However, due to the limited habitat available for this species, there is only a low potential for it to occur in the Assessment Area.

Foothill Yellow-legged Frog

Foothill yellow-legged frogs occur in streams and rivers with shallow riffle areas, pools, and at least some cobble-sized substrate (Nussbaum et al. 1983; Jennings and Hayes 1994) generally below 4,000 feet in elevation in northwestern California. Breeding occurs in shallow, slow-flowing water with at least some pebble and cobble substrate after high flows have receded (Fuller and Lind 1992; Leonard et al. 1993). Occupied streams typically have very low to moderate amounts of canopy cover, but sub-adults and adults usually occur where shading is at least 20 percent (Ashton et al. 1998).

Habitat that is structurally suitable for foothill yellow-legged frogs occurs in some of the Assessment Area’s streams, but the frog’s status there is unknown. Much of the Assessment Area is too high in elevation for foothill yellow-legged frogs, but lower-elevation perennial streams provide potential habitat. Streams in densely forested areas are unlikely to provide suitable habitat.

Western Pond Turtle

Western pond turtles occur in many low-gradient aquatic habitats up to about 5,000 feet in northern California. They typically select ponded or slow-moving water with many basking sites and aquatic vegetation. Upland nest sites typically have clay or silt substrate and a south-facing aspect. The pond turtle is known to nest up to 1,320 feet from aquatic habitat (Jennings and Hayes 1994) but usually nests much closer (within 600 feet). Reese and Welsh (1997) reported that individuals moved an average of approximately 600 feet from water to their over-wintering sites. Western pond turtles have also been reported to hibernate in mud.

Aquatic habitat suitable for pond turtles is very limited in the Assessment Area. No mapped or unmapped ponds, lakes, or marshes have been found, and most streams are characterized by steep gradients or, in low-gradient reaches, by dense shade; neither condition is suitable for pond turtles. The most likely habitat for pond turtles in the Assessment Area is along the North and South Forks of the Salmon River (approximately 4 miles) and in ponds on private property (only one has been identified on private property in the Assessment Area).

Bald Eagle

Bald eagles breed near large, open bodies of water that provide a dependable supply of fish and other prey, such as water birds. Most nests are in large trees less than 0.5 mile from the main water body, and almost all nest sites are less than 2.0 miles (Lehman 1979), provide commanding views, and are buffered from human activities. Migrant and wintering bald eagles are also usually found near water but may occur any place there is relatively little human activity and available prey—primarily injured waterfowl, carrion (including dead cattle), and fish. Wintering bald eagles may roost communally in sheltered stands of large trees.

The nearest reported nest sites are along the Klamath and Trinity rivers (CNDDB 2008), and there are bald eagle management areas in the Happy Camp and Oak Knoll Ranger Districts along the Klamath River. There are no known nest or roost sites in or near the Assessment Area. Bald eagles could potentially nest within 2 miles of the lowest reaches of the South and North Forks of the Salmon River because the upper reaches of the rivers are too small to support breeding eagles, but the wider and deeper lower reaches may provide a dependable prey base. Potential nest sites are abundant in the Assessment Area; however, the distance to foraging habitat reduces the likelihood of occurrence to low.

Northern Goshawk

Northern goshawks are found in mid- to late-successional conifer forests; nest stands are usually characterized by a canopy cover that exceeds 50 percent, level terrain or “benches” of gentle slope, northerly aspects, proximity to water (usually less than one-third mile away), patches of larger trees, and proximity to meadows or forest openings. Telemetry studies suggest that foraging individuals avoid dense young forest stands and brush but use a wide variety of stand conditions, showing some preference for relatively mature stands with moderate canopy closure (Austin 1993; Hargis et al. 1994; Beier and Drennan 1997; Drennan and Beier 2003).

There are approximately 28,897 acres of suitable nesting habitat in the Assessment Area and five Goshawk Management Areas (GOMAs) with 1.0-mile home ranges that overlap the Assessment Area (Table 4). Two new goshawk territories were found in 2008 during the first large-area, protocol-level goshawk surveys in the Assessment Area (Herrera 2008). Klamath LRMP Standards and Guidelines specify that these GOMAs and active territories maintain 300 acres of dense mature forest within a 0.5-mile Primary Nest Zone and 900 acres in a mosaic of mid- to late-successional forest conditions in a 1.0-mile Foraging Habitat Zone.

Table 4. Northern goshawks in the Eddy Gulch LSR Project Assessment Area.

Territory	GOMA Established	Latest Survey/Status*	Prior Occurrence/ Reproduction	Home Range Overlaps Assessment Area	Home Range Overlaps an FRZ
Eddy Gulch	Yes-SAR1	2008/U	1991/1991	Yes	No
Matthews	Yes-SAR8	2008/U	1987/1987	Yes	No
Sixmile	Yes-SAR11	2008/U	1987/R	Yes	Yes
West Fork Whites	Yes-SAR14	1989/R	None	Yes	Yes
Blue Ridge Ranch	No	1994/R	1993/1993	No	No
Callahan Creek	No	1994/R	None	No	No
Russian River	Yes-SAR 13	2008/U	Unknown	Yes	No
Lower Shadow Creek	No	2008/R	2007/R	Yes	Yes
Lower Butcher Creek	No	2008/U	None	Yes	No

Note: * R = reproducing (including number of fledged if known); U = unknown.

Peregrine Falcon

Breeding peregrine falcons require prominent cliffs or other precipitous features with ledges or other platforms that are essentially inaccessible to mammalian predators and that provide protection from the weather (White et al. 2002). Nest sites are often near rivers, lakes, marshes, or ocean waters, which help provide an adequate prey base of small- to medium-sized birds, but peregrines can travel long distances, and nests may be several miles from any significant water feature.

Peregrines are widely distributed on the Klamath National Forest, and there are two known nest sites on the Forks of Salmon and Cecilville quadrangles that overlap the Assessment Area (CNDDB 2008). There are no known peregrine nest sites in the Assessment Area, but the rocky cliffs just northwest of the Eddy Lookout have the potential to support a breeding pair. Field and aerial photo reviews did not reveal any other suitable habitat in the Assessment Area.

Willow Flycatcher

Willow flycatchers inhabit riparian deciduous scrub, primarily willows, in or along wet meadows, streams, lakes, or other moist habitats. Occasional overstory trees may be present in a territory, but they avoid forest canopy (Bombay et al. 2003). Optimum habitat in northern California is typically moist meadows with perennial streams, lowland riparian woodlands dominated by willows (primarily in tree form) and cottonwoods, or smaller spring-fed or boggy areas with willow or alders (Harris et al. 1987; CDFG 2005). In the Pacific Northwest, willow flycatchers will sometimes colonize clearcuts post-harvest if patches of deciduous scrub have been retained or resprouted (Altman et al. 2003; Harris 2006).

Field reconnaissance and review of aerial photos did not identify any riparian habitat that is likely to support breeding flycatchers. Streams in the Assessment Area tend to be either high-gradient streams dominated by mountain alder or lower-gradient streams with a forest overstory, and both types are avoided by breeding willow flycatchers (Bombay et al. 2003).

Pallid Bat

The pallid bat is typically a colonial, resident bat occurring up to approximately 7,000 feet elevation in California. Pallid bats will use a variety of habitats, including grasslands, shrublands, woodlands, and mixed-conifer forests but are most common in open dry habitats with rocky areas for roosting (CDFG 1990; Sherwin and Rambaldini 2005). Day and night roosts include crevices in rocky outcrops and cliffs, caves, mines, trees, and various human structures such as bridges (especially wooden and concrete girder designs) and buildings. Habitat suitable for pallid bats is widespread, and suitable roost sites in the form of large trees and snags are scattered throughout the Eddy Gulch LSR. There have been no surveys in the Assessment Area, but pallid bats are expected to be fairly common in the Assessment Area.

Townsend’s Big-eared Bat

The Townsend’s big-eared bat is a colonial bat that uses many habitat types, ranging from low-elevation deserts to mid-elevation montane habitats throughout California. Its distribution is strongly correlated with the availability of caves and cave-like roosting habitat, including abandoned mines and buildings with cave-like spaces (Maser 1998; Pierson and Rainey 1998; Fellers and Pierson 2002; Sherwin and Piaggio 2005). Large-diameter trees have also been shown to be used for roosting in California coastal forests (Fellers and Pierson 2002; Mazurek 2004). Foraging associations include edge habitats along streams and areas adjacent to and within a variety of wooded habitats (Fellers and Pierson 2002).

Roosting Townsend's bats have been documented in the Cecilville Caves just southeast of the Assessment Area (Pierson and Rainey 1998), and they may also occur in other caves, mines, or buildings in the Assessment Area. Large hollow trees, although less likely to be used than caves or mines, are also widely scattered over the Assessment Area.

American Pine Marten

American pine martens prefer large blocks of dense (more than 50 percent canopy cover), multistoried, multispecies, late-successional coniferous forests, typically higher than 3,000 feet in the northern Sierra Nevada (Zielinski et al. 2005) and northwest California. Occupied areas usually include CWD with a high number of large (over 24 inches dbh) snags and downed logs; dense riparian corridors (Buskirk and Powell 1994; Ruggiero et al. 1994), and an interspersion of small (less than 1 acre) openings with good ground cover. Forests with a lack of structure near the ground are used little or not at all. The preference and apparent need for structure near the ground (for example, downed logs, large slash piles) is important because it creates subnivean spaces for protection from the weather and larger predators and also provides access to prey (Ruggiero et al. 1994).

Suitable habitat is widely distributed in the Klamath Ranges, but martens appear to be rare. Extensive surveys for forest carnivores in the Klamath National Forest began in 1992 (for example, Kucera et al. 1995) but did not detect any martens on the Salmon River and Scott River Ranger Districts until the 2005–2006 surveys, when they were detected in the Marble Mountain Wilderness Area north of the Eddy Gulch LSR (S. Yaeger, pers. comm. 2008). Incidental sightings have been recorded on four districts (excluding Oak Knoll), but this cannot be confirmed. Habitat suitable for martens is found throughout the upper elevations of the Assessment Area.

The rare Humboldt marten (*M. a. humboldtensis*) was reportedly detected at least as close as the Blue Creek drainage of the Klamath River in the Orleans Ranger District, but it is not known or suspected from the Salmon River and Scott River Ranger Districts based on its current distribution (Zielinski et al. 2001).

Pacific Fisher

The Pacific fisher is a Federal Candidate for listing under the ESA. The Pacific fisher was petitioned for listing in November 2000. After a 12-month review, the USFWS found Pacific fisher to be a distinct population segment and gave a “warranted but precluded” decision to the petition. As a result of that decision, the West Coast distinct population has become a Federal Candidate species under the ESA (USDI 2004) and will be annually reviewed for its status and may be listed at a later date.

The Pacific fisher typically occurs in mid- to late-successional coniferous forest and deciduous riparian habitats. They prefer large blocks of dense multistoried (greater than 60 percent canopy closure), multispecies, mid- to late-successional coniferous forests with a high number of large (over 30 inches dbh) snags and downed logs and a hardwood component (Ruggiero et al. 1994; Krohn et al. 1997; Zielinski et al. 2004a). This complex forest structure supports prey, provides individuals access to prey during winter, and provides typical fisher resting and denning sites. Habitat usually also contains small openings with understory vegetation and woody debris that support an abundance of diverse prey (such as voles, hares, porcupines, squirrels, mice, chipmunks, carrion, and fruit). Their preferred habitats are often connected by riparian corridors, saddles, or other linkages that serve as movement corridors. Fishers will den in brush piles, logs, snags, rocky areas, upturned trees, or in other protected cavities; hollow logs and snags are particularly important for denning. Young are typically born in February through May and remain with the female until late autumn.

The most influential variables affecting rest site selection in California fisher populations include maximum tree sizes and dense canopy closure, but other features are important to rest site choice as well, such as large-diameter hardwoods, large conifer snags, and steep slopes near water (Zielinski et al. 2004a). Across home ranges in a northern California study area, fishers selected sites made up of stands with large-diameter trees and dense canopy cover that were generally situated within drainage-bottoms (Yaeger 2005). Fishers select areas as rest sites where structural features are most variable but where canopy cover is least variable, suggesting that resting fishers place a premium on continuous overhead cover but prefer resting locations that also have a diversity of sizes and types of structural elements (Zielinski et al. 2004a, 2004b). Rest-site structures used by fishers include cavities in live trees, snags, hollow logs, fallen trees, canopies of live trees, mistletoe clumps, or large or deformed branches and to a lesser extent stick nests, rocks, ground cavities, and slash and brush piles (Heinemeyer and Jones 1994; Higley et al. 1998; Mazzoni 2002; Zielinski et al. 2004a, 2004b).

The Pacific fisher is an uncommon permanent resident in the Klamath National Forest. Although no den sites have been located in the Assessment Area, suitable denning, resting, and foraging habitat for fisher is widespread in the Assessment Area, especially below 5,000 feet. Fishers have been detected on numerous occasions at data stations in the Eddy Gulch LSR (Yaeger 2008; Zielinski et al. 2000). Additionally, camera stations have detected individuals near Etna Summit, on the south side of Etna Mill Creek, and in the Russian River Wilderness Area. The Eddy Gulch LSR is expected to support over 34,000 acres of suitable habitat (USFS 1999).

California Wolverine

The California wolverine is a montane (mountainous) species that can occur from 1,600 to 14,000 feet in elevation in Douglas-fir and mixed-conifer habitats, and probably also use red fir, lodgepole, wet meadow, and montane riparian habitats (Schempf and White 1977; Zeiner et al. 1990). The wolverine has a large home range (from 39 to 347 square miles [Ruggiero et al. 1994; CDGF 1990]); and will roam over hundreds of miles through a variety of habitats.

Structurally suitable habitat exists in the Assessment Area, although it is unlikely that wolverines currently use the Eddy Gulch LSR. There are several reported sightings from in and near the Assessment Area prior to the 1990s (USFS 1995; CNDDB 2008), but those sightings cannot be verified, and there have been no confirmed detections in the Coastal Ranges for over 80 years despite extensive survey efforts (for example, Zielinski et al. 2005), and most authorities consider the California wolverine to be extinct (Aubry et al. 2007; Schwartz et al. 2007). A single wolverine was observed near Truckee, California in 2008; however, it was determined to be a transient individual with genetic make up that does not match that of the California wolverine (USFS 2008).

1.6.3 Forest Service Management Indicator Species and Species Associations

The Klamath National Forest identified the following species associations and 15 species as management indicators to assess landscape and project-level effects on habitat conditions (USFS 1995, p. 4-39). Rationale for designation of these MIS is found in the EIS for the Klamath LRMP (USFS 1995) and on the "LRMP MIS Selection Summary." Completion of this checklist certifies that all project level MIS were considered during design of the proposed treatments for the Eddy Gulch LSR Project. The MIS Report is included as Appendix B of this Wildlife and Habitat Report.

River and Stream MIS Association

Species included in this association are tailed frog, Cascade frog, American dipper, northern water shrew, and long-tailed vole.

Tailed Frog. Tailed frogs are found in cool perennial streams in conifer-dominated habitats. The species occurs more frequently in mature or late-successional stands and use submerged rocks and logs in streams for cover. Potential habitat for tailed frogs in the Assessment Area occurs in approximately 67 miles of perennial streams. Tailed frogs have been collected from the Eddy Gulch

LSR in Music Creek, Johns Meadows Creek, and South Russian Creek east of Robinson Flat on the North Fork Salmon River watershed; and just outside the LSR in Dry Gulch, South Fork Taylor Creek, and Taylor Creek east of Cecilville (CNDDB 2008).

Cascades Frog. Please refer to the description of Cascades frog above in "Section 1.6.2: Forest Service Sensitive Species."

American Dipper. American dippers live along clear, fast-flowing, perennial streams and rivers with rock faces, waterfalls, large boulders, or other features that provide similar niches for nesting (Kingery 1996). Important habitat elements include gravel and cobble within the stream, in-stream or streamside boulders for perching, and overhanging ledges and crevices for nesting. Fallen logs and tree roots are sometimes used for nesting and roosting (Kingery 1996). There are approximately 75 miles of streams containing suitable habitat for American dippers throughout the Assessment Area, and individual dippers have been observed at multiple locations along the larger perennial streams.

Northern Water Shrew. Northern water shrews are common to abundant small mammals that are closely associated with montane riparian habitats. The species is seldom found further than 100 feet from water. Streams containing habitat suitable for northern water shrews occur throughout the Assessment Area.

Long-tailed Vole. Long-tailed voles are small mammals that are common residents of herbaceous understories of many forest habitat types and are expected to be abundant in montane riparian, wetlands, grasslands, and wet meadows. They nest in burrows in soft soils or within or beneath logs and seek cover in dense herbaceous vegetation. Potential habitat for long-tailed voles may occur throughout the Assessment Area but is limited by a lack of meadows, grasslands, or other habitats with a well-developed herbaceous layer.

Marsh, Lake, and Pond MIS Association

The marsh, lake, and pond MIS association consists only of the Western pond turtle. The northern red-legged frog does not occur in the Assessment Area.

Western Pond Turtle. Please refer to the description of Western pond turtle above in "Section 1.6.2: Forest Service Sensitive Species."

Hardwood MIS Association

Species associated with the hardwood habitat consist of the acorn woodpecker and western gray squirrel. There are 1,276 acres of mapped hardwood habitats in the Assessment Area.

Acorn Woodpecker. Acorn woodpeckers are found in hardwood, hardwood-conifer, or conifer habitats with mature oaks and snags. In the conifer belt, they are usually found in open stands with tree-sized oaks such as California black oak and canyon live oak; dense tanoak stands are typically avoided. Habitat suitable for acorn woodpeckers in the Assessment Area is generally restricted to open hardwood stands at lower elevations. Their abundance is unknown, but they are probably rare to uncommon in the Assessment Area because open hardwood stands are infrequent.

Western Gray Squirrel. Western gray squirrels are dependent on mature oak and mixed-conifer habitats, requiring large trees, mast crops, and snags. Suitable habitat found throughout the forest includes deciduous or broad-leafed woodlands dominated by oak, riparian areas, and mixed forests. The forestwide directive suggests maintaining a significant component of mature, mast-producing hardwoods and oak species where these species occur within conifer stands. Habitat suitable for gray squirrels is widespread, and this species is fairly common in the Assessment Area.

Snag MIS Association

The Snag MIS Association consists of Vaux's swift, red-breasted sapsucker, downy woodpecker, hairy woodpecker, white-headed woodpecker, black-backed woodpecker, and pileated woodpecker. There are 21,790 acres of forest generally suitable for the Snag MIS association.

Vaux's Swift. Vaux's swifts are aerial insectivores that nest and roost in large hollow trees and snags. Vaux's swifts are most common in late-successional coastal forests, but they also occur in other conifer-dominated forests below the zone of true firs. The swifts are reported to be most common in old-growth forests with high canopy closure (Bull and Cooper 1991; Bull and Hohmann 1993; Sterling and Paton 1996), but they also occur in burned forests and in towns with no canopy cover as long as large hollow trees or chimneys are available for nesting (B. Williams, unpubl. data).

The status of Vaux's swift in the Assessment Area is unknown (it is most likely rare), but habitat generally suitable for Vaux's swifts is fairly widespread.

Red-breasted Sapsucker. Red-breasted sapsuckers in California nest in montane riparian, montane hardwood-conifer, mixed-conifer, and true fir forests, preferring sites near meadows, clearings, or streams (Manaan et al. 1980; Raphael and White 1984; Walters et al. 2002). Nest cavities are typically excavated in dead trees or dead portions of live trees (Raphael and White 1984; Joy 2000). Most foraging occurs on live trees, but red-breasted sapsuckers will forage on snags, logs, and the ground (Raphael and White 1984). Habitat suitable for red-breasted sapsuckers is widespread in the Assessment Area, and individuals have been observed in the Eddy Gulch LSR.

Downy Woodpecker. Downy woodpeckers are a common resident of riparian deciduous and associated hardwood and conifer habitats and are closely associated with riparian softwoods. Habitat suitable for downy woodpeckers is fairly widespread but generally sparse, and downy woodpeckers are most likely rare to uncommon in the Assessment Area.

Hairy Woodpecker. Hairy woodpeckers are typically generalist woodpeckers that may occur in many types of conifer and hardwood-conifer habitats, with habitat preference varying geographically (Jackson et al. 2002). In California the species is usually found in open to moderately dense stands of mature conifers with snags of sparse to intermediate density, but they often favor burned stands and also use riparian habitats. Habitat suitable for hairy woodpeckers is widespread and hairy woodpeckers are common in the Assessment Area.

White-headed Woodpecker. White-headed woodpeckers reside in several types of montane coniferous forests up to higher elevation lodgepole pine and red fir habitats (Raphael and White 1984; Milne and Hejl 1989), but the species typically reaches its greatest abundance where two or more pine species are present, especially ponderosa pine (Garrett et al. 1996). Nests are often placed in stands with relatively open canopies or near habitat edges or openings. Nests typically occur in large-diameter snags and stumps, although live trees may also be used (Raphael and White 1984; Milne and

Hejl 1989; Dixon 1995; Buchanan et al. 2003). Habitat suitable for white-headed woodpeckers is widespread, and white-headed woodpeckers are fairly common in the Assessment Area.

Black-backed Woodpecker. Black-backed woodpeckers in California are generally rare and mostly confined to recently burned lodgepole pine, red fir, or other higher-elevation forests (Dixon and Saab 2000) where outbreaks of wood-boring beetles follow fires (Goggans et al. 1988; Murphy and Lenhausen 1998). They also occur in unburned forests if there is adequate prey (Bull et al. 1986; Goggans et al. 1988). Nests are frequently located in dead trees although live trees are also used (Raphael and White 1984; Bull et al. 1986). Unlike many other woodpeckers of the Pacific Northwest, this species often nests in small-diameter trees (Raphael and White 1984; Bull et al. 1986). Potential habitat for black-backed woodpeckers is widely distributed across upper elevations of the Assessment Area, but black-backed woodpeckers are very rare in northwestern California (Harris 2006). Black-backed woodpeckers are unlikely to occur in the Assessment Area with regularity, and they are most likely to occur in response to large stand-replacing fires.

Pileated Woodpecker. Pileated woodpeckers are generally residents of mature conifer or hardwood-conifer habitats near permanent water. They are most common in late-successional old-growth mixed-conifer forests with moderate to dense canopy cover and large numbers of snags, stumps, and logs (Bull 1987; Bull et al. 1992; Mellen et al. 1992; Bull and Holthausen 1993; Bull and Jackson 1995; Boleyn 1997; Aubry and Raley 2002). Pileated woodpeckers forage primarily on ants and wood-boring beetles (Bull and Jackson 1995). Downed logs have been shown to be an important substrate for forest-dwelling ants (Torgersen and Bull 1995) and are often frequented by foraging woodpeckers (Manaan 1984; Bull and Holthausen 1993; Boleyn 1997). There are approximately 16,784 acres of conifer forest suitable for pileated woodpeckers that are distributed widely throughout the Assessment Area, and individuals have been observed in the Eddy Gulch LSR.

1.7 Desired Conditions

The Klamath LRMP specifies that LSRs are to be managed to maximize the amount of late-successional forest to a level reasonably sustainable because surrounding areas of Matrix and private lands are expected to contain relatively little late-successional forest habitat.

However, dramatic differences in late-successional forest structure and process exist between forest community types in the LSR, and no single desired condition is appropriate for the entire landscape. It is desirable to have amounts of late-successional habitats that are between 45 and 65 percent identified functioning range to ensure continued functionality following inevitable natural disturbances.

Processes that historically have led to the development of late-successional ecosystems include tree growth and maturation; death and decay of large trees; low- to moderate-intensity disturbances (such as fire, wind, insects, and disease) that create canopy openings and gaps in various strata of vegetation; establishment of trees beneath the maturing overstory trees, either in gaps or under the canopy; and closing of canopy gaps by lateral growth or growth of understory trees. These processes result in forests moving through different stages of late-successional conditions that may span several hundred years.

It is desirable to have variability in late-successional vegetative characteristics. It is neither desirable nor possible to have entire landscapes containing the same vegetative characteristics, stocking levels, tree sizes, and understory component. Within each vegetation community, desired conditions will vary according to site capability, which is influenced by elevation, slope, aspect, and soil conditions. Multistoried conditions will be scattered throughout the landscape, but they will be more prevalent on the lower half of the more mesic north and east aspects and in riparian areas. South- and west-facing slopes will have very few multilayered conditions, except in the Douglas-fir-tanoak series. Canopy closure will vary across the landscape, ranging from approximately less than 40 percent on primary ridgetops and south and west slopes to greater than 50 percent on north and east slopes and riparian areas. The upper portions of all aspects, except in the true fir type, will generally have lower densities compared to lower portions of the slopes. Snag and down log accumulations will be higher on the lower portions of slopes and decrease as one moves up slope.

It is desirable to provide habitat that contributes to the recovery of the NSO, especially the productivity of the existing pairs within the Eddy Gulch LSR, including the USFWS priority protection areas. Variability in habitat attributes will be consistent with that described for late-successional habitats. Reintroduction of fire into LSRs may reduce the occurrence of habitat components locally. This is a recognized trade-off in order to create less hazardous fuels conditions that would otherwise put large areas of habitat at risk.

1.7.1 Desired Conditions Specific to the Northern Spotted Owl

Desired conditions that relate to specific objectives and opportunities for the habitat of the NSO are as follows:

- Scott and Salmon Mountains CHU subunit 35 maintains stable, self-sustaining, and interconnected populations of at least 22 NSO pairs.
- NSO pair home ranges provide a suitable mix (80 percent core area suitable habitat, 40 percent home range suitable habitat; ratio should be 2:1 of nesting-roosting:foraging (USFWS 2008b)) of nesting, roosting, foraging, and dispersal habitat that exceeds minimum levels to account for potential loss to stand-replacing events. Important measurement indicators (such as basal area, canopy cover, and large-diameter trees) are meeting current definitions of optimal habitat.
- Forested stands in home ranges are more resistant to large-scale fires but will burn with sufficient intensity to create small openings within forested habitat. This type of pattern will create a mosaic of stands in different successional stages and be consistent with patterns under historic fire regimes. Over time, this pattern will likely enhance critical habitat function by providing horizontal diversity across the landscape.
- Plantation stocking is promoting the development of large trees that will contribute to future development of additional or replacement late-successional habitat. Trees are generally spaced to maximize growth, and vegetation is managed to reduce the potential for stand-replacing fire, but scattered patches of understory brush are retained to provide habitat for prey.
- To the extent possible, the productivity of owl pairs should be increased indirectly by improving prey habitat.

- To the extent compatible with FRZ objectives, stand stocking and structure are promoting development and maintenance of the desired late-successional condition parameters.

1.8 Environmental Consequences

1.8.1 Alternative A: No Action

1.8.1.1 Federally Listed Species

Direct and Indirect Effects on NSO Habitat in Areas Not Affected by Wildfire

Under the no-action alternative, and in the absence of wildfire, there would be no direct effects on NSOs or their habitat.

The amount or quality of NSO habitat in the Assessment Area would change slowly in areas not affected by fire. Continued forest growth could have beneficial or adverse indirect effects, depending on local conditions. In relatively young or open stands, continued forest growth could benefit NSOs by allowing for a slow increase in tree size, basal area, canopy cover, snags, and CWD. This could lead to an increase in the number of activity centers and the amount of nesting/roosting or foraging habitat in existing activity centers. Continued forest growth could also decrease fire risk as young or open stands develop a moister microclimate. In most stands, continued growth would increase stand density, density-related tree mortality, fuel hazards, and the probability of a stand-replacing fire. Continued growth could make some stands too dense for owls (Irwin et al. 2007) and reduce overall stand diversity. In summary, young or open stands not occupied by NSOs would most likely benefit from continued forest growth, but understory stand densities in many other areas, including stands occupied by NSOs, would most likely exceed the optimal stand density for nesting/roosting or foraging habitat because high understory density would limit owl movement. The risk of stand-replacing fires will also increase as ladder fuels increase.

Direct and Indirect Effects on NSO Habitat in Areas Affected by Wildfire

The modeled wildfire (refer to Section 1.2.1. above) would have various direct effects on Critical Habitat, NSOs, NSO habitat, and NSO prey, depending on the location, season, intensity, and pattern of the wildfire. Smoke may not affect most NSOs (Bevis et al. 1997); however, heavy and continuous smoke may affect NSOs during the nesting season when young birds cannot escape the fire (USDA 2007). Fire may also increase the risk of predation on NSOs as they move to unfamiliar territory, into more open habitats, or during the day.

There are approximately 28,797 acres of suitable NSO habitat in the portion of the Scott and Salmon Mountains CHU subunit 35 contained in Eddy Gulch LSR. Over time, if left untreated, all of these acres have the potential to be affected by wildfire.

The 7,200-acre modeled fire would include 1,368 acres of low- to moderate-intensity fire that could benefit NSOs immediately after the fire by removing cover and/or concentrating prey into remaining patches of habitat (Lyon et. al. 2000). Jenness et al. (2004) concluded that relatively low-intensity ground fires probably have little or no short-term effect on the presence or reproductive success of Mexican spotted owls (*S. occidentalis lucida*). Similarly, Bond et al. (2002) hypothesized that NSOs have the ability to withstand the immediate, short-term (1-year) effect of fire occurring at primarily low to moderate severity within their territory. There would be short-term benefits as a result of the mosaic of small openings that would invigorate forest understory and create new snags and CWD used by NSO prey, resulting in additional prey. Low- to moderate-intensity fires would reduce fuels, thereby reducing the likelihood of future stand-replacing fires.

The modeled fire resulted in 81 percent crown fire (5,832 acres) where a moderate- to high-intensity fire could consume NSO nesting/roosting or foraging habitat, and extensive consumption of snags, CWD, understory, and litter and duff layers would reduce prey abundance. The modeled fire would have various indirect effects. Crown fires would result in substantial mortality, initiating successional changes that would replace mid- and late-successional forest stands with brush fields and dense young forests and increase the probability of future high-intensity wildfire. Fire may also affect enough nesting/roosting or foraging habitats that it could lead to changes in NSO occupancy of the area (Clark 2007). Excessive habitat loss in a core area and/or home range would most likely cause abandonment of one or more activity centers during or shortly following fire.

The USFWS considers habitat (in interior California) necessary to support NSOs consist of 400 acres of suitable habitat made up of at least 250 acres of nesting/roosting and 150 acres of foraging habitat in the 0.5-mile core area. All but one core area within the Eddy Gulch LSR Project Assessment Area are currently below 250 acres of nesting/roosting habitat. A crown fire would result in 75 percent mortality to trees greater than 20 inches dbh, removing most suitable nesting/roosting habitat, and creating an adverse effect on NSO habitat in the Assessment Area. When the simulated fire behavior was compared to available nesting/roosting habitat, crown fires could adversely affect any of the 20 core areas. Table 5 shows the existing number of nesting/roosting acres with the potential number of acres and the percentage of nesting/roosting habitat that would be removed by the modeled fire in each of the 20 core areas, as any one of the core areas is susceptible to crown fire. Additionally, all four of the USFWS priority protection areas would lose a substantial amount of habitat in a wildfire.

Direct and Indirect Effects on Critical Habitat With and Without Wildfire

Under the no-action alternative, and in the absence of wildfire, there would be no direct effects on Critical Habitat. The amount or quality of Critical Habitat in the Assessment Area would change slowly in areas not affected by fire. Continued forest growth could have beneficial or adverse indirect effects, depending on local conditions. In relatively young or open stands, continued forest growth could benefit Critical Habitat by allowing for a slow increase in tree size, basal area, canopy cover, snags, and CWD. This could lead to an increase in the amount of nesting/roosting or foraging habitat available within the Assessment Area. Continued forest growth could also decrease fire risk as young or open stands develop a moister microclimate. In other stands (most stands), continued growth would increase stand density, density-related tree mortality, fuel hazards, and the probability of a stand-replacing fire. Continued growth could make some stands too dense for owls (Irwin et al. 2007) and reduce overall stand diversity. In summary, young or open stands not currently containing suitable habitat would most likely benefit from continued forest growth, but understory stand densities in many other areas, including stands containing suitable habitat, would most likely exceed the optimal stand density for nesting/roosting or foraging habitat as increased understory stand density would limit owl movement, and as ladder fuels increase so will the risk of stand-replacing fires.

Table 5. NSO core areas, in or overlapping the Assessment Area, that are susceptible to the simulated wildfire under the no-action alternative.

Activity Center	Nesting / Roosting Habitat in Core Areas	Nesting / Roosting Habitat in Core Areas Removed by Crown Fire	Nesting / Roosting Habitat in Core Areas Adversely Affected by Crown Fire
	Acres		Percentage
KL0257	102	60	59
KL0365	141	51	36
KL1012[a]	174	140	80
KL1013	150	73	49
KL1014[a]	203	66	33
KL1028[a, b]	266	249	94
KL1030	244	150	61
KL1031[a]	140	129	92
KL1032[a, b]	161	154	96
KL1033[a]	254	165	65
KL1034[a]	209	138	66
KL1035[a]	169	116	69
KL1039	184	122	66
KL1040	166	104	63
KL1041	142	88	62
KL1046[a]	165	71	43
KL1047	100	89	89
KL1090	93	20	22
KL1258	132	23	17
KL4026[a]	171	145	85

Notes:

a. Denotes activity centers within which core areas would be treated with prescribed burning under Alternative B, and therefore are not expected to be susceptible to crown fires and habitat loss.

b. Denotes activity centers within which portions of the core areas would not be treated with prescribed burning under Alternative C, and therefore are expected to remain susceptible to crown fires and some habitat loss.

There are approximately 28,797 acres of suitable NSO habitat in the portion of the Scott and Salmon Mountains CHU subunit 35 contained in Eddy Gulch LSR. Over time, if left untreated, all of these acres have the potential to be affected by wildfire. Approximately 81 percent of the 7,200-acre wildfire would adversely affect PCEs in 20 percent of the suitable NSO habitat in CHU subunit 35 in Eddy Gulch LSR. Thus, the no-action alternative would have long-term adverse effects on Critical Habitat and the four PCEs by taking no action and failing to reduce the risk of stand-replacing fire in the landscape in a minimum of 5,832 acres within the Eddy Gulch LSR.

Moderate- to high-intensity fire could consume Critical Habitat. The modeled fire would have various indirect effects. Crown fires would initiate successional changes that would replace mid- and late-successional forest stands with brush fields and dense young forests and increase the probability of future high-intensity wildfire. Fire may also affect enough of existing Critical Habitat that it could lead to changes in NSO occupancy of the area. Excessive Critical Habitat loss would most likely cause abandonment of one or more activity centers during or shortly following fire.

Cumulative Effects on NSO and Critical Habitat

Changes to NSO habitat would be as described under direct and indirect effects. In the absence of fire, continued forest growth may increase NSO habitat in some areas, but fire hazard would increase in most areas. Proposed future activities on the Salmon River and Scott River Ranger Districts include the following: installation of telephone and fiber-optic lines along existing roads through the Ranger District; North Fork Roads Stormproofing Project (stormproofing 76 miles of road requiring blading, improving road drainage, and protecting riparian and stream systems; decommissioning 36 miles of roads to reduce sediment delivery to streams and adding 2.4 miles of existing road); and the construction of a fuelbreak system west of Black Bear Ranch (approximately 700 acres of ridgetop fuel reduction). These proposed future activities would have little effect on future wildfire behavior in the Assessment Area; therefore, the no-action alternative increases the potential for fire to remove the existing physical and biological features important to functioning Critical Habitat as well as dispersal habitat. Local community fuel reduction projects on private lands are small and would have little effect in reducing the risk or extent of fire in the Assessment Area.

1.8.1.2 Forest Service Sensitive Species

Tehama Chaparral and Klamath Shoulderband

Direct and Indirect Effects. No measurable direct effects on the Tehama chaparral or the Klamath shoulderband are expected in areas that are affected by wildfires because the species lives in moist talus, especially during the dry season when fires are most likely.

Negligible to moderate indirect effects could be expected to occur, depending on the location and severity of wildfire. Their habitat is generally resistant to fire, but extensive loss of forest surrounding talus slopes and rocky area could lead to conditions that are to dry and inhospitable for these species. Under the no-action alternative, there would be no direct or indirect effects on the Tehama chaparral or Klamath shoulderband in areas that are not affected by wildfire.

Cumulative Effects. Under the no-action alternative, no incremental effects are expected as a result of present or future projects because no actions are proposed under this alternative. However, loss of riparian or overstory vegetation could reduce habitat suitability for the Tehama chaparral or the Klamath shoulderband in immediately affected areas, and this risk is higher in areas with accumulated fuels.

Southern Torrent Salamander

Direct and Indirect Effects. In the absence of wildfire there would be no direct effects on salamanders. Over the long term, however, indirect effects could result as succession continues and the amount of late-successional habitat increases, providing benefits to the southern torrent salamander preferred habitat. Large diameter shade trees, CWD, and a deep litter layer would all continue to slowly increase as a result of the Alternative A.

Wildfire is not likely to directly affect individuals because southern torrent salamanders are rarely found away from aquatic habitat. However, fire could consume forest canopy that is an important component of the salamander’s habitat. The loss of forest canopy would result in indirect effects that would vary with fire intensity. Areas that burn with high intensity are likely to contribute sediment to streams. This sediment could fill interstitial spaces in coarse substrate that are used for cover by this species. Loss of vegetation that results in reduced shading may adversely affect the salamander, and perhaps small populations, because adults prefer cold, clear streams and are known to have a narrow range of preferred water temperatures (Welsh and Lind 1996). The loss of CWD and litter layer would reduce available cover for any individuals that may move out of aquatic habitat.

Cumulative Effects. There are no other proposed or anticipated actions that would combine with Alternative A to cause cumulative effects on the southern torrent salamander or its habitat beyond the project’s direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating in the Assessment Area.

Cascades Frog, Foothill Yellow-legged Frog, and Western Pond Turtle

Direct and Indirect Effects. The effects on the Cascades frog, foothill yellow-legged frog, and Western pond turtle are discussed together because they primarily occupy aquatic habitats and similar effects are expected. In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no direct or indirect effects on either species or their habitat.

Wildfire is not likely to directly affect individuals because these species are rarely found away from aquatic habitat during the fire season. Fire would not directly affect aquatic habitats used by these species, but it could remove shoreline vegetation (sometimes used by frogs) or harm turtles near upland nest sites depending on the timing of the fire. The indirect effects of fire would vary with fire intensity. Areas that burn with high intensity are likely to contribute sediment to aquatic habitats that could suffocate egg masses and/or tadpoles or reduce the macro-invertebrate prey base. This is generally more likely in low-gradient reaches where sediment may accumulate. Sedimentation could also reduce pond longevity. Loss of vegetation that results in reduced stream shading may benefit these species because adults require basking sites for thermoregulation, and increased stream temperatures would likely benefit larval or juvenile development, especially for the species near their upper elevational limits. For turtles, the loss of habitat components (such as large CWD) could remove basking sites, but recruitment of CWD and reduced vegetation would potentially create more basking sites and upland nest sites, especially in areas that are now densely shaded.

Cumulative Effects. There are no other proposed or anticipated actions in upland areas that would combine with Alternative A to cause cumulative effects on these species or their habitat beyond the project’s direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating in the Assessment Area.

Bald Eagle

Direct and Indirect Effects. Direct effects would result if wildfire were to kill young eagles unable to escape the nest or roost area. Fire could also consume large nest trees or nesting habitat. Areas that burn with high intensity could lead to increased sedimentation and, in turn, affect prey (fish) adversely; however, this indirect effect would be a short-term and negligible. In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no direct or indirect effects on the bald eagle or bald eagle habitat.

Cumulative Effects. The no-action alternative would not provide for the long-term protection of nesting habitat from stand-replacing fire. Large-scale changes in stream conditions that could reduce prey availability are possible but unlikely. No other effects are expected as a result of ongoing or future projects.

Northern Goshawk

Direct and Indirect Effects. In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no actions that would directly affect northern goshawks or their habitat. The amount or quality of northern goshawk habitat in the Assessment Area would change slowly in areas not affected by wildfire. The continued forest growth could result in either beneficial or adverse indirect effects, depending on local conditions. In relatively young or open stands, continued forest growth would benefit nesting habitat for northern goshawks by allowing for a slow increase in tree size, basal area, and canopy cover. It could also decrease fire risk as maturing stands develop a moister microclimate. In most other stands, continued growth would increase stand density, density-related tree mortality, fuel hazards, and the probability of a stand-replacing fire. Continued growth could also make some stands too dense for northern goshawks and reduce overall stand diversity.

The modeled fire would have various effects on northern goshawks, northern goshawk habitat, and prey depending on the location, season, intensity, and pattern of the fire. Fire or smoke may injure or kill northern goshawks, most likely during the nesting season when young birds may be unable to escape the nest or roost area. Direct effects would result if moderate- to high-intensity wildfire could reduce suitability of northern goshawk nesting, roosting, or foraging habitat, and extensive loss of snags, CWD understory, and litter and duff layers reduces prey abundance. Based on the modeled wildfire of 7,200 acres, up to 5,832 acres (81 percent) of the forested habitat could be removed or adversely affected. Depending on the exact location of the fire, this habitat loss would most likely cause adverse effects on or abandonment of one or more activity centers.

The modeled fire would cause various indirect effects. Excessive habitat loss in a core area and/or home range would most likely cause abandonment of one or more activity centers during or shortly following fire (although changes in goshawk occupancy may be delayed if some habitat remains following fire or if tree mortality is delayed; delayed mortality is common in low- to moderate-severity fire). Moderate- to high-intensity fire would initiate successional changes that could increase the probability of future stand-replacing fire as forest is replaced with brush fields and dense young forest. Low- to moderate-intensity fire could benefit northern goshawks by reducing the likelihood of future stand-replacing fire and by creating a mosaic of openings that would invigorate forest understory and create prey habitat.

Cumulative Effects. There are no proposed or anticipated actions that would combine with Alternative A to cause cumulative effects on the northern goshawk or its habitat beyond the project's direct and indirect effects discussed above. Continued forest growth may increase northern goshawk habitat in some areas, but fire hazard would increase in proportionally larger areas. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating in the Assessment Area.

Peregrine Falcon

Direct and Indirect Effects. Wildfire would likely not result in direct effects on peregrine falcons because nest sites are in rocky cliffs, and heavy smoke is not likely to persist around an eyrie. Areas that burn with high intensity may create patches of reduced vegetation, which can reduce prey availability; however, this is expected to be a negligible indirect effect. In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no direct or indirect effects on the peregrine falcon.

Cumulative Effects. There are no other proposed or anticipated actions that would combine with Alternative A to cause cumulative effects on the peregrine falcon or its habitat beyond the project's direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating in the Assessment Area.

Willow Flycatcher

Direct and Indirect Effects. In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, individual flycatchers in the Assessment Area and Riparian Reserve would not be disturbed, so there would be no direct or indirect effects on individual flycatchers. No suitable habitat is currently known to occur in the Assessment Area, so there would be no direct or indirect effects on habitat.

In areas affected by wildfire, those areas that burn with high intensity are more likely to benefit willow flycatchers by removing most or all of the forest canopy, allowing for extensive growth of a riparian shrub layer and nesting habitat for approximately 10–12 years. Vigorous brush fields created by stand-replacing fires could potentially provide suitable breeding habitat, just as clearcuts have sometimes led to the creation of suitable breeding habitat elsewhere in northwestern California (Harris 2006) and Oregon (Altman et al. 2003). Those areas that burn with low intensity would not benefit flycatchers because the overstory layer would remain intact.

Cumulative Effects. There are no other proposed or anticipated actions that would combine with Alternative A to cause cumulative effects on the willow flycatcher or its habitat beyond the project's direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating in the Assessment Area.

Pallid Bat and Townsend's Big-eared Bat

Direct and Indirect Effects. These two bats are analyzed together, but pallid bats are more likely to be directly affected because of their more general use of the forest for roosting. In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no affect on habitat or disturbance to roosting bats in the Assessment Area and, therefore, there would be no direct effects on the pallid bat or Townsend's big-eared bat.

The amount or quality of habitat would change slowly in areas not affected by wildfire. The continued forest growth could have either beneficial or adverse effects, depending on local conditions. In relatively young or open stands, continued forest growth would benefit bats by allowing for a slow increase in snags. This could hypothetically lead to an increase in the number of maternal colonies, although it seems unlikely that pallid bats in the Project Area are limited by suitable roost sites. It could also decrease fire risk as maturing stands develop a moister microclimate. In other areas, continued growth would increase stand density, density-related tree mortality, fuel loads, and the probability of a stand-replacing fire. Continued growth could also make some stands too dense for foraging bats and reduce overall stand diversity.

In areas affected by the modeled wildfire, direct effects would occur if bats (specifically, juvenile bats or maternal colonies) are killed or harmed by fire or smoke, depending on the timing of fire. Fire could also consume snags and large hollow trees used as maternal colonies or roost sites, but fire would also create snags and cavities. Short-term loss of vegetation would reduce the abundance of aerial and terrestrial insect prey.

The modeled fire would have various indirect effects. Moderate- to high-intensity fire would initiate successional changes that could increase the probability of future stand-replacing fire (and the loss of large trees and snags) as forest is replaced with brush fields and dense young forest. Low- to moderate-intensity fire could benefit bats by creating snags and cavities and by creating a mosaic of openings that would invigorate forest understory and increase the abundance of insect prey.

Cumulative Effects. There are no proposed or anticipated actions that would combine with Alternative A to cause cumulative effects on the bats or their habitat beyond the project's direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating in the Assessment Area.

American Pine Marten and Pacific Fisher

Direct and Indirect Effects. In the absence of wildfire, there would be no actions that would directly affect martens, fishers or their habitat. However, over the long term, the amount or quality of habitat in the Assessment Area would change slowly in areas not affected by wildfire. The continued forest growth could result in either beneficial or adverse indirect effects, depending on local conditions. In some young or open stands, continued forest growth would benefit these species by allowing for a slow increase in tree size, basal area, canopy cover, snags, and CWD. This could lead to an increase in denning and resting habitat or foraging habitat. It could also decrease fire risk as maturing stands develop a moister microclimate. In other areas, however, continued growth would increase stand density, density-related tree mortality, fuel hazards, and the probability and extent of stand-replacing fire.

The modeled wildfire could have various direct effects on martens or fishers, their habitat, and their prey, depending on the wildfire's location, season, intensity, and pattern. Fire or smoke may injure or kill individuals, most likely during the breeding season when young animals may be unable to escape. Fire may also increase the risk of predation as individuals move into more open habitats. Any type of fire could reduce the amount of resting, denning, and subnivean access habitat, and extensive consumption of snags, CWD, understory, and litter and duff layers would reduce prey abundance in the short-term. Beneficial direct effects would include the creation of snags that could be used as resting or denning sites. Fire could also increase prey availability by removing cover and/or concentrating prey into remaining patches of habitat.

Areas that burn with moderate to high intensity would reduce the overall number of available acres over the long term. Based on the modeled fire of 7,200 acres, up to 5,832 acres (81 percent) of forested habitat could be removed or adversely affected. Depending on the exact location of the fire, this habitat loss would likely cause adverse effects on or abandonment of one or potentially two territories.

The modeled wildfire would have various indirect effects. Low- to moderate-intensity fire could benefit habitat by reducing the likelihood of future stand-replacing fire and by creating a mosaic of openings that would invigorate forest understory and increase recruitment of snags and CWD used as denning and resting sites as well as by prey (and as subnivean access). Moderate- to high-intensity fire would initiate successional changes that could increase the probability of future stand-replacing fire as forest is replaced with brush fields and dense young forest.

Cumulative Effects. There are no proposed or anticipated actions that would combine with Alternative A to cause cumulative effects on the marten, fisher or their habitat beyond the project's direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating inside the Assessment Area.

California Wolverine

Direct and Indirect Effects. In the absence of wildfire, it is unlikely that the amount of potential habitat available for the wolverine in the Assessment Area would change in the short term. Over the long term, however, continued forest growth would increase stand density, density-related tree mortality, fuel loads, and the probability of a stand-replacing fire. Currently, there would be no direct or indirect effects on the wolverine because none are known to occur in the Assessment Area.

The modeled fire could have various direct effects on wolverines, wolverine habitat, and wolverine prey depending on its location, season, intensity, and pattern. Fire or smoke may injure or kill wolverines, most likely during the breeding season when young animals may be unable to escape. Moderate- to high-intensity fire could consume wolverine habitat, but the effect from a fire the size of the modeled fire may be minor with respect to a wolverine's large home range. Extensive consumption of snags, CWD, understory, and litter and duff layers would reduce prey abundance in the short-term, but fire could increase prey availability by removing cover, by concentrating prey into remaining patches of habitat, or by killing or injuring animals and thus providing a source of carrion.

The amount or quality of wolverine habitat in the Assessment Area would change slowly in areas not directly affected by wildfire, but the modeled fire would have various indirect effects. Moderate- to high-intensity fire would initiate successional changes that could increase the probability of future stand-replacing fire as forest is replaced with brush fields and dense young forest. However, this could benefit wolverines if the early successional habitats increase the availability of large prey and if large prey, such as deer, are limiting to wolverines in the region. Low- to moderate-intensity fire would reduce the likelihood of future stand-replacing fire and create a mosaic of openings that would invigorate forest understory used by prey species. This would also create a more variable landscape that is closer to the historical landscape condition when wolverines regularly occurred in California.

Cumulative Effects. There are no proposed or anticipated actions that would combine with Alternative A to cause cumulative effects on the wolverine or its habitat beyond the project's direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating inside the Assessment Area.

1.8.1.3 Forest Service MIS Associations

River and Stream MIS Association

Direct and Indirect Effects. In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no direct effects on river and stream habitats or to current population trends. Large-diameter shade trees and CWD would increase over the long term, resulting in indirect beneficial effects.

Wildfires may consume vegetation that adjoins aquatic habitats, but fire would not directly affect aquatic habitat. Wildfires, especially a high-intensity fire, could remove riparian vegetation, which would adversely affect stream temperatures and other habitat components. Areas that burn with high intensity are likely to contribute sediment to aquatic habitats that could suffocate egg masses and/or tadpoles or reduce the macroinvertebrate prey base. Sedimentation effects would vary with stream type, as low-gradient reaches are more likely to accumulate sediment and small debris than high-gradient reaches. Fire could increase the recruitment of CWD to streams, but very long-term recruitment (well beyond 20 years) of CWD would eventually approach zero in areas burned by stand-replacing fire.

Cumulative Effects. There are no proposed or anticipated actions that would combine with Alternative A to broadly cause cumulative effects on the River and Stream MIS Association beyond the project's direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating inside the Assessment Area.

Marsh, Lake, and Pond MIS Association

Direct and Indirect Effects. In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no direct or indirect effects on individuals, population trends, or aquatic habitats, including Riparian Reserves.

The modeled wildfire would not directly affect aquatic habitats or current population trends, but it could remove shoreline vegetative cover. Wildfires, especially the high-intensity fire, could remove all or a portion of overstory vegetation, which could affect water temperature. Areas that burn with high intensity are likely to contribute sediment to aquatic habitats, which could suffocate egg masses and/or tadpoles or reduce the macroinvertebrate prey base. Sedimentation could also reduce pond longevity.

Cumulative Effects. There are no proposed or anticipated actions that would combine with Alternative A to cause cumulative effects on the Marsh, Lake, and Pond MIS Association beyond the project's direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating inside the Assessment Area.

Hardwood MIS Association

Direct and Indirect Effects. In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no direct effects on hardwood habitats or to population trends of the individual species. In areas not affected by fire, tree size and snags are expected to slowly increase. However, areas not affected by wildfire would likely become increasingly dominated by a dense conifer overstory, which would decrease hardwood productivity and dominance and thus decrease use of the habitat by species that prefer hardwoods but avoid conifer forests.

Based on the modeled fire, up to 81 percent of the hardwood habitat in a given area could be removed or adversely affected. Any kind of fire could consume hardwood snags and CWD, but fire would also create snags and cavities that provide nest or roost sites. Fire could benefit hardwoods by removing competition from encroaching young conifers.

The modeled fire would have various indirect effects. Moderate- to high-intensity fire would initiate successional changes that could increase the probability of future stand-replacing fire as forest is replaced with brush fields and dense young forest. This would prevent the development of mature hardwood habitats. Low- to moderate-intensity fire is likely to benefit hardwood habitats by reducing the likelihood of future stand-replacing fire, by creating a mosaic of openings, by initiating tree and snag decay that would create foraging opportunities and nesting/roosting structure, and by reducing competition from conifers.

Cumulative Effects. There are no proposed or anticipated actions that would combine with Alternative A to cause cumulative effects on the Hardwood MIS Association beyond the project's direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating inside the Assessment Area.

Snag MIS Association

Direct and Indirect Effects. In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no direct effects on snags or population trends of species associated with snag habitat within the Assessment Area, and snags would slowly increase in areas not affected by wildfire. This could increase habitat suitability in some stands, but habitat in other stands would suffer from reduced tree growth and accumulation of only small snags, which are much less valuable to wildlife than large snags. Snags would not be produced by fire, which is an important factor in snag recruitment. The risk of high-severity fire would increase in most areas.

Any kind of fire could consume snags, but fire would also create snags and cavities that provide nest or roost sites. Although fire generally creates more snags than it destroys, most of the snags created by moderate- to high-intensity fire would not be located in live forests. Based on a modeled fire, up to 81 percent of the forested habitat could be removed or adversely affected.

The modeled wildfire would have various indirect effects. The extent of these effects, whether beneficial or adverse, would vary by species and fire intensity, size, and pattern (Saab et al. 2007), but is unlikely to affect current population trends. The modeled fire may benefit snag-associated species by recruiting snags and by increasing foraging opportunities in the short term as beetles and other insects colonize newly killed trees. However, high-intensity wildfire would remove forest overstory (required by some snag-dependent species) and could initiate successional changes to brush fields that would reduce long-term snag recruitment.

Cumulative Effects. The no-action alternative would not provide for the long-term protection of Snag MIS Association habitat in forested settings from the effects of high-severity wildfire. No other effects are expected as a result of ongoing or future projects.

1.8.2 Alternative B: Proposed Action

1.8.2.1 Federally Listed Species

Direct and Indirect Effects on NSO Habitat from Treatments in M Units (Inside FRZs)

Thinning in M Units could reduce three features that are used to define suitable NSO nesting/roosting or foraging habitat: canopy cover, basal area, and the number of large-diameter trees. Treatments in M Units would have little effect on individual NSO or their Critical Habitat because

- the M Units are along ridges, and the physiographic features associated with most of the M units indicate a low probability of use by foraging or nesting/roosting individuals;
- the M Units avoid all but one NSO core, area part of which occurs along a ridgeline; and
- all NSO home ranges in which M Units occur will retain habitat sufficient to support NSOs following treatment.

Mechanical thinning of M Units in NSO home ranges would downgrade[3] 36.4 acres of nesting/roosting habitat to foraging habitat (Table 6), and 199.7 acres of foraging habitat within home ranges would be modified. In some cases affected habitat polygons are shared by more than one NSO activity center (see Table 7), and individual M Units are counted more than once, but acreage calculations are not.

Treatments would modify 199.7 acres of foraging habitat in nine 1.3-mile radius home ranges. Treatments in M Unit 19 would modify 5.7 acres of foraging habitat within a core area (KL 1032), where foraging habitat exceeds the required 150 acres of foraging habitat (Table 7). The Proposed Action has been designed to maintain basal area and trees per acre that are characteristic of NSO foraging habitat, and thus proposed treatments are not expect to create habitat changes that would affect occupancy of the activity centers.

3. Definitions for treatments to owl habitat:
- Downgrade—proposed treatment will change the habitat suitability classification from nesting/roosting to foraging or from foraging to dispersal.
- Modify—treatment proposed within owl home ranges will not change the habitat suitability class, but will alter the current canopy cover, basal area, and/ or trees per acres.
- Remove—proposed treatment will remove habitat, no habitat suitability classification will apply to remaining habitat.

Table 6. Breakdown of NSO habitat within M Units, pre- and post-treatment.

M Unit	Total Acres	Within Home Range (HR) or Core Area (CA)?[a]	Pre-Treatment NSO Habitat Within M Unit (acres)		Habitat Removed or Downgraded Within M Unit (acres)		Post-Treatment NSO Habitat Within M Unit (acres)	
			N/R[b]	F[b]	N/R	F	N/R	F
3	7	HR	0	1.5	0	0	0	1.5
4	33	HR	0	30	0	0	0	30
7N	14	No habitat	0	0	0	0	0	0
7S	19	HR	0	1.3	0	0	0	1.3
8	5	HR	1.4	0	1.4	0	0	1.4
9	29	HR	1.1	23.6	1.1	0	0	24.7
10	32	HR	0	6.14	0	0	0	6.14
10[c]	32		1.2	2.6	1.2	0	0	3.8
11	3	No habitat	0	0	0	0	0	0
12	22	HR	0.2	2.37	0.2	0	0	2.39
13	32		9.7	16.5	9.7	0	0	26.2
15	138		0	6.3	0	0	0	6.3
16	4	No habitat	0	0	0	0	0	0
17	12	HR	0	10.36	0	0	0	10.36
19	46	HR and CA	0	5.7	0	0	0	5.7
20	13	HR	0	0.18	0	0	0	.18
21	108	HR	0	15.80	0	0	0	15.8
21[c]	108		5.3	58.6	5.3	0	0	63.9
22	7	HR	0	4.6	0	0	0	4.6
23	42	HR	2.5	29.1	2.5	0	0	31.6
24	45	HR	8.7	28.6	8.7	0	0	37.3
25	27	No habitat	0	0	0	0	0	0
30	9		0	8.8	0	0	0	8.8
31	20	HR	0	7.54	0	0	0	7.54
32	5	HR	0	0.9	0	0	0	0.9
35	4	No habitat	0	0	0	0	0	0
36	21	No habitat	0	0	0	0	0	0
37	12	No habitat	0	0	0	0	0	0
38	12	No habitat	0	0	0	0	0	0
39	14	HR	0	0.38	0	0	0	0.38
40	7	HR	0	3.41	0	0	0	3.41
43	12	HR	1.1	2.21	1.1	0	0	3.31
51	12	HR	0.2	2.8	0.2	0	0	3
52	19		0	10.7	0	0	0	10.7
54	37		0	1.4	0	0	0	1.4
60	17	No habitat	0	0	0	0	0	0
61	25	HR	0	1.5	0	0	0	1.5
65	6	HR	0	1.57	0	0	0	1.57
65[c]	6		0	2.6	0	0	0	2.6
66	2	HR	0	2	0	0	0	2
73	26	HR	14.5	7.76	14.5	0	0	22.26
75	9	HR	2.4	6.44	2.4	0	0	8.84
76	8	HR	4.3	3.91	4.3	0	0	8.21
79	13		0	12.3	0	0	0	12.3
80	3	No habitat	0	0	0	0	0	0

Notes:

a. All M Units are found within Critical Habitat.

b. N/R = nesting/roosting; F = foraging.

c. M Units also found partially within home range.

Table 7. Acres of proposed thinning in M Units in occupied NSO habitats.

Activity Center	Pre-project Habitat Within 0.5-Mile Core Area			Acres Habitat Downgraded[a] or Removed[b] in 0.5-mile Core Area		Post-project Acres Habitat in 0.5-mile Core Area		Pre-project Habitat Within 1.3-mile Home Range			Acres Habitat Downgraded or Removed in 1.3-mile Home Range		Post-project Acres Habitat in 1.3-mile Home Range	
	NR [250][c]	F [150]	Total [400]	NR	F	NR	F	NR	F	Total [1,335][d]	NR	F	NR	F
KL1012	174	111	285	0	0	174	111	865	909	1,774	0	0	865	909
KL1013	150	115	365	0	0	150	115	838	751	1,589	0	0	838	751
KL1014	203	152	355	0	0	203	152	797	951	1,748	0	0	797	951
KL1028	267	84	351	0	0	267	84	826	592	1,418	11.2	0	814.8	603.2
KL1029	207	156	363	0	0	207	156	920	760	1,680	0	0	920	760
KL1030	244	94	338	0	0	244	94	727	552	1,279	0	0	727	552
KL1031	140	199	339	0	0	140	199	775	774	1,549	2.4	0	772.6	776.4
KL1032	161	192	353	0	0	161	192	521	947	1,468	0	0	521	947
KL1033	254	133	387	0	0	254	133	987	1,042	2,029	8	0	979	1,050
KL1034	209	46	255	0	0	209	46	1,003	985	1,988	14.7	0	988.3	999.7
KL1035	169	230	399	0	0	169	230	793	1,231	2,024	0.4	0	792.6	1,231.4
KL1047	100	187	287	0	0	100	187	316	748	1,064	0	0	316	748
KL4026	171	159	330	0	0	171	159	747	1,000	1,747	11.2	0	735.8	1,011.2

Notes:

a. Defined as changing the current habitat classification from nesting/roosting to foraging.

b. Defined as changing the current habitat classification to an unclassified state.

c. USFWS minimum acres necessary to support breeding pairs.

d. USFWS minimum acres of combined nesting/roosting and foraging habitat necessary in NSO home ranges.

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Treatments in M Units would remove small trees and reduce the basal area and canopy cover in 36.4 acres of nesting/roosting habitat in home ranges of six activity centers (Table 7), two of which overlap the same M Units. Treatments would downgrade mapped nesting/roosting habitat in two NSO home ranges (8 acres in KL1033 and 14.7 acres in KL1034). Treatments in M Units would also downgrade additional acres of mapped nesting/roosting habitat (11.2 acres in KL1028, 2.4 acres in KL1031, 0.4 acre in KL1035, and 11.2 acres in KL 4026) in four NSO home ranges. All treatments occur on ridgetops, a landscape feature not typically used as nesting/roosting habitat (Irwin et al. 2000; Irwin et al. 2004), thus it probably functions as foraging habitat, which is in excess in all of the activity centers (Table 7).

The Proposed Action is designed to retain trees larger than 20 inches dbh, and the post-treatment basal area will meet or exceed standards for foraging habitat. Because the treatment units will maintain the targets for basal area and trees per acres (greater than 24 inches), these units are expected to function as NSO foraging habitat post-treatment. Reducing the canopy cover is consistent with that of the pre-European fire regime (please refer to the Silviculture Report for the Eddy Gulch LSR Project 2009), and it will allow more sunlight to reach the forest floor, increasing surface resources in the long term and increasing prey that are dependent on those resources.

All home ranges in which there are M Units exceed the 1,335 acres of suitable habitat and the 935 acres of suitable foraging habitat outside the core area, so M Unit treatments would not affect occupancy. Additionally, creating such mosaics of different vegetation and successional stages may offer a stable prey base (Franklin et al. 2000).

Limited thinning outside of core areas is unlikely to affect NSO habitat use because the thinning activities are either along ridgetops away from known usage areas, or thinned acres are found within home ranges that have an excess of habitat (beyond USFWS minimum requirements). Some owls may shift their activity centers in response to thinning, but changes in home range sizes attributable to thinning treatments are unlikely (Irwin et al. 2000). Effects are especially unlikely where thinning prescriptions are designed to retain foraging habitat or where thinning occurs along ridges or on the periphery of the home range.

The construction of 1.03 miles of new temporary roads, disturbing 1.7 acres on ridgetops, under Alternative B would remove 0.60 acre of foraging habitat and 0.02 acre of habitat classified as nesting/roosting. However, based on the ridgetop location of the 0.02 acre of nesting/roosting habitat, it is presumed to function as foraging habitat for NSOs. None of the temporary roads occur in NSO core areas, and the roads will be closed (ripped and mulched, as needed) following treatment, so there would be no long-term effects on NSOs. No new landings are proposed, and existing landings will not be expanded under Alternatives B and C, thus no long-term effects on NSOs are expected.

Direct and Indirect Effects of Treatments in Fuel Reduction Areas in FRZs and Along Emergency Access Routes

Treatments along emergency access routes would be similar to the FRZ or Rx Unit the route passes through. These treatments would have little effect on canopy cover because burning would remove smaller trees that do not contribute substantially to canopy cover in the overstory. Fuel reduction treatments would cause changes in the amount and/or types of snags, CWD, understory vegetation (including small trees), and prey. Treatments could potentially consume existing snags but may also create new snags. Typically, large trees and snags are not lost during prescribed fire. The burn plan (developed prior to implementing any treatments for the Eddy Gulch LSR Project) will design a prescribed fire that consumes smaller-diameter trees. Prescribed fire would consume most of the smaller down woody debris and some of the CWD, but much of the CWD would likely remain when burning in spring prescriptions. A study by Stephens and Moghaddas (2005b) noted that the reduction in volume of existing snags and CWD following prescribed fire treatments depends on both tree diameter and decay class (decay classes 1–3 for snags and CWD denote sound structural integrity of the heartwood, wherein decay class 4 denotes rotten heartwood and decay class 5 denotes no structural integrity). For example, total sound CWD (decay classes 1 and 2) was not significantly reduced by treatments. The most dramatic change of CWD in this study was the reduction of rotten CWD, especially in decay class 4, as a result of prescribed fire treatments.

Treatments would remove or consume existing snags and individual hazard trees along 16 miles of emergency access routes outside of FRZs or Rx Units, but effects on NSOs would be negligible because (1) treated areas would generally avoid NSO nest stands; (2) snag retention would follow Klamath LRMP guidelines in NSO nesting/roosting and foraging habitat treated mechanically or by hand; and (3) snag loss would be concentrated in ridgetop FRZs where NSOs are not likely to nest or roost. NSOs in KL1047, the only core area where roadside hazard fuel reductions are proposed, would be protected by resource protection measures designed to avoid disturbance effects on owls, suitable habitat would be maintained by following Klamath LRMP guidelines and resource protection measures, and hazard trees are expected to be individual trees along only the road prisms and is not expected to affect canopy cover. Similarly, treatments would destroy or consume most of the smaller woody debris and some of the CWD, but CWD retention would follow Klamath LRMP Guidelines in NSO nesting/roosting/foraging habitat treated mechanically or by hand, and some CWD would also remain when burning in spring prescriptions. Stephens and Moghaddas (2005b) note that most understory vegetation would also be removed in fuel reduction areas. Mastication would not remove trees greater than 10 inches dbh, and burning would not remove trees greater than 4 inches dbh. Removing small trees and brush would have no effect on existing foraging or nesting habitat.

Overall, snag, woody debris, and understory removal are not likely to directly affect NSOs, but fuel reduction activities could affect NSOs by affecting their prey, including woodrats (Wirtz et al. 1988; Lyon et al. 2000). However, treatments are designed to minimize effects on prey by limiting treatments to no more than 50 percent of the suitable habitat within a home range within a given year, and treatments in the Assessment Area would be spread over a 5-year period. Prescribed fire is also designed to leave a mosaic of burned and unburned areas so some shrubs, snags, and CWD would remain to provide cover or food for prey species (Lyon et al. 2000; Lehmkuhl et al. 2006b) and minimize effects on NSOs. NSOs may temporarily benefit from fuel reduction activities as rodent prey move to avoid disturbance or concentrate in remaining patches of habitat. A reduction in understory cover may also facilitate NSO foraging efficiency. After treatment, NSO prey species are likely to increase as understory vegetation and litter layers recover and down woody debris is recruited from the snag population (Waters et al. 1994; Carey and Wilson 2001; Suzuki and Hayes 2003; Gomez et al. 2005). Reduced vegetative competition would also accelerate tree growth in some areas (refer to Tables 3-6, 3-7, and 3-8 in Section 3.2 of the Eddy Gulch LSR Project EIS).

Direct and Indirect Effects of Treatments in Rx Units

Prescribed fire would cause changes in the amount and/or types of snags, CWD, understory vegetation, and prey. These treatments would have little effect on canopy cover because burning would remove smaller trees that do not contribute substantially to canopy cover in the overstory. There is the potential that treatments could potentially consume existing snags but may also create new snags. Typically, large trees and snags are not lost during prescribed fire. The burn plan (developed prior to implementing any treatments for the Eddy Gulch LSR Project) will design a prescribed fire that consumes smaller-diameter trees. Prescribed fire would consume most of the smaller down woody debris and some of the CWD, but much of the CWD would likely remain when burning in spring prescriptions. A study by Stephens and Moghaddas (2005b) noted that the reduction in volume of existing snags and CWD following prescribed fire treatments depended on both tree diameter and decay class (decay classes 1–3 for snags and CWD denote sound structural integrity of the heartwood, wherein decay class 4 denotes rotten heartwood and decay class 5 denotes no structural integrity). For example, total sound CWD (decay classes 1 and 2) was not significantly reduced by treatments. The most dramatic change of CWD in this study was the reduction of rotten CWD, especially in decay class 4, as a result of prescribed fire treatments.

Prescribed fire is likely to kill, injure, or displace NSO prey, including woodrats (Wirtz et al. 1988; Lyon et al. 2000). However, treatments are designed to minimize effects on prey by limiting treatments to no more than 50 percent of the suitable habitat within a core area or home range within a given year. Burning may also provide a temporary benefit as prey move from burned areas to unburned areas, increasing their availability to NSO. Additionally, treatments in the Assessment Area would be spread over the 11-year timeframe to complete treatments, thus reducing effects over time. Prescribed fire is also designed to leave a mosaic of burned and unburned areas (the total sum of all openings in any given burn unit would not exceed 10 percent) so some shrubs, snags, and CWD would remain to provide cover or food for prey species (Lyon et al. 2000; Lehmkuhl et al. 2006b) minimizing the effects on NSOs.

CWD and litter layers would begin to accumulate after treatment, and understory vegetation would regenerate in most areas. These changes are expected to benefit NSO prey (Waters et al. 1994; Carey and Wilson 2001; Suzuki and Hayes 2003; Gomez et al. 2005). Reduced vegetative competition would also accelerate tree growth in some areas (refer to Tables 3-6, 3-7, and 3-8 in Section 3.2 of the Eddy Gulch LSR Project EIS). Prescribed low intensity fire, as dictated in the EIS, is unlikely to affect activity center occupancy or reproduction (Bond et al. 2002; Jenness et al. 2004; Clark 2007).

Prescribed fire treatments would benefit NSOs and NSO habitat by reducing fuels to a level that would decrease the likelihood of a crown fire. Fire would still burn with sufficient intensity to create small openings in untreated areas. This type of pattern would be consistent with patterns under historic fire regimes and is consistent with the recommendations for maintaining habitat for northern flying squirrels (Lehmkuhl et al. 2006a; Lehmkuhl et al. 2006b) and woodrats in inland forests, while managing for fire and healthy forest ecosystems. Additionally, prescribed fires and under thinning would create a patchwork of small openings within the forest that support mature hardwoods and a variable understory of hardwoods and shrubs used by woodrats and other prey. Denser forest (at least 60 percent canopy cover), with numerous large snags and large CWD, would remain widespread and continue to provide habitat for flying squirrels.

Direct and Indirect Effects on NSO from Barred Owl Competition

It is unclear whether forest management has an effect on the outcome of interactions between barred owls and NSO (Gutiérrez et al. 2007). However, the proposed thinning and fuel reduction treatments are not likely to influence the outcome of such potential interactions because they would have limited effects on the factors most likely to be responsible for management-related outcomes: NSO habitat, habitat use, or prey species or prey availability. If barred owls were to out-compete NSOs in the LSR, it is very unlikely that the proposed fuel reduction activities would have influenced the outcome.

Direct and Indirect Effects on NSO Habitat and NSO in Areas Affected by Wildfire

Fire behavior modeling in the Eddy Gulch LSR Project Assessment Area showed a wildfire ignited in an Rx Unit would burn 62.5 acres with a low-intensity fire during a 3.5-day period (refer to Figure 3-8 in Section 3.3 of the EIS). This would provide sufficient time for suppression forces to effectively contain and control that fire, leaving potential owl habitat with an underburn and creating minimal disturbance or effects on existing owl habitat. Wildfires ignited in FRZs would be controlled and contained at smaller sizes. Wildfires allowed to burn under an appropriate management response could be larger. It is unknown how much of the area affected by a crown fire would be NSO habitat. Under either scenario, 10 NSO core areas (5,000 acres) would not be adversely affected in treated areas but are more likely to experience more low- to moderate-intensity surface fires (instead of crown fires) based on the fire model (refer to Table 5). Ten core areas (5,000 acres) may still be adversely affected in untreated areas and would continue to be susceptible to loss of habitat if affected by a crown fire.

Additionally, treatments would modify fire behavior and reduce the loss of habitat in all or substantial portions of the four USFWS priority protection areas (refer to Section 1.6 above). All four areas are likely to have similar conditions to those found in the Assessment Area and thus are likely to benefit from reductions in the fuel load and the potential for future stand-replacing wildfires. Only two of these priority protection areas are entirely within the Assessment Area, and both would directly benefit from proposed treatments to protect them against stand-replacing wildfires. The other two areas are within nventoried roadless areas and would indirectly benefit by having fuel hazard reduction projects in adjacent habitat, thus increasing the ability of suppression crews to limit the size of wildfires.

Direct and Indirect Effects on NSO Critical Habitat

Approximately 16.2 additional acres of nesting/roosting Critical Habitat (outside of existing home ranges) would be downgraded to foraging habitat as a result of treatments in M Units (refer to Table 4); the total of 52.6 acres of nesting/roosting habitat downgraded within the entire Assessment Area represents less than 0.5 percent of existing nesting/roosting habitat within the entire CHU subunit 35. Treatments to all 52.6 acres of nesting/roosting habitat are scattered throughout 13 M Units and range in habitat patch size from 0.2 acre to 14.5 acres. These treatments will result in a decrease in basal area (trees greater than 10 inches dbh, ranging from 140 to 206), a decrease in canopy cover (ranging from 37 percent in mid-successional white fir habitats to 50 percent in late-successional Douglas fir and mixed-conifer habitats), and reducing the trees per acre over 24 inches dbh (ranging from 6 in mid-successional to 28 in late-successional habitat). The decreases in basal area, canopy cover, and trees per acre (over 24 inches dbh) are all relatively minor changes from existing conditions and are not considered habitat downgrading. Please refer to Table 6 in the Eddy Gulch LSR Silviculture Report (2009) for further details.

Approximately 200 additional acres of foraging Critical Habitat will be modified by the proposed treatments. The total of 319.5 acres of foraging habitat modified by thinning activities represents 3 percent of existing foraging habitat within the Assessment Area, and approximately 2 percent of the total foraging habitat within the CHU. However, silvicultural prescriptions are designed to retain habitat function in these stands post treatment. Treatments in 91 acres of foraging habitat in mid-successional Douglas-fir stands would result in basal area of 140 square feet per acre, canopy cover of approximately 48 percent, and six trees per acre over 24 inches dbh. All other treatments would retain approximately 200 square feet basal area per acre, greater than 12 trees per acre over 24 inches dbh, and trees greater than 20 inches dbh. In addition, because the patches of foraging habitat to be modified are along ridgetops and are widely dispersed in less than 1-acre to 59-acre patches across the Assessment Area (refer to Table 4), fuel reduction activities are not expected to affect the ability of the LSR or the Scott and Salmon Mountains CHU subunit 35 to provide NSO foraging opportunities or create barriers to intra-provincial connectivity. Thinning in red fir and some other stands may target trees heavily infected by dwarf mistletoe, but mistletoe removal is not likely to affect NSO habitat use or prey densities because mistletoe would remain widespread on the landscape.

Dispersal habitat was not analyzed for effects from the proposed treatments because habitat suitable for NSO dispersal is common and widespread throughout the Assessment Area and is not considered to be a limiting factor. All habitat that is currently classified as dispersal will remain dispersal habitat under the proposed treatments; no treatment will drop canopy cover to below 33 percent (in red fir stands) to 54 percent (in Douglas fir stands), and basal area will not drop below 183 square feet per acre for trees over 10 inches dbh.

Treated stands would be more resistant to large-scale fires but would burn with sufficient intensity to create small openings (less than 1 acre) in untreated patches. This type of pattern, which would create a mosaic of stands in different successional stages, would be consistent with patterns under historic fire regimes; such patterns would likely enhance Critical Habitat function by providing horizontal diversity of habitat across the landscape (Franklin et al. 2000; Irwin et al. 2007). Treated stands that may burn under future conditions are not expected to affect the overall suitability of existing habitat.

Over time prescribed fires are expected to enhance the function of Critical Habitat within CHU25. Prescribed fire treatments would benefit Critical Habitat by reducing fuels to a level that would decrease the likelihood of a crown fire. Fire would still burn with sufficient intensity to create small openings in untreated areas. This type of pattern would be consistent with patterns under historic fire regimes and is consistent with the recommendations for maintaining habitat for northern flying squirrels (Lehmkuhl et al. 2006a; Lehmkuhl et al. 2006b) and woodrats in inland forests, while managing for fire and healthy forest ecosystems. Additionally, prescribed fires would create a patchwork of small openings within the forest that support mature hardwoods and a variable understory of hardwoods and shrubs used by woodrats and other prey. Denser forest (at least 60 percent canopy cover), with numerous large snags and large CWD, would remain widespread and continue to provide habitat for prey species.

Effects on Critical Habitat from other proposed project activities, such as road construction, are expected to be minimal. Under Alternative B the construction of 1.03 miles of new temporary roads would create a loss of approximately 0.60 acre of foraging habitat and 0.02 acre of habitat classified as nesting/roosting. However, based on the physiographic features of the locations of the 0.62 acre, it is more likely to function as dispersal habitat. The roads will be closed (ripped and mulched, as needed) following treatment, so no long-term effects are expected on Critical Habitat. No new landings are proposed, and existing landings will not be expanded under Alternatives B and C, thus no long-term effects on Critical Habitat are expected.

Late-successional habitat will not be removed during project activities. Thinning and fuel reduction treatments have been designed to minimize the removal of trees greater than 20 inches dbh, and all prescriptions retain adequate canopy cover in existing NSO habitat, and LSRA recommendations for snag and CWD retention are followed. Thus, the project is not expected to affect connectivity of late-successional habitats or the ability of the Eddy Gulch LSR to provide a functional, interactive, late-successional forest.

Cumulative Effects on NSOs and Critical Habitat

Alternative B, combined with local community fuel reduction projects, including the proposed fuelbreak system west of Black Bear Ranch, would further decrease the risk of high-intensity fire inside and near the Eddy Gulch LSR. The other proposed or anticipated actions include the installation of a fiber-optic line and North Fork Roads Stormproofing Project and, when combined with Alternative B, would cause no cumulative effects on NSOs, Critical Habitat, or NSO prey beyond the project's direct and indirect effects.

There are approximately 28,797 acres of suitable NSO habitat within the portion of the Scott and Salmon Mountains CHU subunit 35 contained in Eddy Gulch LSR. Cumulatively, the project would affect the Scott and Salmon Mountains CHU subunit 35 by removing less than 0.5 percent of the existing nesting/roosting habitat and modifying 2 percent of the existing foraging habitat within this sub unit; all of these acres would continue to function as foraging habitat. Due to the limited effects on the PCEs, Alternatives B and C would not significantly increase the cumulative effects on the CHU regardless of other reasonably foreseeable future actions, including installation of a fiber optic line, North Fork Roads Stormproofing Project, and the fuelbreak system west of Black Bear Ranch. Reducing fuel levels would have long-term beneficial effects on Critical Habitat by reducing the risk of stand-replacing fire in the landscape.

1.8.2.2 Forest Service Sensitive Species

Tehama Chaparral and Klamath Shoulderband

Direct and Indirect Effects. No direct effects are anticipated to the Tehama chaparral, the Klamath shoulderband, or their habitat. The animals are likely to be subsurface during the burning season, and no fuel reduction activities are proposed that would significantly affect conditions on talus. Thinning and fuel reduction treatments are expected to have a beneficial indirect effect by substantially reducing the chances and extent of stand-replacing fires, which can remove riparian vegetation and lead to increased temperatures and desiccation. Large-diameter shade trees and CWD would increase over the long-term as a result of Alternative B.

The construction of 1.03 miles of new temporary roads (disturbing 1.7 acres) is not expected to have any significant effect on the species because all temporary roads are on ridgetops or near-ridgetop locations, and the amount of disturbance is small at the landscape level. All of the temporary roads would be closed using normal erosion control measures (ripped and mulched, as needed). Implementation of hazard tree removal is not expected to have any affect on the overall amount of suitable habitat for these species because the removal of a few scattered trees will not affect canopy shade.

Cumulative Effects. Alternative B, combined with other ongoing or reasonably foreseeable future actions listed in Section 3.1.4 of the EIS, is not expected to cause any cumulative effects on these species or their habitat. These projects are expected to have either no effect (fiber optic project) or to result in net improvement (North Fork Roads Stormproofing Project and fuelbreak system west of Black Bear Ranch) to overall habitat conditions and natural resources. Combined with local community fuel reduction projects, which will not be removing habitat, Alternative B would decrease the risk of high-intensity fire in and near the Assessment Area. No other actions would combine to create any significant effects on the Tehama chaparral or the Klamath shoulderband.

Southern Torrent Salamander and Foothill Yellow-legged Frog

Direct and Indirect Effects. Thinning and mastication would not have any direct effects on these two species because they are protected by design standards and Resource Protection Measures designed to minimize effects on aquatic habitats and Riparian Reserves. Prescribed fires that burn in Riparian Reserves may reduce vegetative cover, but limited low-intensity fire in Riparian Reserves is not likely to affect individuals because they are not likely to occur in terrestrial habitats that would be affected by fire. Direct effects from road-related activities are highly unlikely because all temporary roads are on ridgetops or near-ridgetop locations, and the amount of disturbance is small at the landscape level. No proposed roads are near Riparian Reserves, none require any stream crossing structures, none traverse unstable slopes, and none are proposed on granitic or similarly noncohesive soils. All of the temporary roads would be closed using normal erosion control measures (ripped and mulched, as needed).

Thinning and fuel reduction treatments are expected to have a beneficial indirect effect in the long-term on southern torrent salamander by reducing the chances and extent of stand-replacing fires (to approximately 10 percent of existing conditions), which can remove riparian vegetation and lead to increases in stream temperature and sedimentation. Large-diameter shade trees and CWD would increase over the long term under Alternative B.

The indirect effects on southern torrent salamander from temporary road construction and fuel reduction activities would be negligible because any sedimentation would be minimized by the retention of buffers around all Riparian Reserves. These buffers, as well as Best Management Practices (BMPs), would minimize the sediment load that could reach stream channels.

Thinning and fuel reduction treatments may have a minor beneficial indirect effect on foothill yellow-legged frogs by reducing the chances and effects of sedimentation from stand-replacing fires. Thinning and mastication would not cause sedimentation of streams because Klamath LRMP Standards and Guidelines would be followed, including Riparian Reserve buffers and implementation of BMPs.

Limited low-intensity prescribed fire in Riparian Reserves is not likely to affect habitat for foothill yellow-legged frogs because such fires are not likely to affect aquatic habitat or substantially affect stream shading. However, reduced fire frequency resulting from proposed treatments may reduce fire-return intervals below historical intervals and reduce habitat available for species that benefit from sunlight on aquatic habitats.

Cascades Frog and Western Pond Turtle

Direct and Indirect Effects. Thinning and mastication would not have any direct effects on these species because their habitat is protected by design standards and Resource Protection Measures designed to minimize effects on aquatic habitats and Riparian Reserves. Prescribed fires that burn in Riparian Reserves may reduce vegetative cover, but limited low-intensity prescribed fire in Riparian Reserves is not likely to affect frogs because they are not likely to occur in terrestrial habitats that would be affected by fire. Treatments on land adjacent to Riparian Reserves may affect upland turtle nest sites, although these effects should be rare events because turtles select open areas dominated by grasses and herbaceous annual plants, and fuel reduction activities would be focused on forest or shrub habitats on forested ridges. Direct effects from road-related activities are highly unlikely because effects are similar to those described above for the southern torrent salamander and foothill yellow-legged frog.

Fuel reduction activities are not expected to affect the amount of habitat along the edge of the Salmon Rivers or along the edge of private ponds. Underburns would not be expected to have a significant effect on shade within Riparian Reserves. Creation of temporary roads, followed by subsequent closure following thinning, may have negligible, short-term indirect effects on stream habitat as a result of the potential for sediment delivery to streams within the Assessment Area. Implementation of BMPs and protection measures for fish would eliminate any potential downstream effects (in the Salmon Rivers) of sedimentation from roadwork. There would be no indirect effects on Cascades frog or pond turtle habitat as a result of sedimentation.

Alternative B supports habitat components of late-successional forests that would provide for increased CWD and thus potential basking structure for the pond turtle over the long-term. However, reduced fire frequency promoted by the proposed treatments may reduce fire-return intervals below historical intervals and reduce habitat available for species that benefit from sunlight on aquatic habitats.

Cumulative Effects—Southern Torrent Salamander, Cascades Frog, Western Pond Turtle, and Foothill Yellow-legged Frog. Alternative B, combined with local community fuel reduction projects, would decrease the risk of high-intensity fire in and near the Assessment Area. No other ongoing or reasonably foreseeable future actions within the Assessment Area would combine to create any significant cumulative effects on the southern torrent salamander, Cascades frog, Western pond turtle, foothill yellow-legged frog, or their habitat.

Bald Eagle

Direct and Indirect Effects. No direct effects are expected to occur from implementation of Alternative B. Fuel reduction activities could potentially affect bald eagles through the production of fire, smoke, and visual and noise disturbance near their nests. There are no known nests, but if a new nest is discovered, a seasonal restriction of January 1 to August 31 would protect eagles from all activities that that modify habitat within 0.5 mile, or that create smoke or noise above ambient levels within 0.25 mile of any nest sites that are discovered within the Assessment Area.

Thinning and other fuel reduction treatments are not likely to directly affect bald eagle habitat because, there is only one FRZ (FRZ 7) within 2 miles of potential foraging habitat, and no M Units or other overstory thinning would occur in FRZ 7. Understory treatments would not be expected to affect bald eagle habitat.

Thinning and fuel reduction treatments may have beneficial indirect effect by reducing the potential loss of nest trees or nest stands from higher-intensity fires and by reducing potential sedimentation effects on foraging habitat from stand-replacing fires. Thinning and mastication would not cause sedimentation of the Salmon River because Klamath LRMP Standards and Guidelines would be followed, including Riparian Reserve buffers and implementation of BMPs.

Cumulative Effects—Bald Eagle. Alternative B, combined with other ongoing or reasonably foreseeable future actions within the Assessment Area listed in Section 3.1.4 of the EIS, is not expected to cause any cumulative effects on the bald eagle, their prey, or their habitat. These projects are expected to have either no effect (fiber optic project) or to result in net improvement (North Fork Roads Stormproofing Project and fuelbreak system west of Black Bear Ranch) to overall habitat conditions and natural resources. Combined with local community fuel reduction projects, which will not be removing habitat, Alternative B would decrease the risk of high-intensity fire in and near the Assessment Area. No other actions would combine to create any significant effects.

Northern Goshawk

Direct and Indirect Effects. Habitat use by goshawks and NSOs in the Klamath region are similar. Thus the nesting/roosting and foraging habitat discussions for the NSO also apply to the goshawk.

Thinning and, to a much lesser extent, prescribed burning and mastication would reduce features that are used to define suitable goshawk nesting and foraging habitat: canopy cover, basal area, and the number of large-diameter trees. However, thinning and other fuel reduction activities would not affect goshawk habitat because the prescriptions avoid downgrading existing habitat. Fuel reduction activities would have little effect on canopy cover because burning would remove smaller trees that do not substantially contribute to canopy cover in the overstory. All M Units in FRZs would have canopy cover reduced below 60 percent, but all stands would still function as foraging habitat as the prescriptions maintain at least 40 percent canopy cover and retain all trees greater than 20 inches dbh. The construction of 1.03 miles of temporary roads under Alternative B would create a loss of less than one acre of forested habitat; additionally, these roads are scattered, thus habitat losses are small and dispersed and the roads would be closed upon project completion. No temporary roads are proposed in or near known goshawk activity centers.

The 1.0-mile home ranges of two GOMAs (Sixmile and West Fork Whites) and another activity center located during 2008 surveys (Shadow) lie within proposed FRZs. The proposed treatments would not harm any of these protected areas because thinning or other fuel reduction activities would retain foraging habitat and because nesting habitat would not be reduced to less than 300 acres in the one activity center for which mechanical treatments are proposed (approximately 37 acres within the Primary Nest Zone of the Shadow Creek territory). No overstory thinning is proposed for the West

Fork Whites GOMA, with the exception of the removal of individual roadside hazard trees, which would not affect the number of acres of suitable habitat. Thinning prescriptions in the Sixmile GOMA ensure that thinned stands in the Foraging Habitat Zone (FHZ) would retain at least 40 percent canopy and all trees greater than 20 inches dbh, meeting Klamath LRMP Standards for goshawk FHZ.

Fuel reduction activities, primarily fire and mastication, may kill, injure, or displace prey. Although prey densities may be reduced in affected areas, treatments are designed to minimize effects on prey by limiting treatments to no more than 50 percent of the NSO suitable habitat within a year. Prescribed fire is also designed to leave a mosaic of burned and unburned areas so some shrubs and snags would remain to provide cover for prey species and minimize effects on goshawks.

Limited thinning outside of nest areas is unlikely to affect goshawk occupancy of historic nest stands. Many thinned stands that downgrade habitat would also become at least foraging habitat over time as canopy cover increases.

Thinning and fuel reduction treatments are expected to benefit goshawk habitat by substantially reducing the forest's susceptibility to stand-replacing crown fires. Fire would still burn with sufficient intensity to create small openings within forested habitat. This type of pattern, which would create a mosaic of stands in different successional stages, would be consistent with patterns under historic fire regimes. This pattern would likely benefit goshawks by providing horizontal diversity of habitat across the landscape.

Fuel reduction treatments would cause changes in the amount and/or types of snags, CWD, understory vegetation including small trees, and prey. Treatments would remove or consume many existing snags and hazard trees, but effects on northern goshawks would be negligible because prescribed burning would create some new snags and seasonal restrictions would apply to all treated areas within historic or additional sites within the Assessment Area (please refer to the Resource Protection Measures, Section 2.9.1.2 in Chapter 2 of the EIS). Most understory vegetation would also be removed in fuel reduction areas. Mastication will not remove trees greater than 10 inches dbh, and burning will not remove trees greater than 4 inches dbh. Emergency Access Routes are hand treatments along sides of roads, and hazard tree removal would follow pre-approved Forest guidelines. Removing small trees will have no effect on existing foraging or nesting habitat.

Fuel reduction treatments would initiate successional changes in forest understory, including snags and CWD. The CWD would accumulate from fallen snags and understory vegetation would regenerate in most areas. Reduced vegetative competition would also accelerate tree growth in some areas. Northern goshawk prey species are likely to increase as understory vegetation and litter layers recover, CWD is recruited from the snag population, and additional snags are recruited. Thus, effects on goshawk prey species abundance and distribution are expected to be minimal.

Thinning and fuel reduction activities have the potential to affect northern goshawks through the production of fire, smoke, visual, and noise disturbance. Northern goshawks are sensitive to noise disturbances during nesting and will often exhibit defensive territorial behavior around nest sites when disturbed (CDFG 1990). Noise produced during fuel reduction activities may alter nesting behavior.

Disturbance may also occur from fire, smoke, or other activities associated with prescribed fire. Heavy smoke at ground level and in forested stands may have adverse effects, but light to moderate smoke that is mixing or venting well is probably of little consequence to northern goshawks. It is expected that adults are sufficiently mobile to avoid direct injury by fire. To ensure that breeding goshawks are not disturbed by activities that create noise above ambient levels or smoke near nest stands, seasonal restrictions will be in place from March 1 to August 31 that apply to all activities that modify habitat within 0.5 mile, or create smoke or noise above ambient levels within 0.25 mile of historic sites or any additional nest sites that are discovered within the Assessment Area. Dates for seasonal restrictions cover the time period from which adult goshawks typically initiate breeding activity to the point where juveniles are physically capable of moving away from such disturbances.

Temporary roads proposed for construction under Alternative B would be closed (ripped and mulched, as needed) following thinning and thus become available as habitat over the long term.

Cumulative Effects. Alternative B, combined with local community fuel reduction projects, including the proposed fuelbreak system west of Black Bear Ranch, would further decrease the risk of high-intensity fire both inside and near the Eddy Gulch LSR. There are no other proposed or anticipated actions that would combine with Alternative B to cause cumulative effects on goshawks, goshawk habitat, or goshawk prey beyond the project's direct and indirect effects.

Peregrine Falcon

Direct and Indirect Effects. Peregrine falcon nesting/roosting habitat would not be directly or indirectly affected by the proposed fuels reduction activities. Peregrine falcons are known to be susceptible to disturbance near their nests. There are no known nests in the vicinity; if a new nest is discovered, a seasonal restriction of February 1 to July 31 would protect peregrines from all activities that create noise above ambient levels within 0.25 to 0.5 mile (dependent on topographic features) of active eyries.

Cumulative Effects. Alternative B, combined with other ongoing or reasonably foreseeable future actions listed in Section 3.1.4 of the EIS, is not expected to cause any cumulative effects on the peregrine falcon, their prey, or their habitat. These projects are expected to have either no effect (fiber optic project) or to result in net improvement (North Fork Roads Stormproofing Project and fuelbreak system west of Black Bear Ranch) to overall habitat conditions and natural resources. Combined with local community fuel reduction projects, which will not be removing habitat, Alternative B would decrease the risk of high-intensity fire in and near the Assessment Area. No other actions would combine to create any significant effects.

Willow Flycatcher

Direct and Indirect Effects. Thinning and fuel reduction treatments are not expected to have any direct or indirect effects on willow flycatchers. However, the prevention of stand-replacing fire—the only process that would likely create mostly treeless riparian scrub required by the flycatcher—would likely preclude use of the Assessment Area by willow flycatchers. Limited low-intensity prescribed fire in Riparian Reserves could affect individuals if suitable patches of riparian scrub (not known from the Assessment Area, but possible) were burned.

Cumulative Effects. Alternative B, combined with other ongoing or reasonably foreseeable future actions within the Assessment Area listed in Section 3.1.4 of the EIS, is not expected to cause any cumulative effects on the willow flycatcher, their prey, or their habitat. These projects are expected to have either no effect (fiber optic project) or to result in net improvement (North Fork Roads Stormproofing Project and fuelbreak system west of Black Bear Ranch) to overall habitat conditions and natural resources. Combined with local community fuel reduction projects, which will not be removing habitat, Alternative B would decrease the risk of high-intensity fire in and near the Assessment Area. No other actions would combine to create any significant effects.

Pallid Bat and Townsend's Big-eared Bat

Direct and Indirect Effects. Fuel reduction treatments and temporary road construction are expected to have short-term minor adverse direct effects on both bat species. Project activities may remove individual trees or snags that may be used for roosting, especially by the pallid bat, which occurs widely in many forest types. Destruction of active roosts through felling and/or removal of trees or snags may kill or harm individual bats, especially during the breeding season when young may be unable to escape. However, effects on roosting habitat are expected to be minimized by the lack of thinning in NSO core areas, by employing the Klamath LRMP Standards and Guidelines for snag and large-diameter tree retention in most of the FRZs, and by implementing limited operating periods for the NSO and northern goshawk that overlap the period when bats rear their young. Noise from project activities could disturb bats and cause temporary roost abandonment. Abandonment of maternity roosts could result in lowered reproductive success or death of the young of the year. However, disturbance at any specific roost would be short term and occur only during the year of project implementation.

Prescribed fires may affect prey availability, either positively or adversely, as vegetation and litter layers are consumed. Thinning and other fuel-reduction treatments are expected to have long-term beneficial effects by promoting the development of large-diameter trees, which may provide suitable roosting sites. Reintroduction of fire would also be likely to create basal hollows and other cavities used by bats. Additionally, these activities would change expected fire behavior over time, resulting in fires of less intensity, thus reducing the potential that existing habitat would be removed.

Prey availability would most likely increase over time because prescribed fire promotes vigorous growth of understory vegetation and insect production. Felling of snags and removal of logs may reduce the amount of microhabitat available for some insects, but new fire-killed snags would also provide a new resource for some insects such as wood-boring beetles.

Cumulative Effects. Alternative B, combined with other ongoing or reasonably foreseeable future actions listed in Section 3.1.4 of the EIS, is not expected to cause any cumulative effects on the pallid and Townsend's bats, their prey, or their habitat. These projects are expected to have either no effect (fiber optic project) or to result in net improvement (North Fork Roads Stormproofing Project and fuelbreak system west of Black Bear Ranch) to overall habitat conditions and natural resources. Combined with local community fuel reduction projects, which will not be removing habitat, Alternative B would decrease the risk of high-intensity fire in and near the Assessment Area. No other actions would combine to create any significant effects.

American Pine Marten

Direct and Indirect Effects. All proposed activities, including road-related activities, in the vicinity of suitable habitat could disrupt marten use and movement in the area and create short-term adverse direct effects on individuals. Thinning and fuel reduction activities have the potential to affect martens through the production of fire, smoke, and noise disturbance. Noise produced during fuel reduction activities may alter marten behavior, but preliminary studies have not found martens to be particularly sensitive to noise (Zielinski et al. 2004c). Underburning in the vicinity of den sites could cause mortality of young if dens are above ground or are not well ventilated. It is expected that adult animals are sufficiently mobile to avoid direct injury by fire.

Thinning of 931 acres in FRZs (approximately 3.8 percent of the mid- and late-successional habitat in the Assessment Area), and, to a much lesser extent, prescribed burning and mastication, would reduce canopy cover, basal area, and the number of large-diameter trees. All thinned stands in FRZs would have canopy cover reduced below 60 percent, but many stands would still function as habitat because they would retain large trees and at least 40 percent canopy cover. Fuel reduction treatments, primarily prescribed fire but also mastication and thinning, would also cause changes in the amount and/or types of snags, CWD, and understory vegetation, but would have little effect on canopy cover because burning would remove smaller trees that do not substantially contribute to canopy cover in the overstory. Thinning would remove snags, but the effects on martens would most likely be negligible because the treated areas would be limited in extent (approximately 11 percent of the FRZ area) and would also avoid NSO core areas and Riparian Reserves.

Mastication would destroy small down woody debris, and some snags but would retain large snags and large-diameter down woody debris according to Klamath LRMP guidelines. Prescribed fire would consume much of the smaller down woody debris and some snags but would create many new snags. Much of the large down woody debris would likely remain when burning in spring-like conditions, and this would help ensure that subnivean access is available in winter. Temporary displacement of individuals may occur; however, no long-term adverse effects on the species are expected from the loss of smaller CWD and occasional snags.

Fuel reduction activities, primarily fire and mastication, may also kill, injure, or displace prey. Although prey densities may be reduced in affected areas, treatments are designed to minimize effects on prey by limiting treatments to no more than 50 percent of the suitable NSO habitat within a year. Prescribed fire is also designed to leave a mosaic of burned and unburned areas so some shrubs, snags, and CWD would remain to provide cover for prey species and minimize effects on martens. Martens may temporarily benefit from fuel reduction activities as rodent prey move to avoid disturbance or concentrate in remaining patches of habitat.

Thinning, mastication, and prescribed burning activities may result in short-term reductions in available prey as CWD and understory vegetation are reduced. However, fuel reduction treatments are expected to benefit martens by substantially reducing the forest’s susceptibility to stand-replacing crown fires. As the habitat develops over time, it is expected that there would be an increase in denning and resting sites (with an increase in CWD), as well as complex structure near the forest floor that would provide prey habitat and marten direct access to the subnivean zone for marten.

Cumulative Effects. Alternative B, combined with other ongoing or reasonably foreseeable future actions listed in Section 3.1.4 of the EIS, is not expected to cause any cumulative effects on the marten, their prey, or their habitat. These projects are expected to have either no effect (fiber optic project) or to result in net improvement (North Fork Roads Stormproofing Project and fuelbreak system west of Black Bear Ranch) to overall habitat conditions and natural resources. Combined with local community fuel reduction projects, which will not be removing habitat, Alternative B would decrease the risk of high-intensity fire in and near the Assessment Area. No other actions would combine to create any significant effects.

Pacific Fisher

Direct and Indirect Effects. The potential direct effects on Pacific fishers from vegetation management activities under Alternative B consist of modification or loss of habitat or habitat components, especially with regard to denning and resting habitat and foraging and movement habitat. Direct effects would also include behavioral disturbance to denning from thinning, road construction, prescribed fire, or other associated activities.

Direct effects from noise and prescribed fires can lead to the displacement of individuals or the disruption of foraging and breeding activities. Denning effects are expected to be negligible because Resource Protection Measures put in place to protect the NSO during the breeding season would indirectly protect denning individual fishers. Fishers are also a highly mobile species such that effects on foraging individuals would be minor, as areas with human disturbance would likely be avoided by foraging individuals. Temporary displacement of individuals may occur as a result of the proposed treatments; however, the Resource Protection Measures put in place to protect 50 percent of all suitable NSO habitat, over the course of any one season, would minimize disturbance to any fisher sharing similar habitat. Additionally, by ensuring that breeding NSOs are not disturbed by activities that create noise above ambient levels or have an intrusion of smoke at the nest, the seasonal restriction within owl habitat would indirectly reduce disturbance likelihood on fishers.

Fisher habitat is typically characterized as mature, structurally diverse, closed canopy stands, but fisher will occupy managed or burned stands if remnant structures are maintained (Jones 1991; Yaeger 2005). Thinning in FRZs and, to a much lesser extent, prescribed burning and mastication, would reduce four features that are used to define suitable resting, denning, and foraging habitat: canopy cover, basal area, CWD, and the number of large-diameter trees. However, because fisher denning and resting habitat is considered a subset of suitable NSO habitat, thinning and other fuel reduction activities would downgrade 47 acres and thus is unlikely to affect individuals or overall habitat in size and scope of the landscape and total available habitat that remains. Additionally, the prescriptions modifying 323 additional acres of suitable habitat will adhere to the NSO standards and would indirectly protect features preferred by the Pacific fisher.

All thinned stands in FRZs would have canopy cover reduced below 60 percent (no less than 48 percent in Douglas-fir or mixed-conifer stands), but stands that retain at least 40 percent canopy cover would still function as movement habitat and as foraging habitat because they would retain large trees (with basal areas in the range of 132 to 230 square feet per acre), and thinning would generally proceed from below so that the larger trees would remain, including all trees larger than 28 inches (except hazard trees). Thinning would reduce canopy cover below 40 percent (to no less than 32 percent) in some white and red fir stands, but preferred habitat is common and widespread in the Assessment Area, so a small reduction in ridgetop movement habitat would not create any dispersal barriers for individuals. Additionally, Resource Protection Measures for Riparian Reserves would ensure habitat connectivity and movement patterns for individuals.

Fuel reduction treatments, primarily prescribed fire but also mastication and thinning, would cause changes in the amount and/or types of snags, CWD, and understory vegetation, but would have little effect on canopy cover because burning would remove smaller trees that do not substantially contribute to canopy cover in the overstory. Thinning would remove snags but the effects on individuals would most likely be negligible because the treated areas would be limited in extent (approximately 11 percent of the FRZ area), and would be located along ridges, which are used less frequently by resting individuals. Mastication would destroy small down woody debris and some snags but would retain large snags and large-diameter down woody debris. Prescribed fire would consume much of the smaller down woody debris and some snags but would create many new snags. Much of the large down woody debris is likely to remain when burning in spring-like conditions. Effects on fisher would also be minimized by retaining unburned habitat (at least 10 percent) in the ridgetop FRZs.

Fuel reduction activities, primarily fire and mastication, may kill, injure, or displace preferred prey. Although prey densities may be reduced in affected areas, treatments are designed to minimize effects on NSO prey, and therefore indirectly to fisher prey, by limiting treatments to no more than 50 percent of the NSO suitable habitat within a year. Prescribed fire is also designed to leave a mosaic of burned and unburned areas so some shrubs, snags, and CWD would remain to provide cover for prey species and minimize effects on the Pacific fisher.

The construction of 1.03 miles of temporary roads under Alternative B would create a short-term loss of approximately 0.62 acre of suitable NSO habitat; the habitat loss is small and widely scattered, and includes only 0.5 acre of late-successional habitat. Additionally, the roads would be closed (ripped and mulched, as needed) following thinning, and those areas would become available as habitat over the long term.

Approximately 47.3 acres of resting/denning would be downgraded within the entire Assessment Area, but large-diameter trees, snags, and CWD would be retained on the landscape. Because the patches of habitat to be removed are along ridges and are dispersed across the Assessment Area, fuel reduction activities are not expected to affect the ability of remaining habitat to provide foraging opportunities or create barriers to movement. Therefore, the action alternatives are not expected to affect the ability of the habitat to provide resting, foraging, and dispersal abilities for the Pacific fisher.

The prescriptions for thinning and fuels treatments are consistent for maintaining habitat for small mammals in northern interior forests while managing for fire and healthy forest ecosystems. Fuel reduction treatments would initiate successional changes in forest understory, including snags and CWD. Prey species are likely to increase as understory vegetation and litter layers recover and CWD is recruited from the snag population. Reduced vegetative competition would also accelerate tree growth in some areas (see Tables 3-6, 3-7, and 3-8 in Section 3.2). Thus, effects on Pacific fisher prey species abundance and distribution are expected to be minimal.

Thinning and fuel reduction treatments are expected to benefit fisher habitat by reducing the forest's susceptibility to stand-replacing crown fires to approximately 10 percent of current conditions. Fire would still burn with sufficient intensity to create small openings within forested habitat. This type of pattern, which would create a mosaic of stands in different successional stages, would be consistent with patterns under historic fire regimes. This pattern would likely benefit fisher and their prey by providing horizontal diversity of habitat across the landscape.

The protection of NSO activity centers, northern goshawk habitat, and Riparian Reserves would provide connectivity between large blocks of suitable habitat. Implementation of either action alternative would not increase any large-scale, high-contrast fragmentation above current levels. Riparian zones (used as movement corridors) would not be altered by the proposed treatments; therefore, indirect effects that could result from implementation of either action alternative would have minimal effects on the movement patterns of Pacific fishers. Implementation of Alternative B should have little effect on the suitable denning and foraging habitat. Additionally, design features of FRZs would retain habitat elements within the range of those used by fisher for foraging and dispersal, such that the FRZs would likely not create large barriers to further expansion and connectivity to fisher habitat. Temporary roads under Alternative B would be closed (ripped and mulched, as needed) following thinning, and those areas would become available as habitat over the long term.

The risk for potential stand-replacing fires would be considerably higher under the no-action alternative than Alternative B, which could mean a loss of many more acres of potentially suitable denning, foraging, roosting, and travel habitat in the long term. The Pacific fisher may be affected by project activities, but the activities are not expected to result in significant indirect effects.

Cumulative Effects. Alternative B, combined with other ongoing or reasonably foreseeable future actions listed in Section 3.1.4 of the EIS, is not expected to cause any cumulative effects on the fisher, their prey, or their habitat. These projects are expected to have either no effect (fiber optic project) or to result in net improvement (North Fork Roads Stormproofing Project and fuelbreak system west of Black Bear Ranch) to overall habitat conditions and natural resources. Combined with local community fuel reduction projects, which will not be removing habitat, Alternative B would decrease the risk of high-intensity fire in and near the Assessment Area. No other actions would combine to create any significant effects.

California Wolverine

Direct and Indirect Effects. The effects of the proposed treatments on wolverine habitat would be similar to the effects on fisher and marten habitat, except that wolverines are most likely less dependent on closed-canopy forest and more susceptible to disturbance. Thinning, mastication, and road-related activities would employ heavy machinery and may require repeated visits to a site. Because wolverines are sensitive to human disturbance, these activities would likely prevent wolverines from using portions of the Assessment Area during project implementation. Short-term disturbance effects on movement and foraging activities are possible, but these effects would be localized and would not affect the population's viability over time given the species' low likelihood of presence in the region.

Fuel reduction treatments, primarily prescribed fire but also mastication and thinning, would cause changes in the amount and/or types of snags, CWD, and understory vegetation. Thinning would remove snags, but the effects on individuals would most likely be negligible because the treated areas would be limited in extent (approximately 11 percent of the FRZ area). Mastication would destroy small down woody debris and some snags but would retain large snags and large-diameter down woody debris. Prescribed fire would consume much of the smaller down woody debris and some snags but would create many new snags. Much of the large down woody debris is likely to remain when burning in spring-like conditions. Effects on wolverine would also be minimized by retaining unburned habitat (at least 10 percent) in the ridgetop FRZs.

Fuel reduction activities, primarily fire and mastication, may kill, injure, or displace preferred prey. Although prey densities may be reduced in affected areas, treatments are designed to minimize effects on NSO prey and therefore indirectly to some wolverine prey, by limiting treatments to no more than 50 percent of the suitable habitat within a year. Prescribed fire is also designed to leave a mosaic of burned and unburned areas so some shrubs, snags, and CWD would remain to provide cover for prey species and minimize effects on the wolverine.

The construction of 1.03 miles of temporary roads under Alternative B would create a short-term loss of approximately 0.62 acre of habitat; however, the habitat loss is small and scattered, and includes only 0.5 acre of late-successional habitat. Additionally, the roads would be closed (ripped and mulched, as needed) following thinning, and those areas would become available as habitat over the long term.

Over time, thinning and fuel reduction treatments are expected to benefit wolverines by reducing fuels to a level that would decrease the likelihood of extensive, high-intensity fire. Fire would still burn with sufficient intensity to create small openings within forested habitat. This type of pattern, which would create a mosaic of stands in different successional stages, would be consistent with patterns under historic fire regimes. This pattern would likely benefit wolverines by providing horizontal diversity of habitat across the landscape, including habitat conditions favored by prey such as deer and elk.

Cumulative Effects. Alternative B, combined with other ongoing or reasonably foreseeable future actions listed in Section 3.1.4 of the EIS, is not expected to cause any cumulative effects on the wolverine, their prey, or their habitat. These projects are expected to have either no effect (fiber optic project) or to result in net improvement (North Fork Roads Stormproofing Project and fuelbreak system west of Black Bear Ranch) to overall habitat conditions and natural resources. Combined with local community fuel reduction projects, which will not be removing habitat, Alternative B would decrease the risk of high-intensity fire in and near the Assessment Area. No other actions would combine to create any significant effects.

1.8.2.3 Forest Service MIS Associations

River and Stream MIS Associations

Direct and Indirect Effects. Thinning and mastication would not have any direct effects on the habitat because it would be protected in the Riparian Reserves. Prescribed fires that would be implemented in Riparian Reserves may reduce vegetative cover over the short term, but limited low-intensity fire in Riparian Reserves is not likely to affect the overall habitat.

Thinning and fuel reduction treatments are expected to have a beneficial indirect effect in the long term by reducing the chances and effects of stand-replacing fires, which can remove riparian vegetation and lead to increases in increases in stream temperature and sedimentation. Large-diameter shade trees and CWD would increase over the long term as a result of Alternative B.

Road-related activities have the potential to affect habitat. The construction of 1.03 miles of new temporary roads would not have a significant effect on riparian-associated species because all new temporary roads would be on ridgetops or near-ridgetop locations. None of the new temporary roads would be near Riparian Reserves, none require any stream crossing structures, none traverse unstable slopes, and none are proposed on granitic or similarly non-cohesive soils. All of the new temporary roads would be closed using normal erosion control measures (ripped and mulched, as needed). Thus, direct adverse effects from road-related activities would be negligible.

Temporary road construction and fuel reduction effects would be negligible because any sedimentation would be minimized by the retention of buffers around all Riparian Reserves. These buffers, as well as BMPs, would minimize the sediment load that could reach stream channels.

Implementation of hazard tree removal would not change canopy cover at the stand or landscape level because the individual trees that are removed would be limited to road prisms and scattered throughout the landscape. Removal of a few scattered trees would not have a significant effect on habitat suitability or function for these species.

In summary, the amount and quality of river and stream habitat in the Assessment Area would be the same pre- and post-project. Degradation of habitat components (such as riparian vegetation, individual shade trees) would occur in Riparian Reserves. A temporary shift or relocation of individuals may result from proposed activities in the landscape, but it is not expected to affect populations or population trends for tailed frogs, American dippers, or Cascade frogs.

Cumulative Effects—River and Stream MIS and Marsh, Lake, and Pond MIS Associations. Future actions on upland areas in the Assessment Area are not expected to affect aquatic habitats individuals, or population numbers. Therefore, Alternative B would not increase cumulative effects on species in these associations.

Marsh, Lake, and Pond MIS Associations

Direct and Indirect Effects. No direct effects are expected to occur as a result of thinning or mastication under Alternative B because aquatic habitats are protected by Resource Protection Measures, BMPs, and Riparian Reserves.

Although riparian habitat is not the vegetation type proposed for prescribed burns, the burns could move into riparian habitat; however, protective measures would be in place to ensure that upland habitat is protected while benefiting from the positive effects of a light underburn.

Fuel reduction activities are not expected to affect the amount of habitat along the edge of the Salmon River or along the edge of private ponds. Underburns would not be expected to have a significant effect on shade within Riparian Reserves. The creation of temporary roads, followed by closure after thinning is complete, could deliver sediment to pond habitats, but implementation of BMPs would reduce any indirect effects and therefore effects are considered negligible. Treatments on land adjacent to Riparian Reserves may affect upland turtle nest sites, although these effects should be rare events because turtles select open areas dominated by grasses and herbaceous annual plants, and fuel reduction activities would be focused on forest or shrub habitats on forested ridges.

Temporary road construction (under Alternative B) and fuel reduction effects would be negligible because any sedimentation would be minimized by the retention of buffers around all Riparian Reserves. These buffers, as well as BMPs, would minimize the sediment load that could reach stream channels.

Implementation of hazard tree removal would not change canopy cover at the stand or landscape level because the individual trees that would be removed are limited to road prisms and scattered throughout the landscape. Removal of these trees would not have a significant effect on habitat suitability or function for these species.

Cumulative Effects. Refer to the cumulative effects discussion above for the River and Stream MIS Association.

In summary, the amount and quality of marsh, lake, and pond habitat in the Assessment Area would be the same pre- and post-project. Temporary degradation of some habitat components (such as riparian vegetation, basking sites, and upland nest areas) would occur in Riparian Reserves. A temporary shift or relocation of individuals may result from proposed activities in the landscape, but it is not expected to affect populations or population trends for the Western pond turtle.

Hardwood MIS Associations

Direct and Indirect Effects. Thinning in FRZs and construction of 1.03 miles of temporary roads may remove important structural components of hardwood habitats such as large-diameter trees, snags, and CWD under Alternative B. However, the removal of large-diameter trees would only occur under limited circumstances; large snags or groups of snags would be retained over most of the landscape, and large-diameter hardwoods and CWD would be retained where consistent with FRZ objectives. Therefore, effects on the distribution and abundance of these habitat components are expected to be minimal.

Fuel reduction treatments (prescribed fire and mastication) also have the potential to remove hardwoods, snags, and CWD. However, prescriptions are designed to imitate low-intensity fire and are designed to retain these components, especially hardwoods. Thus, fuels treatments are not expected to have a significant effect on important structural components of hardwood habitats.

Thinning and fuel reduction treatments are expected to benefit hardwood habitats by reducing fuels to a level that would decrease the likelihood of extensive, high-intensity fire. Treatments would also increase hardwood dominance in some areas by reducing conifer overstory and competition from young conifers that have encroached into mature hardwood stands during the era of fire suppression.

Cumulative Effects. Alternative B, combined with other ongoing or reasonably foreseeable future actions in the Assessment Area, is not expected to cause any cumulative effects on hardwood habitats, individual species associated with the hardwood habitat, or population numbers. Combined with local community fuel reduction projects, Alternative B would decrease the risk of high-intensity fire both inside and near the Assessment Area.

Overall, the amount of hardwood habitat in the Assessment Area would be the same pre- and post-project. Degradation of habitat components (such as individual trees) would occur with the removal of some hardwoods in mixed hardwood-conifer stands and plantations and the removal of large conifers. Shifting or relocation of territories may result from proposed activities in the landscape, but it is not expected to affect populations or population trends for western gray squirrels or acorn woodpeckers.

Snag MIS Associations

Direct and Indirect Effects. Thinning, hazard tree removal, and construction of 1.03 miles of temporary roads may remove large-diameter snags. However, the removal of large-diameter snags would only occur under limited circumstances, and snags would be retained at Klamath LRMP Standards and Guidelines over approximately 89 percent of the ridgetop FRZs. Prescribed fire and mastication would also remove snags; however, prescriptions are designed to imitate low-intensity fire and would also create many snags. Thus, habitat for snag-dependent species would remain abundant and well distributed throughout the Assessment Area, and the effect is considered negligible to populations and population trends.

Thinning and fuel reduction treatments would benefit snag-dependent species in forested habitats by reducing fuels to a level that would decrease the likelihood of extensive stand-replacing fire. Fire would still burn with sufficient intensity to create snags within forested habitat. This type of pattern would be consistent with patterns under historic fire regimes.

Cumulative Effects. Alternative B, combined with other ongoing or reasonably foreseeable future actions, is not expected to cause any cumulative effects on snag habitats, individual species associated with the snag habitat, or population numbers.. Combined with local community fuel reduction projects, Alternative B would decrease the risk of high-intensity fire both inside and near the Assessment Area.

1.8.3 Alternative C: No New Temporary Roads Constructed

1.8.3.1 Federally Listed Species

Direct and Indirect Effects on NSO Habitat from Treatments in M Units (Inside FRZs)

Alternative C would be similar to Alternative B; however, 1.03 miles of temporary roads would not be constructed, resulting in 99 fewer acres being treated. This would result in no treatments or changes to 30 acres of foraging habitat outside of any NSO core area but within home ranges. These 30 acres would, however, be susceptible to a wildfire.

Direct and Indirect Effects of Treatments in Fuel Reduction Areas and Emergency Access Routes

Effects would be the same as found under Alternative B.

Direct and Indirect Effects of Treatments in Rx Units

Treatments under Alternative C would have the same effect as those found under Alternative B, but 822 fewer acres would be treated because no temporary roads would be created for access to these acres. These untreated areas would be susceptible to a wildfire which could remove habitat in the home range of KL1028.

Direct and Indirect Effects on NSO from Barred Owl Competition

Effects are the same as found under Alternative B.

Direct and Indirect Effects on NSO Habitat and NSOs in Areas Affected by Wildfire

Effects on NSO under Alternative C are very similar to Alternative B, except 1.03 miles of temporary roads would not be constructed, and 99 acres of M Units and 822 acres in Rx Units would not be treated. Without temporary roads only two NSO core areas would be treated differently than under Alternative B. KL1028 would have fewer acres treated (less than 400 acres) with prescribed fire and thus would leave greater than 80 percent of the core area and nesting/roosting habitat at risk of a crown fire, as well as the activity center. If a wildfire were to occur, approximately 81 percent of the 400 acres that would not be treated would be subject to a crown fire, substantially removing that habitat. Under Alternative C, KL1032 approximately 10 percent of foraging habitat and 1 percent of nesting/roosting habitat, which is along or over a ridgetop from the activity center, would not be treated and could be subject to a crown fire. However, loss of such a small portion of the core area in KL1032 is not likely to affect a nesting pair or the status of the activity center. Fire brands from crown fires in untreated areas could land in other untreated areas, which could escape initial attack and adversely affect other NSO core areas or NSO Critical Habitat. Failure to treat 400 acres in KL1028 would also remove habitat in the Grasshopper Ridge USFWS priority protection area.

Direct and Indirect Effects on NSO Critical Habitat

Effects on Critical Habitat would be the same as those under Alternative B, except approximately 30 acres of foraging that were treated in M Units under Alternative B are outside of any NSO core area and found only within home ranges that had an excess of foraging habitat and were never considered to be an effect on Critical Habitat.

Treatments under Alternative C would have the same effect; however, 822 fewer acres would be treated because no temporary roads would be created for access to these acres. These 822 acres of Critical Habitat that were treated under Alternative B will not be treated under Alternative C and would thus be subject to a higher fire danger and potential loss.

Alternative C would be similar to Alternative B; however, the 1.03 miles of temporary roads would not be constructed, this will result in 30 fewer acres of suitable habitat being treated. These 30 acres of Critical Habitat that were treated in M Units under Alternative B. will not be treated under Alternative C and would thus be subject to a higher fire danger and potential loss.

Cumulative Effects on NSOs and Critical Habitat

The cumulative effects on NSOs under Alternative C are similar to Alternative B, except additional habitat could be burned during a wildfire if that fire occurred in one of the untreated areas.

1.8.3.2 Forest Service Sensitive Species

Tehama Chaparral and Klamath Shoulderband

Direct and Indirect Effects. Effects are the same as found under Alternative B.

Cumulative Effects. Cumulative effects are the same as found under Alternative B.

Southern Torrent Salamander and Foothill Yellow-legged Frog

Direct and Indirect Effects. Effects are the same under Alternative B.

Cumulative Effects—Southern Torrent Salamander, Cascades Frog, Western Pond Turtle, and Foothill Yellow-legged Frog. Future actions in or near the Assessment Area are not expected to affect aquatic habitats; therefore, Alternative C would not result in cumulative effects on these species.

Cascades Frog and Western Pond Turtle

Direct and Indirect Effects. Effects are the same as found under Alternative B.

Cumulative Effects. See cumulative effects above under southern torrent salamander and foothill yellow-legged frog.

Bald Eagle

Direct and Indirect Effects. Effects are expected to be the same as found under Alternative B. The untreated habitats in Alternative C are not near potential nesting habitat.

Cumulative Effects—Eagle, Northern Goshawk, Peregrine Falcon, Willow Flycatcher, Pallid Bat, Townsend's Big-Eared Bat, American Pine Marten, Pacific Fisher, and California Wolverine. Alternative C, combined with other ongoing or reasonably foreseeable future actions, is not expected to cause any cumulative effects on these species, their habitat, or prey. Combined with local community fuel reduction projects, which will not be removing habitat, Alternative C would both decrease the risk of high-intensity fire in and near the Assessment Area. No other actions would combine to create any significant effects.

The cumulative effects on bald eagles under Alternative C are expected to be the same as under Alternative B.

Northern Goshawk

Direct and Indirect Effects. Without temporary roads 921 acres will remain untreated. 822 fewer acres treated with prescribed fire would thus leave habitat at risk of a crown fire. There would be 99 fewer acres would be treated in M Units, but these units are outside of any protected GOMAs.

Habitat use by goshawks and NSOs in the Klamath region are similar under Alternative C. Thus the nesting/roosting and foraging habitat discussions for the NSO also apply to the goshawk, please refer to NSO effects under Alternative C.

Cumulative Effects. Refer to the cumulative effects discussion above for the NSO.

Peregrine Falcon

Direct and Indirect Effects. Peregrine falcon nesting/roosting habitat would not be directly or indirectly affected by the proposed fuels reduction activities under Alternative C. Peregrine falcons are known to be susceptible to disturbance near their nests, but a seasonal restriction of February 1 to July 31 would protect peregrines from all activities that create noise above ambient levels within 0.25 to 0.5 mile (dependent on topographic features) of active eyries.

Cumulative Effects. Cumulative effects are the same as found under Alternative B.

Willow Flycatcher

Direct and Indirect Effects. Effects are expected to be similar to Alternative B, but additional untreated habitat may slightly increase the potential for stand-replacing fire to initiate early successional habitats used by willow flycatchers.

Cumulative Effects. Effects are expected to be similar to Alternative B, but additional untreated habitat may slightly increase the potential for stand-replacing fire to initiate early successional habitats used by willow flycatchers.

Pallid Bat and Townsend's Big-eared Bat

Direct and Indirect Effects. Effects are expected to be the same as found under Alternative B.

Cumulative Effects. Refer to the cumulative effects discussion above for the NSO.

American Pine Marten, Pacific Fisher, and California Wolverine

Direct and Indirect Effects. All proposed activities in the vicinity of suitable habitat under Alternative C could disrupt marten, fisher, and wolverine use and movement in the area and create short-term adverse direct effects on individuals just as was described under the Alternative B effects. Without temporary roads, 921 acres would remain untreated. There would be 822 fewer acres treated with prescribed fire within drainages and 99 fewer acres would remain untreated along ridgetops. These areas would thus leave dispersal, foraging, and denning/resting habitat at risk of a crown fire.

Cumulative Effects. Refer to the cumulative effects discussion above for the NSO.

1.8.3.3 Forest Service Management Indicator Species and Species Associations

River and Stream MIS Association

Direct and Indirect Effects. Effects are expected to be the same as found under Alternative B.

Cumulative Effects—River and Stream MIS and Marsh, Lake, and Pond MIS Associations. Future actions in the Assessment Area are not expected to affect aquatic habitats; therefore, Alternative C would not increase cumulative effects on species in these associations.

Marsh, Lake, and Pond MIS Association

Direct and Indirect Effects. Effects are expected to be the same as found under Alternative B.

Cumulative Effects. Refer to the cumulative effects discussion above for the River and Stream MIS Association.

Hardwood MIS Association

Direct and Indirect Effects. Effects are expected to be the same as found under Alternative B.

Cumulative Effects—Hardwood MIS and Snag MIS Associations

Alternative C, combined with other ongoing or reasonably foreseeable future actions in the Assessment Area, is not expected to cause any cumulative effects on hardwood habitats. Combined with local community fuel reduction projects, Alternative C would decrease the risk of high-intensity fire both inside and near the Assessment Area.

Refer to the cumulative effects discussion above for the NSO.

Snag MIS Association

Direct and Indirect Effects. Effects are expected to be the same as Alternative B.

Cumulative Effects. Refer to the cumulative effects discussion above for the Hardwood MIS Association.

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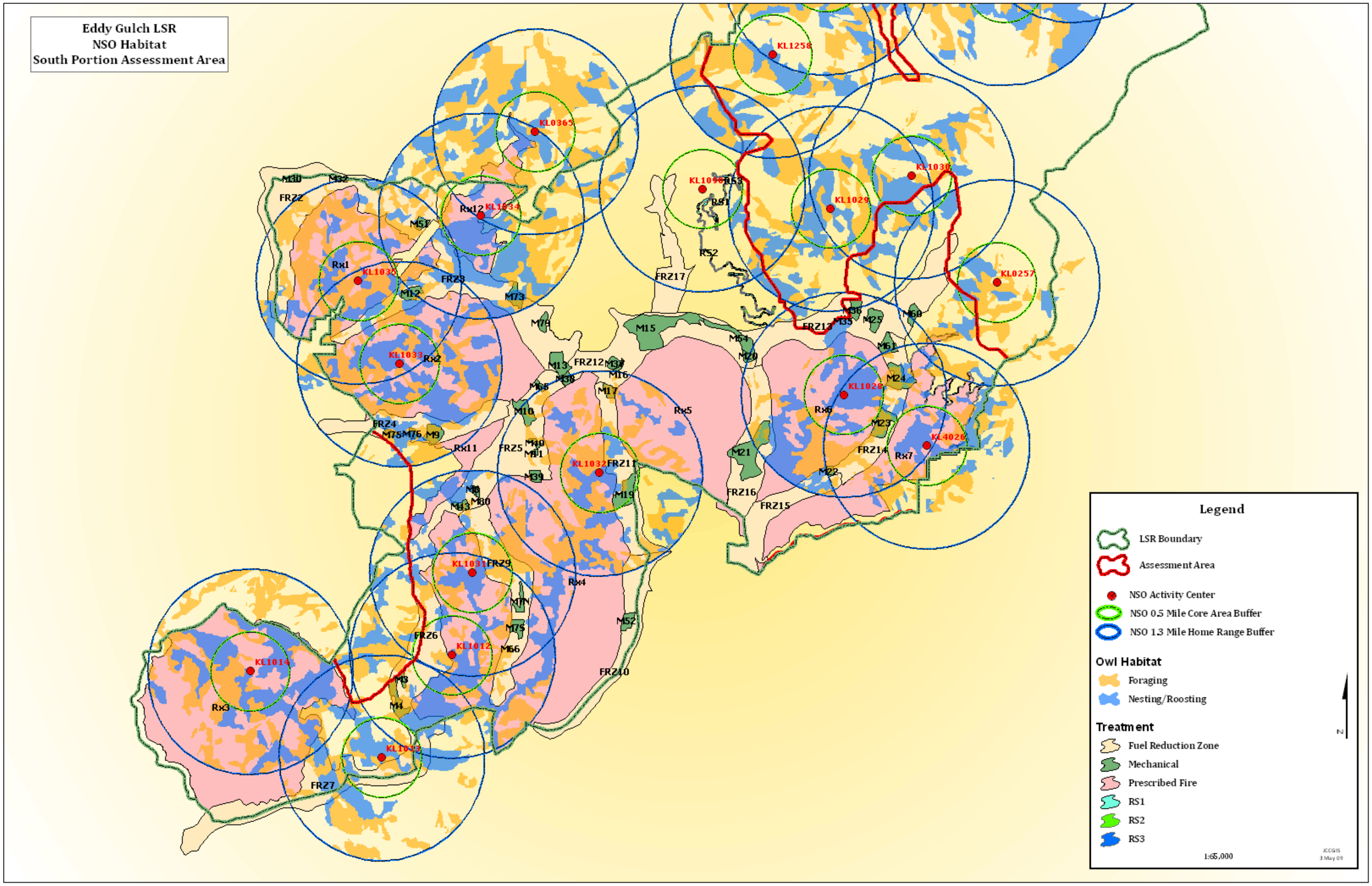
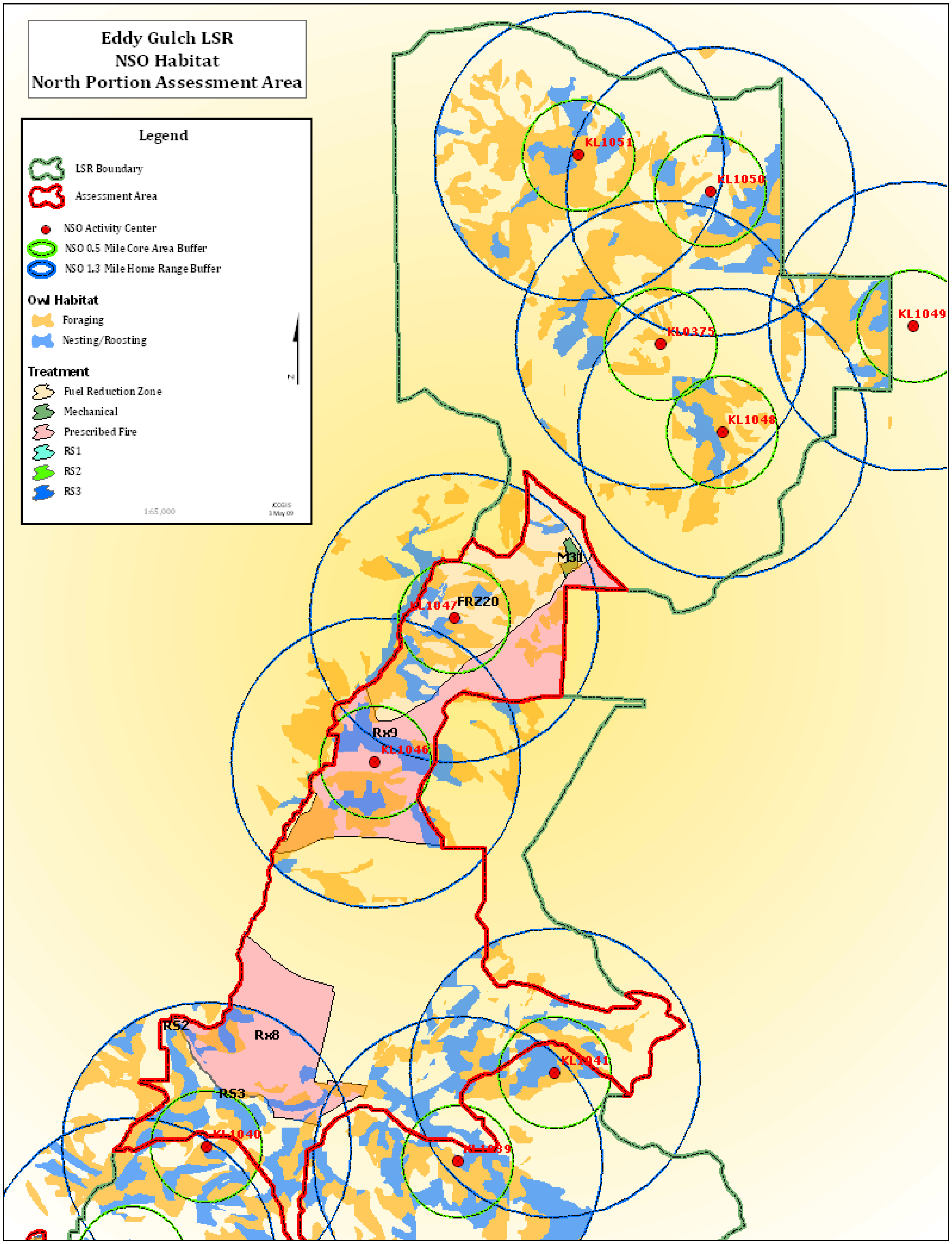
Appendix A

Maps

Map A-1a. NSO activity centers, core areas, and home range buffers in the south portion of the Assessment Area.



Map A-1b. NSO activity centers, core areas, and home range buffers in the north portion of the Assessment Area.



APPENDIX B

MANAGEMENT INDICATOR SPECIES REPORT PART II

FOR THE

EDDY GULCH LATE-SUCCESSIONAL RESERVE
FUELS / HABITAT PROTECTION PROJECT

Salmon River and Scott River Ranger Districts
Klamath National Forest

June 9, 2009

Prepared by: *Alice Berg* Date: *June 9, 2009*

Consulting Fisheries Biologist
and Subcontractor to
RED, Inc. Communications, Prime Contractor to
Klamath National Forest

Prepared by: *Brian Williams*
and Stephanie Martin Date: *June 9, 2009*

Consulting Wildlife Biologists
and Subcontractor to
RED, Inc. Communications, Prime Contractor to
Klamath National Forest

Reviewed by: ______________________ ______________
Julie Perrochet Date

Reviewed by: ______________________ ______________
Susan Stresser Date

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Management Indicator Species Report for the Eddy Gulch Late-Successional Reserve Fuels / Habitat Protection Project

1. Introduction

The purpose of this report is to evaluate and disclose the effects of the Eddy Gulch Late-Successional Reserve Fuels / Habitat Protection Project (Eddy Gulch LSR Project) on the Management Indicator Species (MIS) identified in the Klamath National Forest Land and Resource Management Plan (Klamath LRMP) (USFS 1995), which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 Code of Federal Regulations [CFR] 219). This report documents the effects on the habitat of selected MIS that could result from the three alternatives analyzed in the Eddy Gulch LSR Project environmental impact statement (EIS): Alternative A: No Action, Alternative B: Proposed Action, and Alternative C: No New Temporary Roads Constructed. Detailed descriptions of the Eddy Gulch LSR Project alternatives are contained in Chapter 2 of the Eddy Gulch LSR Project EIS.

1a. Direction Regarding the Analysis of Project-Level Effects on MIS

The Monitoring Requirements contained in Chapter 5 of the Klamath LRMP do not require population monitoring or surveys on any MIS except for steelhead trout and rainbow trout. For MIS listed on Pages 4-38 to 4-41 of the Klamath LRMP, project-level MIS effects analysis are informed by project- and landscape-scale habitat analysis alone. Project-level effects on MIS are analyzed and disclosed as part of environmental analysis under the *National Environmental Policy Act*. This involves examining the effects of the proposed project alternatives on MIS habitat by discussing how direct, indirect, and cumulative effects would change the quantity and/or quality of habitat in the landscape and project area (Klamath LRMP Page 4-39). The Klamath LRMP requirements for MIS analyzed for the Eddy Gulch LSR Project are summarized in Attachment 1 (MIS Part I Checklist) of this MIS Report. The following steps were taken to adequately analyze project effects on MIS:

1. Identifying which MIS have habitat that would be directly or indirectly affected by the project alternatives (Klamath LRMP Standards and Guidelines 8-21 through and including 8-34). This information is documented in Attachment 1 of this MIS Report.
2. Identifying the Klamath LRMP forest-level monitoring requirements for this subset of forest MIS (LRMP Chapter 5, Table 5-1). This information is documented in Attachment 1.
3. Analyzing landscape- and project-level effects on habitats for which the MIS were selected to indicate in the Klamath LRMP.
4. Relating project-level effects on MIS habitat to habitat and population trends for fish MIS, per the Klamath LRMP.

This MIS Report documents application of the above steps to select and analyze MIS for the Eddy Gulch LSR Project. Also see Attachments 2, 3, and 4 of this report.

1b. Direction Regarding Monitoring of MIS Population and Habitat Trends at the Forest Scale

Forest-scale monitoring requirements for the Klamath National Forest MIS are found in Table 5-1 of Monitoring Plan by Resource in the Klamath LRMP.

Habitat Status and Trend

The requirement to evaluate landscape and project-level effects on habitat conditions associated with the Species Associations and related MIS is identified in the Klamath LRMP on page 4-39. Habitat monitoring requirements are summarized in Attachment 1. "Habitats" are the vegetation types (for example, mixed-conifer forest), ecosystem components (such as rivers and ponds), and special habitat elements (such as snags) as identified in the Klamath LRMP. "Habitat status" is the current amount of habitat on the Klamath National Forest. "Habitat trend" is the direction of change in the amount of habitat between the time the Klamath LRMP was approved and the present. The following summarizes the methodology used for assessing habitat status and trend:

1. Use the geographic information system (GIS) vegetation layers to describe the location of habitat for nonfish MIS within the project Assessment Area.

2. Determine the distribution of fish MIS species using the Klamath National Forest GIS layer for fish distribution.

3. Consider the reason the MIS habitat was selected as an Indicator, and determine the potential effects on that habitat for which an MIS was selected.

4. Identify the indicated habitat using habitat relationships data or models in the Klamath LRMP Appendix I (USFS 1995) and California Wildlife Habitat Relationship (CWHR) System (CDFG 2005). The CWHR System is considered "a state-of-the-art information system for California's wildlife" and provides the most widely used habitat relationship models for California's terrestrial vertebrate species (*ibid*) (see Attachments 1 and 2).

5. Detailed information on the habitat relationships for MIS on the Klamath National Forest and on the CWHR System can be found in Attachments 1 and 2.

6. The habitat trends for MIS habitat are monitored using ecological and vegetation data for the Klamath National Forest and stream surveys. These data include spatial ecological and vegetation layers created from remote-sensing imagery obtained at various points in time, which are verified using photo-imagery, on-the-ground measurements, and tracking of events that change vegetation and stream conditions (for example, vegetation management, floods, and wildland fires).

Population Status and Trend

"Population status" is the current condition of the steelhead trout and rainbow trout. "Population trend" is the direction of change in that population measure over time. Population monitoring data are collected and/or compiled at the stream scale rather than the project scale because site-specific monitoring or surveying of a proposed project or activity area is not required" (36 CFR 219.14(f), and the actual treatment areas of an action may not contain streams but may affect streams through sediment delivery or flow changes.

2. Klamath LRMP Monitoring Requirements for MIS Selected for Project-Level Analysis

2a. MIS Monitoring Requirements

MIS are animal species identified in the Klamath LRMP, which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). Guidance regarding MIS set forth in the Klamath LRMP directs Forest Service resource managers to (1) analyze the effects (at the landscape and project scale) of proposed projects on the habitats of each MIS listed in the Klamath LRMP Standards and Guidelines 8-21 through 8-34; and (2) assess presence of goshawk in suitable habitat and determine the number of pairs of northern spotted owls in LSRs, and to conduct implementation monitoring to determine population trends and relationship to habitat changes for steelhead trout and rainbow trout.

2b. How MIS Monitoring Requirements are Being Met

Northern Spotted Owl and Northern Goshawk

Project-level assessment of the northern spotted owl (NSO) and northern goshawks as MIS species per the Klamath LRMP Standards and Guidelines 8-21 through 8-34. Effects on NSOs are evaluated as a species listed under the *Endangered Species Act* (ESA) (USFWS 2009), and the effects on goshawks are evaluated as a species designated as Sensitive by the Forest Service.

There are several ways that NSO presence is being determined: (1) surveys have been conducted in LSRs in coordination with the United States Fish and Wildlife Service (USFWS), (2) habitat evaluations have been conducted by USFWS (in coordination with the Forest Service Pacific Southwest Research Station) to predict NSO presence, (3) habitat loss and potential “Take” throughout the Forest is reported to USFWS annually, and (4) monitoring is accomplished through the formal monitoring programs of the Northwest Forest Plan area.

http://www.reo.gov/monitoring/trends/index.htm

http://biology.usgs.gov/s+t/SNT/noframe/pn172.htm

http://www.reo.gov/monitoring/nso/index.htm

The monitoring results can be used to adapt management practices, as coordinated with the USFWS. (http://www.fws.gov/news/newsreleases/showNews.cfm?newsId=2E89B871-9B9F-78A7-9593E1997BB12FD2).

Chapter 5 of the Klamath LRMP indicates the Standard requiring further action will be set by the Recovery Plan (which is in development).

Chapter 5 of the Klamath LRMP states that goshawk occupancy in suitable habitat will be determined. Surveys are done at the project level where a potential for effects (on habitat) or noise disturbance may be significant. The majority of habitat and survey work is conducted on the Goosenest Ranger District of the Klamath National Forest because of the high likelihood of presence. Also, Goshawk Management Areas have been identified throughout the Klamath National Forest, with a specific Standards and Guidelines (8-20) to protect northern goshawks. Chapter 5 of the Klamath LRMP states that the variation from the Standard requiring further action will be determined in a Regional Conservation Strategy, which has not yet been completed. Therefore, there is no Standard to measure against. Survey information has been provided to the USFWS for evaluation and development of a Regional Conservation Strategy.

Steelhead and Rainbow Trout

Population trend data for steelhead trout are collected and consolidated by the Klamath National Forest in cooperation with state, tribal, and federal agency partners such as the California Department of Fish and Game (CDFG), Karuk Tribe, United States Department of the Interior (USDI) Geological Survey, and USFWS and other conservation partners such universities and watershed restoration councils. Fish presence data for steelhead trout and rainbow trout are collected using a number of direct and indirect methods, such as stream surveys and fishing results (creel census). The Klamath National Forest’s MIS monitoring program for species typically hunted, fished, or trapped (such as steelhead and rainbow trout) was designed to be implemented in cooperation with the CDFG, consistent with direction in the 1982 Planning Rule to monitor forest-level MIS population trends in cooperation with state fish and wildlife agencies to the extent practicable (36 CFR 219.19(a)(6)). To be biologically meaningful for wide-ranging MIS, presence data are collected and tracked not only at the forest scale, but also at larger scales, such as range-wide (range of the NSO), state, province (Northern California), or important species management unit (for example, Klamath River Basin). Available data on steelhead and rainbow trout were analyzed in 2006 to determine the population trends of these species.

Steelhead Trout

Historically, natural steelhead trout spawning in the Klamath River basin extended into the upper Klamath basin (Hamilton et al. 2005). Their current distribution in the basin is now limited to downstream of Iron Gate Dam, although remnant steelhead runs now reside upstream of the dam. South of Cape Blanco, Oregon, steelhead are known to occur in the Rogue, Smith, Klamath, Trinity, Mad, and Eel rivers and in Redwood Creek (Busby et al. 1996).

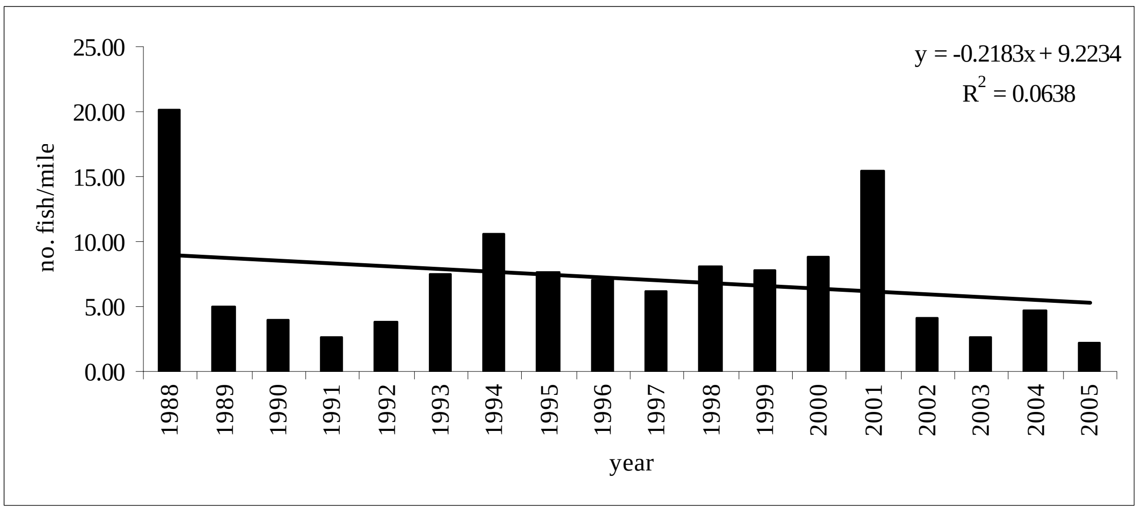
Klamath Mountains Province (KMP) Steelhead Trends. In 2006 Rebecca Quiñones, of the Klamath National Forest, worked with the USFWS to complete a status review of current survey data. The following information is from that effort.

In 2001 the National Marine Fisheries Service (NMFS) reconsidered the status of KMP steelhead under the ESA (66 *Federal Register* [FR] 17845, April 4, 2001) and determined that KMP steelhead do not warrant listing as Threatened or Endangered at this time. However, abundance trends since 1970 have declined to the point that some stocks, particularly that of summer steelhead, are considered to be at risk of extinction (Busby et al. 1996).

The trend analysis was based on instream adult survey data, primarily for summer steelhead adults, because no abundance estimates for winter steelhead were found. However, escapement estimates of hatchery (Iron Gate Hatchery) and natural populations were analyzed separately. Least-squares regression was used to describe trends in escapement numbers, and two-tailed tests were used to test whether the trends were significantly different from zero at a level of significance of 0.05. A line with a slope of zero depicted a trend that was neither increasing nor decreasing over time.

Escapement numbers collected in the Salmon River for summer steelhead adults and half-pounders were regressed on year (1988 to 2005). Estimates of escapement were collected by continuous and concurrent direct observation (snorkel) surveys in the South Fork, North Fork, and mainstem Salmon River (USFS 2006a,b, Figure 1). Summer steelhead escapement did not significantly vary throughout the sampling period ($p = 0.31$, $r^2 = 0.06$). Regression of the natural log of escapement against year yielded similar results ($p = 0.32$, $r^2 = 0.06$).

FIGURE 1. Escapement of summer steelhead trout (1988–2005), Salmon River, California (USFS 2006a,b).



Because adult and half-pounder steelhead were reported separately since 1993, it was possible to analyze each age class separately (Figure 2). Findings showed a significant increase in the number per mile of half-pounders in the North and South Forks of the Salmon River from 1993 to 2005 ($p = 0.0024$, $r^2 = 0.58$). In comparison, adult numbers showed no significant increase or decrease ($p = 0.85$). However, the trend line for adults had a very poor fit to the data ($r^2 = 0.0034$). Also, the trend analysis may reflect numbers of large resident trout that were sometimes incorrectly identified as half-pounders.

Although the abundance of steelhead adults in the Salmon River appeared to be unchanging, the numbers of summer steelhead adults returning to Iron Gate Hatchery decreased significantly since 1967 (Figure 3; $p = 0.00038$, $r^2 = 0.29$). Hatchery escapement numbers were assumed to reflect the total run for each year because the fish ladder, allowing access into the facility, was open throughout the duration of the run (Rushton 2006). Hatchery estimates of summer steelhead numbers include numbers of “fall-run” steelhead as in Busby et al. (1996).

FIGURE 2. Number per mile of summer steelhead half-pounders and adults, North Fork and South Fork Salmon River, California, 1993 to 2005.

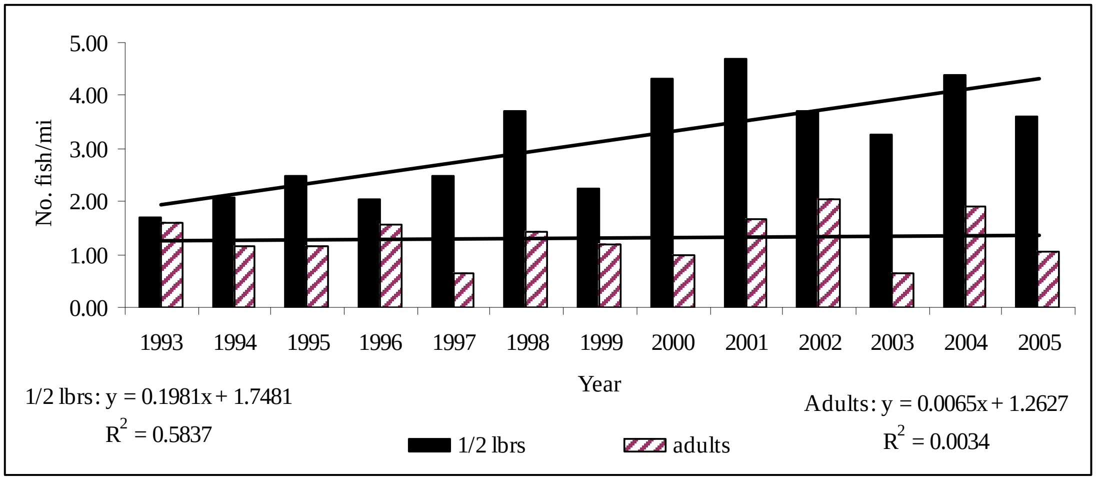
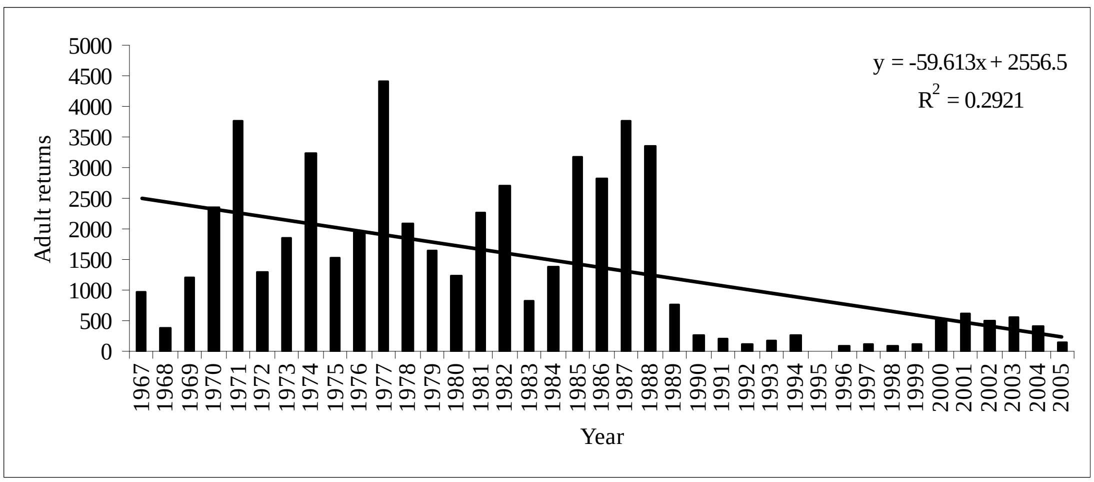


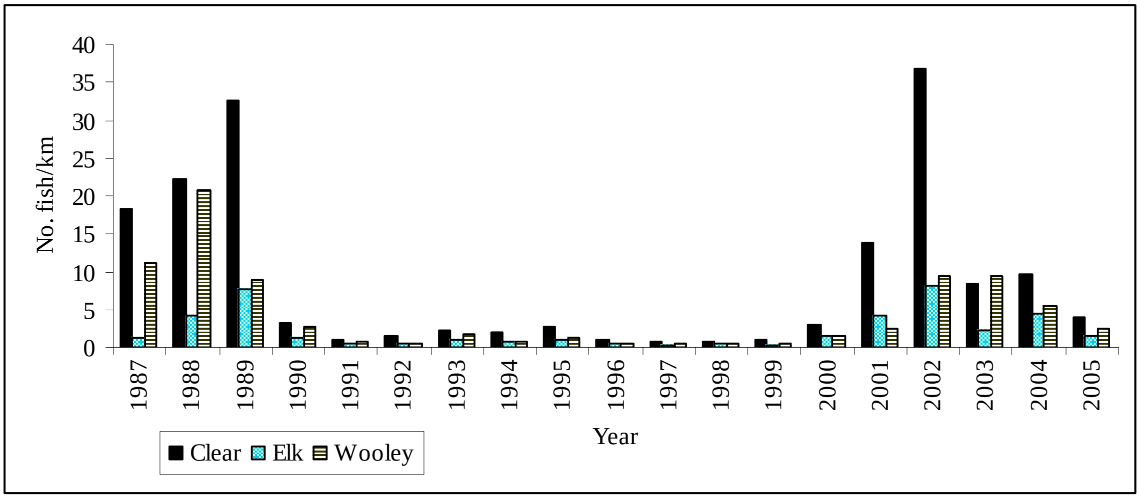
FIGURE 3. Adult steelhead returns to Iron Gate Hatchery, Klamath River, California, 1967 to 2005 (Rushton 2006).



The escapement estimates for summer steelhead adults returning to three creeks (Clear Creek, Elk Creek, and Wooley Creek) were also analyzed (Figure 4). Clear Creek and Elk Creek are tributaries to the Klamath River near Happy Camp. Wooley Creek is a tributary to the mainstem Salmon River, approximately 4.8 kilometers (km) (3 miles) upstream from the mouth. Escapement data from these creeks were collected through direct observation (snorkel surveys) of index reaches.

Numbers of summer steelhead adults returning to Clear Creek ($p = 0.62$, $r^2 = 0.015$), Elk Creek ($p = 0.66$, $r^2 = 0.012$), and Wooley Creek ($p = 0.26$, $r^2 = 0.073$) did not exhibit any apparent increasing or decreasing trends (Figure 3). Instead, the data suggested that adult numbers from 1987 to 2005 had a bimodal distribution, where the peaks were separated by low numbers throughout the 1990s.

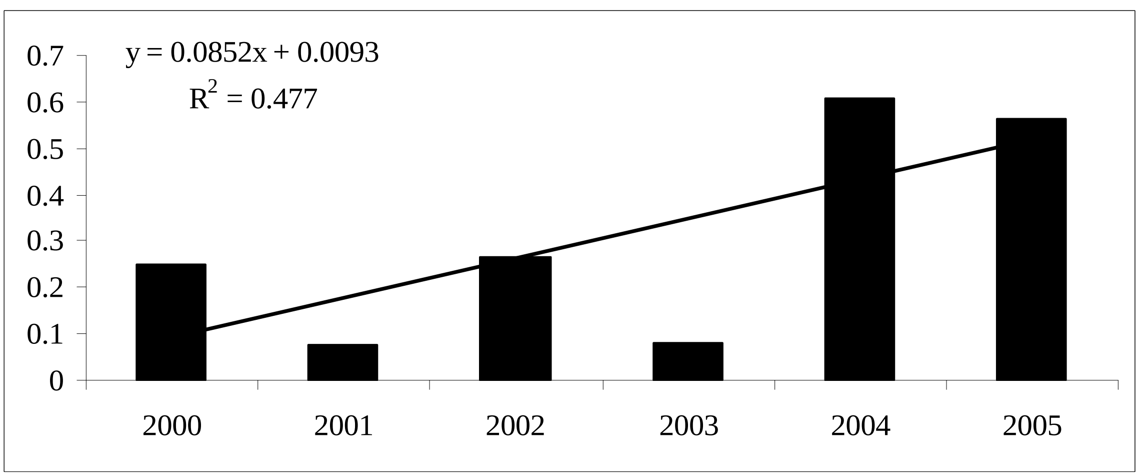
FIGURE 4. Abundance indices (number of fish/km) of adults and half-pounders observed in Clear Creek, Elk Creek, and Wooley Creek, Klamath River basin, California, 1987 to 2005.



Lastly, data collected by the Smith River Alliance from 2000 to 2005 were analyzed (Figure 5). The data to the number of summer steelhead trout counted per miles of stream surveyed were standardize so that numbers could be directly compared. The abundance trend for summer steelhead in the Smith River was not significantly different from zero:

> (p =0.13, r^2 = 0.48). Therefore, the abundance of summer steelhead in the Smith River did not significantly change from 2000 to 2005.

FIGURE 5. Number of summer steelhead adults per miles of stream surveyed from 2000 to 2005, Smith River, California.



Based on the analysis of data with the longest time series (escapement to Iron Gate Hatchery), it was concluded that summer steelhead abundance is significantly declining in the Klamath River basin. The stable trend seen in natural escapement possibly resulted from conducting the analysis on a shorter time series (less than 20 years versus 38 years). Also, it was theorized that the significantly increasing abundance of summer steelhead half-pounders in the Salmon River was compounded by the misidentification of large resident trout as half-pounders. More reliable estimates were needed to further substantiate the trend of half pounders in the Salmon River. The conclusions in this study reflected similar conclusions drawn by Moyle (2002) and Busby et al. (1996).

Moyle (2002) concluded that Klamath Mountains Province winter steelhead were widely distributed and fairly common, although in largely reduced numbers. In comparison, summer steelhead were in danger of extinction, with population estimates at less than 10 percent of historic levels. Moyle cited dam construction, poor watershed management, decreased flows (resulting in increased temperatures and changes to stream channel morphology/composition), and interactions with hatchery produced steelhead as contributing factors to the decline in Klamath Mountains Province steelhead abundance.

Rainbow Trout

Rainbow trout are native to Pacific slope drainages from the Kuskokwim River in Alaska to Baja California, Mexico (*ibid*.). However, their distribution has expanded significantly, including previously fishless streams and lakes, due to introductions. Rainbow trout is an MIS in these three National Forests: Klamath, Shasta-Trinity, and Six Rivers.

Rainbow trout inhabit a wide variety of habitats. However, stream dwelling rainbows tend to prefer waters with a higher percentage of riffles than pools (*ibid*.). In the summer, they prefer habitats with water temperatures between approximately 10°C and 20°C (50°F and 68°F) and will move to deeper, cooler water at temperatures above 21°C (70°F) (Froese and Pauly 1999; WDFW 1991). Optimal habitat conditions include a high saturation of dissolved oxygen (up to 80 percent saturation), pH between 7 and 8 (Mills 1971), and temperatures between 7°C and 17°C (45°F and 63°F) (Van Dam 1938 in Moyle and Cech 2000). Temperatures above 28°C (82°F) are known to be lethal to rainbow trout.

Adult forage and dispersal patterns appear to vary with local conditions, environmental factors, and the presence of other fish species (Meehan and Bjornn 1991; Moyle 2002). Rainbow trout are typically diurnal, opportunistic feeders. They are carnivores that feed in a rover-predator style. The majority of their diet consists of aquatic insects, although they will eat crayfish, grasshoppers, winged bugs, worms, salamanders, and other fish (including other trout). They occasionally feed on benthic invertebrates when the benthic food supply is great and/or when there is increased competition for prey from the water column (Behnke 1992).

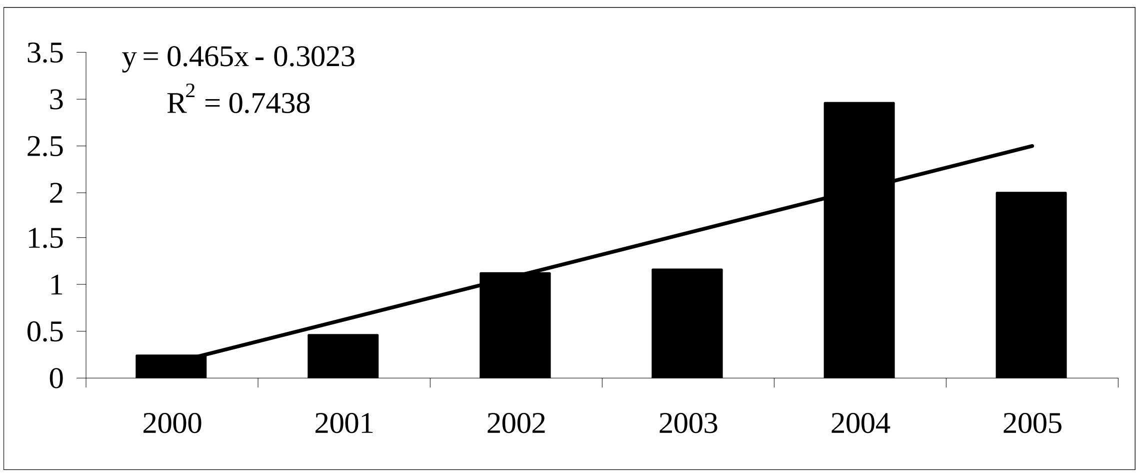
Rainbow trout usually spawn between the ages of 2 to 4 years old. Age of first spawn can vary greatly, depending on size and genetics (Behnke 1992). Female fecundity ranges from 1,200 to 3,200 eggs per kilogram of body weight (Behnke 1992). Rainbow trout spawning behavior typically begins during the spring but can begin as early as in December and varies due to temperature and water flow conditions. Temperatures of 3°C to 6°C (37°F and 43°F) often initiate spawning behavior, although actual spawning does not usually occur until temperatures reach 6°C to 9°C (43°F and 48°F) (Behnke 1992). In lakes, this often means moving from the lake into their natal stream. If the lake is not stream-fed, rainbow trout will move into near-shore shallow waters (Moyle and Cech 2000). In rivers, rainbow trout will migrate from feeding areas into smaller, cool-water tributaries (Moyle and Cech 2000). Both rainbow and steelhead trout are iteroparous, meaning that they can spawn more than once throughout their lifetime.

Rainbow Trout Trends. Only one data set met the criteria for data analysis done in the 2006 Quinones-USFWS report. The criteria was that abundance data had to be collected for a minimum of six continuous years using the same methods, similar to the criteria set by the Biological Review Teams conducting status reviews for NMFS (Spence et al. 1996). Least-squares regression was used to describe trends in numbers and two-tailed tests to test whether the trends were significantly different from zero at a level of significance of 0.05. A line with a slope of zero depicted a trend that was neither increasing nor decreasing over time.

The Smith River Alliance has been conducting adult fish surveys since 2000 in order to record annual abundance and distribution of salmonids in the Smith River (Reedy 2005). Surveys are conducted through direct observation (snorkel dives) in reaches of the mainstem and Middle and South Forks of the river. The data were standardized as the number of rainbow trout counted per miles of stream surveyed, so that numbers could be directly compared.

Based on the Quinones analysis in the Smith River, the number of resident rainbow trout per mile significantly increased from 2000 to 2005 ($p = 0.03$, $r^2 = 0.74$; Figure 6). During the sampling period, numbers of rainbow trout ranged from 2 (2000) to 46 (2005). However, the number of rainbow trout counted per mile peaked in 2004, with a total of 39 individuals counted that year.

FIGURE 6. Number of rainbow trout counted per miles surveyed from 2000 to 2005, Smith River, California (Reedy 2005).



It was not possible to conclusively determine the status of this species due to the lack of data on rainbow trout abundance in the Klamath, Shasta-Trinity, and Six Rivers National Forests. However, data collected in the Smith River and conclusions drawn by Moyle (2002) suggest that rainbow trout abundance is on the increase throughout most of its range. The interpretation of abundance trends may also be confounded by the common practice of introducing rainbow trout into many of the rivers and lakes within these three forests.

Both steelhead trout and rainbow trout are fished for by recreationists, therefore it is not accurate to make a strong tie between instream habitat conditions and population trend. The link between instream habitat conditions and the steelhead trout population trend is further complicated by the influence of ocean conditions. A link between instream habitat conditions and rainbow trout is further complicated by the state of California's rainbow trout stocking program, which adds thousands of individual rainbow trout to streams throughout the Klamath River basin.

For aquatic habitat monitoring, a comprehensive monitoring approach is conducted through the Aquatic and Riparian Effectiveness Monitoring Plan, which is designed for the regional and species range scales. It is intended to characterize the ecological condition of watersheds and aquatic ecosystems, determine present watershed conditions, track trends in watershed conditions over time, and report on the Klamath LRMP's effectiveness across the region. (Reeves et al. 1987). Effects on MIS habitat are also tracked at the project level by updating the Klamath LRMP MIS GIS layer and through Stream Condition Inventories and Fish Habitat Typing Surveys conducted at the project level and the watershed level.

3. Description of the Proposed Project

Alternative B (Proposed Action) and Alternative C (No New Temporary Roads Constructed) propose fuel reduction treatments to protect late-successional forest habitat in the Eddy Gulch LSR Project Assessment Area. The proposed treatments include Fuel Reduction Zones (FRZs), with M Units (thinning units) and fuel reduction areas within the FRZs, and Prescribed Burn Units (Rx Units) outside the FRZs. A detailed description of these two alternatives (plus Alternative A [no action]) is contained in Chapter 2 of the EIS for the Eddy Gulch LSR Project. There are currently 1,175 acres of hardwood habitat in the Assessment Area, 10,028 acres of Riparian Reserves (translated to River/Stream Association habitat), zero acres of open water habitat, and 21,406 acres of snag habitat. Under Alternative A (no action) it is possible that a portion of the Assessment Area would burn under a wildfire. The modeled wildfire suggests that 7,200 acres would burn, and 81 percent of those acres would be by crown fire, with an estimated 5,845 acres of any one or combination of MIS habitats destroyed. The treatments proposed under Alternative B would modify future fire behavior such that no MIS habitat is expected to be lost. Any fires that start post-treatment are expected to remain as surface fires. Under Alternative C (no temporary roads) 921 fewer acres of habitat would go untreated, and 81 percent of this (746 acres) would be subject to crown fires and thus MIS habitat would be lost.

Construction of new temporary roads (1.03 miles) proposed under Alternative B has the potential to affect some habitat components within the MIS Associations. However, to the extent possible, new temporary roads have been routed to minimize removal of large-diameter trees. The 1.03 miles of new temporary roads are proposed through existing late-successional stands; thus, approximately 0.5 acre of late-successional forest, or 0.0004 percent of extant late-successional forest in the Assessment Area, would be modified.

All hazard trees would be identified and removed in accordance with Klamath National Forest Hazard Tree Policy (USFS 2005). Implementation of hazard tree removal would not change canopy cover at the stand or landscape level because the individual trees that are removed are limited to road prisms and scattered throughout the landscape; thus, the effects from the removal of few, scattered hazard trees is not expected to affect populations of any MIS Association.

Although the vegetation/habitat data may over- or under-estimate existing habitat components, it is useful as a tool for comparison of short- and long-term effects between the alternatives. This analysis is for comparison of effects by alternative only and results cannot be applied to specific, individual units on the ground. Modeled effects are based on current condition of the stands and effects of prescriptions as proposed.

4. Selection of Project-level MIS

The MIS for the Klamath National Forest are identified in the Klamath LRMP Standards and Guidelines 8-21 through 8-34. A review was conducted using the checklist in Attachment 1 to determine (1) if the project is within the range of any MIS, (2) if habitat for which the species is an indicator is present within or adjacent to the proposed treatment areas, and (3) if there are potential direct, indirect, or cumulative effects on habitat components.

The following associations and MIS are not discussed further because the habitats for which these species were selected are not in or adjacent to the Assessment Area, as documented in this MIS Report. Therefore, the project will not directly or indirectly affect the habitat for the following species and will, therefore, have no effects on forest-level habitat or population trends:

Grassland/Shrub-Steppe Association

Pronghorn	(*Antilocarpa americana*)
Montane vole	(*Microtus montanus*)
Loggerhead shrike	(*Lanius ludovicianus*)
Swainson’s hawk	(*Buteo swainsoni*)
Sage thrasher	(*Oreoscoptes montanus*)
Burrowing owl	(*Athene cunicularia*)

Mature Ponderosa Pine Association

Flammulated owl	(*Otus flammeolus*)
White-headed woodpecker	(*Picoides albolarvatus*)
Pinyon jay	(*Gymnorhinus cyanocephalus*)

The following species associations and MIS were selected for analysis for the Eddy Gulch LSR Project due to the presence of suitable habitat that may be affected by the project activities. Species associations and MIS associated with habitats that may be affected by project activities are analyzed below.

Hardwood Association

Acorn woodpecker	(*Melanerpes formicivorus*)
Western gray squirrel	(*Sciurus griseus*)

River/Stream Association

Rainbow trout	(*Oncorhynchus mykiss*)
Steelhead	(*Oncorhynchus mykiss*)
Tailed frog	(*Ascaphus truei*)
Cascades frog	(*Rana cascadae*)
American dipper	(*Cinclus mexicanus*)
Northern water shrew	(*Sorex palustris*)
Long-tailed vole	(*Microtus longicaudus*)

Marsh/Lake/Pond Association

Western pond turtle	(*Actinemys marmorata*)
Northern red-legged frog*	(*Rana aurora aurora*)

*The northern red-legged frog range is not within or adjacent to the Eddy Gulch LSR Assessment Area and is not discussed further in this document.

Snag Association

Red-breasted sapsucker	(*Sphyrapicus rubber*)
Hairy woodpecker	(*Picoides villosus*)
White-headed woodpecker	(*Picoides albolarvatus*)
Vaux's swift	(*Chaetura vauxi*)
Downy woodpecker	(*Picoides pubescens*)
Pileated woodpecker	(*Dryocopus pileatus*)
Black-backed woodpecker	(*Picoides arcticus*)

5. MIS Environmental Baseline and Effects of Proposed Project on Selected MIS

Information on species natural history, including general habitat requirements, is presented in Attachment 4 (Species Natural History Summary for MIS). Rationale for designation of MIS is found in the EIS for the Klamath LRMP (1995) and in the "Klamath LRMP MIS Selection Summary" in Attachment 3 of this MIS Report.

Hardwood Association: Acorn Woodpecker and Western Gray Squirrel

The acorn woodpecker acts as an indicator for diversity of oak species and larger conifers, and the western gray squirrel acts as an indicator for mature hardwood and mixed-conifer–hardwood. There are 1,276 acres of mapped hardwood habitats in the Assessment Area.

Environmental Baseline and Population Trend

Acorn Woodpeckers

Acorn woodpeckers are found in hardwood, hardwood-conifer, or conifer habitats with mature oaks and snags. In the conifer belt, they are usually found in open stands with tree-sized oaks such as Oregon white oak, California black oak and canyon live oak; dense tanoak stands are typically avoided.

The California population of acorn woodpeckers, as reported by the USFWS Breeding Bird Survey (BBS) data (1966–2007), is slightly increasing at a rate of 0.4 percent annually (p=0.37, n=122) (Sauer et al. 2008). This data should be interpreted with caution as the BBS suggests that there are many factors that can influence the validity and use of the information, and any analysis of the data should carefully consider the possible problems with the data (Sauer et al. 2008). The Partners in Flight (PIF) population trend data for Bird Conservation Region 5 (BCR5) is uncertain for the acorn woodpecker (Panjabi et al. 2005).

Habitat suitable for acorn woodpeckers in the Assessment Area is generally restricted to open hardwood stands at lower elevations, and there are approximately 1,175 acres of available hardwood habitat, which are not expected to be effected by the project. Their abundance is unknown, but they are probably rare to uncommon in the Assessment Area because open hardwood stands are infrequent. Individuals were not observed during 2007–2008 surveys but were recorded during 1992–1998 survey data (Long and Herrera 2009).

Western Gray Squirrel

Western gray squirrels are dependent on mature oak and mixed-conifer habitats and require large trees, mast crops, and snags. Suitable habitat found throughout the forest includes deciduous or broad-leafed woodlands dominated by oak, riparian areas, and mixed forests. The Klamath forestwide directive suggests maintaining a significant component of mature, mast-producing hardwoods and oak species where these species occur within conifer stands.

The western gray squirrel is fairly common in the Assessment Area and is considered a game species in California. The CDFG estimates approximately 30 million acres of western gray squirrel habitat in the state, which are occupied by approximately 18 million squirrels just before the breeding season (CDFG 2000). Estimates include a net increase of about 1.2 million squirrels annually after consideration of a 50 percent juvenile mortality, 50 percent adult mortality, and a harvest rate due to hunting of less than 1 percent each year, although environmental and density-dependent mechanisms help keep the populations in check with their habitats. Habitat suitable for gray squirrels is widespread and is expected to include a minimum of 1,175 acres of hardwood habitat within the Assessment Area, none of which are expected to be effected by the project.

Implementation of Klamath LRMP Standards and Guidelines

The Klamath LRMP Standards and Guidelines require that projects maintain a significant component of mature, mast-producing hardwoods and oak species (for example, 10 to 35 square feet basal area per acre) in areas where oak stands occur within conifer stands. The project is not proposing to eliminate any hardwoods except to meet FRZ or hazard tree guidelines (USFS 2005).

Effects of the Project on Hardwood Association: Acorn Woodpecker and Western Gray Squirrel

Alternative A: No Action

In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no direct effects on hardwood habitats. In areas not affected by fire, tree size and snags are expected to slowly increase. However, areas not affected by wildfire would likely become increasingly dominated by a dense conifer overstory, which would decrease hardwood productivity and dominance and thus decrease use of the habitat by species that prefer hardwoods but avoid conifer forests.

Based on the modeled fire, up to 81 percent of the hardwood habitat in a given area could be removed or adversely affected. Any kind of fire could consume hardwood snags and coarse woody debris (CWD), but fire would also create snags and cavities that provide nest or roost sites. Fire could benefit hardwoods by removing competition from encroaching young conifers.

The modeled fire would have various indirect effects. Moderate- to high-intensity fire would initiate successional changes that could increase the probability of future stand-replacing fire as forest is replaced with brush fields and dense young forest. This would prevent the development of mature hardwood habitats. Low- to moderate-intensity fire is likely to benefit hardwood habitats by reducing the likelihood of future stand-replacing fire, by creating a mosaic of openings, by initiating tree and snag decay that would create foraging opportunities and nesting/roosting structure, and by reducing competition from conifers.

There are no proposed or anticipated actions that would combine with Alternative A to cause cumulative effects on the Hardwood MIS Association beyond the project's direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating inside the Assessment Area.

Alternative B: Proposed Action and Alternative C: No New Temporary Roads Constructed

Thinning in FRZs may remove important structural components of hardwood habitats such as large-diameter trees, snags, and CWD under Alternatives B and C. Additionally, under Alternative B, the construction 1.03 miles of temporary roads may also remove large-diameter trees, snags, and CWD. However, the removal of large-diameter trees would only occur under limited circumstances; large snags or groups of snags would be retained over most of the landscape, and large-diameter hardwoods and CWD would be retained where consistent with FRZ objectives. Therefore, effects on the distribution and abundance of these habitat components are expected to be minimal.

Fuel reduction treatments (prescribed fire and mastication) also have the potential to remove hardwoods, snags, and CWD under both action alternatives. However, prescriptions are designed to imitate low-intensity fire and are designed to retain these components, especially hardwoods. Thus, fuel reduction treatments under either action alternative are not expected to have a significant effect on important structural components of hardwood habitats.

Thinning and other fuel reduction treatments are expected to benefit hardwood habitats by reducing fuels to a level that would decrease the likelihood of extensive, high-intensity fire. Treatments would also increase hardwood dominance in some areas by reducing conifer overstory and competition from young conifers that have encroached into mature hardwood stands during the era of fire suppression.

Alternatives B and C, combined with local community fuel reduction projects, including the proposed fuelbreak system west of Black Bear Ranch, would further decrease the risk of high-intensity fire inside and near the Assessment Area. The other proposed or anticipated actions include the installation of a fiber-optic line and road maintenance and, when combined with Alternative B or C, would cause no cumulative effects on hardwood habitat beyond the project's direct and indirect effects.

The cumulative effects on hardwood habitats under Alternative C are similar to Alternative B, except additional habitat could burn during a wildfire if that fire occurred in one of the untreated areas.

Overall, the amount of hardwood habitat in the Assessment Area would be the same pre- and post-project. Degradation of habitat components (such as individual trees) would occur with the removal of some hardwoods in mixed hardwood-conifer stands and plantations and the removal of large conifers. Shifting or relocation of territories may result from proposed activities in the landscape, but it is not expected to affect populations or population trends for western gray squirrels or acorn woodpeckers.

River/Stream Association: Fish—Rainbow and Steelhead Trout

Environmental Baseline and Population Trend

The Eddy Gulch LSR Project fish BA/BE provides more information about the direct, indirect, and cumulative effects on these species; the discussion below is a brief summary of that information.

Resident rainbow trout and steelhead trout are indicators of perennial streams with good water quality, clean substrates that provide spawning and rearing habitat, adequate stream flows, in-stream woody debris, and channel conditions.

The Eddy Gulch LSR provides 75 miles of resident rainbow trout habitat and 18.4 miles of steelhead habitat in the following 7th-field watersheds: Black Bear Creek, Cody-Jennings, Crawford Creek, Eddy Gulch, Etna/Mill Creek. Gooey-Ketchum, Gould-East Fork South Fork Salmon River, Indian Creek, Johnson Creek, Kanaka-Olsen, Lower North Russian Creek, Lower South Russian Creek, Mathews Creek, Middle Etna, Robinson-Rattlesnake, Shadow Creek, Sixmile Creek, Sugar Creek, Tanner-Jessups, Taylor Creek, Timber-French, Upper Etna, Upper French, Upper North Russian Creek, Upper South Russian Creek, Whites Gulch, Yellow Dog-Sawmill. Checklists in the fish BA/BE document habitat conditions in the 7th-field watershed streams.

Steelhead and rainbow trout have essentially the same habitat requirements, including cool water, clean gravel for spawning, cobble and boulder substrate for velocity refuge and cover, large woody debris for cover and habitat complexity, and other diverse habitat elements, including deep pools, riffles, cascades, and side-channel habitat. These habitat elements provide (1) adult and juvenile fish with cover and protection from predators, (2) oxygenate flows, (3) juvenile rearing and foraging habitat and adult holding and foraging habitat, and (4) spawning habitat that is critical to sustaining healthy populations of both species.

Summer water temperatures are cool and quite suitable for salmonids in all of the LSR 7th-field watershed streams. Stream shade is high for the majority of stream segments in the LSR and is provided by conifers, hardwoods, and steep topography. Instream large woody debris levels are low, partly due to channel types that have low storage capability and due to past flood events that transported wood out of these streams. Potential large wood recruitment is good due to an abundance of conifers in Riparian Reserves and ongoing protection of the Reserves. The dominant age and size class of conifers in Riparian Reserves is, in general, mid-seral. Long-term protection and restoration measures are in place to allow conifers to continue to grow into larger trees available for recruitment to streams.

Pools are abundant in LSR streams, which exhibit predominantly step/pool bed features. Boulders and cobble are the dominant substrates and provide stable bed and banks. Pool depths do not meet the desired condition (greater than 1 meter depth), as defined by NMFS (1996); however, pool depths do not appear to be associated with sedimentation. Relatively shallower pool depths in the LSR streams are due to channel types that have nondeformable beds, which have limited capability to form deep pools. Pool depths are adequate for both juvenile and adult resident rainbow trout, as well as rearing steelhead. The extent and depth of pools in the LSR expands during winter months under winter flow conditions and thus, pools provide good holding habitat for adult steelhead during winter months.

The 7th-field watersheds in the project Assessment Area are rated as “at risk” for the sediment Indicator due to past disturbances, streamside landslides, and mass wasting potential. However, field reconnaissance of LSR 7th-field watershed streams in 2008 indicated that streams are high-energy, low-sediment supply stream types. Sedimentation appears to be episodic and associated with streamside landslides, earthflows, and flood events. Streambanks are, in general, stable due to boulder substrates and an abundance of vegetation. Instream substrates have low embeddedness, and there was little evidence of pool filling with fine sediment. The amount of fines in pools was low, in general, and composed of sand and small gravels. LSR streams are primarily transport reaches that do not function as long-term storage sites for fine sediment that may be associated with large-scale disturbance events. Rather, these streams transport sediment downstream to deposition reaches in 6th- and 5th-field watershed streams.

Population estimates for steelhead and trout for LSR streams are lacking. Based on field observations and limited survey data, the limiting factor for trout and steelhead production appears to be a lack of spawning habitat. Spawning-size substrates are limited overall, and distribution is limited to pockets behind obstructions such as boulders and large wood. The limited abundance and distribution of spawning substrates is primarily due to channel types (steeper gradient, confined channels with low sinuosity) that transport wood and smaller substrates downstream. These channel types intrinsically lack alluvial deposition reaches and side channels, which function as preferred spawning sites for steelhead in steeper, high energy drainages. LSR 7th-field watershed streams appear to provide good quality rearing habitat and could support more fish if more spawning habitat was available. Thus, steelhead and resident rainbow trout production is likely lower than what could be sustained by the carrying capacity (habitat and food resources) of these streams.

Effects of the Project on River/Stream Association: Fish—Rainbow and Steelhead Trout

Alternative A: No Action

The no-action alternative is described as continuation of the current level of management and public use—this includes road maintenance, dispersed recreation (hunting, fishing, camping, and hiking), mining, watershed restoration projects, and the modeled wildfire. The timeframe for analysis is considered to be 20 years. Given the fuel hazard in the LSR and current predictions of climate change, it is assumed at least one wildfire will escape initial attack during the 20-year period and burn under 90th percentile weather conditions (defined as 10 percent of the days in the historical weather database that had lower fuel moisture and higher wind speeds compared to the rest of the days). An analysis of a wildfire for three days that escaped initial attack in the Assessment Area indicates that fire would burn 7,200 acres. Of those 7,200 acres, 1,355 acres (19 percent) would be surface fire; 5,065 acres (70 percent) would be passive crown fire; and 780 acres (11 percent) would be active crown fire.

The no-action alternative would not result in direct effects on fish or aquatic habitat. Watershed and aquatic habitat conditions will continue to respond to climatic and other environmental changes and will continue to recover from past flood and fire events until reset by a future natural event such as wildfire. The no-action alternative would not directly affect stream shade, water temperature, sedimentation rates, or large woody debris.

The no-action alternative may cause indirect effects on fish and their habitat because fuel loadings are high in the LSR, and effects could occur later in time if a large wildfire occurred. If a wildfire were to occur, it could result in severe effects on watersheds and streams. Adverse effects of a wildfire would include creation of hydrophobic soils, post-fire increases in soil erosion, sedimentation to streams, removal of overstory vegetation, loss of stream shade, increased stream temperatures, and a reduction of future large wood recruitment. Loss of vegetation and burned soils would increase stream temperatures and peak flows and cause destabilization of streamside landslides, which would increase sedimentation rates and amounts. All of these disturbances, if they occur, would adversely affect salmonids by degrading aquatic habitat through pool filling and degradation of spawning habitat. Post-fire sedimentation would likely be chronic until vegetation and soil recovery occurred. Because of existing high fuel loadings, large wood recruitment would likely be decreased in Riparian Reserves because these areas are susceptible to moderate to high intensity fire.

The no-action alternative would not add project-related incremental effects to the effects of past, present/ongoing, or future projects because no management activities are proposed. However, the no-action alternative could result in significant adverse cumulative effects if a wildfire occurred under existing conditions, which includes high fuel loadings across the subject watersheds. Aquatic habitat is recovering from past disturbances and fish populations are at low levels. Thus, a severe wildfire, in combination with past, present/ongoing, and future actions, could result in significant cumulative effects.

Alternative B: Proposed Action and Alternative C: No New Temporary Roads Constructed

Landings. There would be no effects on fish or aquatic habitat from landings since no new landings will be constructed for the project under either action alternative. Existing landings and wide areas along roads will be used. Best Management Practices (BMPs) and resource protection measures will be implemented to prevent erosion off of existing landings during and after use. Thus, no incremental increase in sedimentation or effects on Riparian Reserves are expected from use of existing landings.

Road-related Actions. The construction of new temporary roads and the use of former logging access routes are proposed under Alternative B to access treatment units.

1. Approximately 1.03 miles (5,433 feet) of new temporary roads would be used to access all or portions of seven M Units. All of these temporary roads would be closed (ripped and mulched, as needed) following thinning.
2. Approximately 0.98 mile (5,177 feet) of former logging access routes would be re-opened (vegetation removed and bladed) to access all or portions of five M Units. These routes would be water-barred and closed immediately after thinning is completed.
3. Five short spurs, each less than 100 feet long, would be bladed for tractor or cable yarding operations in two units.
4. Existing landings would be used.

The temporary roads and former logging access routes are associated with thinning units (the M Units) and would be used primarily to provide yarder access to steeper ground that can only be thinned by cable yarding. These roads/routes, taken together, are distributed across three 7th-field watersheds as follows: Black Bear (0.25 mile), Crawford Creek (0.43 mile), and Shadow Creek (1.05 miles).

The former logging access routes re-opened under Alternative B would be located on existing closed road alignments. The short spurs would be reconstructed/bladed for the project and then closed using project design features and BMPs to mitigate effects. The short-term use (construct and close in one season) of temporary roads will reduce the amount of time soils are exposed to erosion forces such as wind and rain. The proposed temporary roads do not bisect Riparian Reserves and are located on ridges. Temporary road construction would not affect fish or aquatic habitat, including stream shade, water temperatures, large woody debris, or sedimentation rates to streams. The anticipated effects of Alternatives B and C are materially the same. Any adverse effects from temporary roads are expected to be insignificant in the short and long term because roads will be near ridgetops, will not cross Riparian Reserves, and will be closed immediately after use.

Alternative C responds to public concerns regarding the environmental and economic effects of constructing new temporary roads. Alternative C is similar to the Proposed Action but approximately 1.03 miles (5,443 feet) of new temporary roads identified in the Proposed Action would not be constructed. As a result, no fuels treatments would occur in portions of seven M Units. This reduces the total acres of treatments in M Units from 931 under Alternative B to 832 under Alternative C. Fuels treatments could not be carried out in those M Units because of excessive treatment costs, high existing dead crown fuel loadings, and potential heat damage to the overstory if these untreated units were prescribed burned. With the reduction in M Unit acres, there would also be 822-acre reduction in prescribed burns in Rx Units under Alternative C.

Water Drafting. Ten water drafting sites would be located in fish-bearing reaches as follows (see Figure C-2 in Appendix C of the Fish BA/BE): Crawford Creek (1), Mathews Creek (1), North Fork Salmon River (1), North Russian Creek (3), Shadow Creek (1), South Russian Creek (1), South Fork Salmon River (1), and Whites Gulch (1).

These sites have existing access but may be rocked to reduce surface erosion of dirt roads. Water drafting will be done in accordance to NMFS's *Water Drafting Specifications* (NMFS 2001), which limits the amount and rate at which water can be withdrawn during pumping and requires that pumps be screened. By following these specifications and considering the ability of fish to flee these areas, the effects of water drafting in fish-bearing reaches have a low potential for direct effects on steelhead, trout, or their habitat. This effect would be less than significant.

Ground-based (Tractor) Yarding. Both action alternatives propose thinning, fuels reduction treatments, and underburning, and both alternatives are similar in scope, scale, and location. The difference between the action alternatives is that Alternative C does not propose construction of the 1.03 miles of new temporary roads that are included in Alternative B. Thus, fewer acres of mechanical units would be thinned under Alternative C (less acreage would be underburned as well; refer to mapped treatment areas for Alternative C in Appendix A of the EIS).

Alternative B would mechanically thin approximately 931 acres and Alternative C would mechanically thin approximately 832 acres. The magnitude of difference between the two action alternatives relative to potential adverse effects on fish and their habitat are insignificant because mechanical units and proposed temporary roads are not inside Riparian Reserves and are located on or near ridgetops.

Design features applicable to both action alternatives include resource protection measures, BMPs, Wet Weather Operation Standards, Forestwide Soil Cover Standards, and Klamath LRMP Standards and Guidelines. Application of these measures will minimize the effects of each action alternative on aquatic resources considered herein.

Mechanical units would be treated using ground-based equipment, including yarders. Under Alternative B, units would be distributed across 7th- and 5th-field watersheds as shown in Table 1. As mentioned above, the 1.03 miles of new temporary roads would not be constructed under Alternative C and as a result, 99 acres in M Units and 822 acres in Rx Units would not be treated. This reduction in thinning acres would affect M Units 15, 17, 21, 24, 36, 37, and 75.

Mechanical units would be treated to thin stands and reduce ladder fuels. Units are located along ridges and pose a low risk relative to affecting steelhead and trout habitat. Tractors, cable systems, and feller-bunchers may be used to remove trees that have been cut by chainsaws. Tractor piling of brush and slash would occur on ground less than 35 percent slope. A yarder would be used to treat mechanical treatment units, which are located along ridges. Yarders would be restricted to use on roads and landings due to physical limitations. Trees would be yarded with tops of trees dragging on the ground. Due to limbs suspending the tree as it is dragged, and the lightest part of the tree being on

Table 1. Summary of project activities under Alternative B by 7th- and 5th-field watershed scales.

Watersheds	Watershed Area	FRZs	RS Treatments	Fuel Reduction Underburn	Fuels Reduction - Mechanical Thinning	Total Acres Treated by Fuels Reduction Actions	Total Acres Disturbed by Temporary Road Construction	Total % Area Disturbed by Proposed Action
	Acres							
7th-Field Watersheds								
Black Bear Creek	9,203.05	1,601.48	0	3,519.33	96.08	5,216.89	0.14	~ 56%
Cody-Jennings Creek	3,797.85	217.19	0	1,359.64	0	1,576.83	0	~ 41%
Crawford Creek	8,354.46	2,040.96	0	4,345.03	214.76	6,600.75	.03	~ 79%
Eddy Gulch	4,426.80	423.78	0	520.38	78.38	1,022.53	0	~ 23%
Gooey-Ketchum Creek	4,384.86	84.46	0	1.29	0	85.76	0	~ <1%
Gould-EF SF Salmon River	3,857.81	90.98	4.02	871.35	7.67	974.02	.01	~ 25%
Indian Creek	3,222.87	81.08	0	0	0	81.08	0	~ <1%
Kanaka-Olsen Creek	5,380.64	18.32	0	0	0	18.32	0	~ <1%
Lower North Russian Creek	4,495.60	0	.62	1,004.94	0	1005.57	0	~ 22%
Lower South Russian Creek	2,137.04	0	6.2	454.74	0	460.94	0	~ 21%
Matthews Creek	4,624.0	305.84	0	1,473.40	19.35	1,798.59	0	~ 39%
Robinson-Rattlesnake Creek	5,199.02	0	1.42	0	0	1.42	0	~ <1%
Shadow Creek	5,690.24	1,549.58	.03	3,072.01	442.34	5,063.96	1.56	~ 89%
Sixmile Creek	4,043.91	131.92	34.80	249.57	24.52	440.81	0	~ 10%
Tanner-Jessups Creek	4,546.11	87.99	0	.16	0.53	88.68	0	~ <1%
Taylor Creek	4,020.14	49.06	0	633.51	.02	682.59	0	~ 17%
Timber-French Creek	4,478.62	203.88	0	0	0	203.88	0	~ 4%
Upper North Russian Creek	3,127.48	951.15	0	16.82	19.6	1,010.57	0	~ 32%
Whites Gulch	8,579.50	439.80	106.15	0	28.8	574.22	0	~ 6%
Shiltos-Kelley Creek	3,900.94	14.34	0	0	0	14.34		
Totals 7th	**9,7470.94**	**8,291.81**	**153.24**	**17,522.17**	**931.53**	**26921.75**	**1.74**	
5th-Field Watersheds								
North Fork Salmon River	111,486.27	2,007.53	114.38	2,630.55	126.8	4,879.26	0	~ 4%
South Fork Salmon River	81,991.25	6,307.35	38.84	14,891.61	804.72	22,042.52	1.74	~27%
Totals 5th	**193,477.52**	**8291.88**	**153.22**	**17,522.16**	**931.52**	**26,921.78**	**1.74**	**~ 14%**

the ground, it is not anticipated that yarding corridors or bare ground patches will develop. However, if bare soils do result from yarding, corridors will be waterbarred, and slash will be placed on the raw earth for protection. Only insignificant short- and long-term effects (related to the use of the yarders) on steelhead and trout and their habitat are expected due to implementation of resourced protection measures and Wet Weather Operating Standards, as well as the yarding techniques used.

Machine Mastication. Mastication using low-ground-pressure tracked or wheeled machines with a masticator head would be used to grind slash produced from mechanical thinning and existing ground fuels. Masticated material would be left scattered in the treatment unit. Secondary treatment is required to dispose of activity-generated ground fuels and existing ground fuels to significantly decrease the potential for stand-replacing fire effects. Secondary treatments for the both action alternatives would include mastication and prescribed burning, which includes burning piles of slash and underburning. The track-mounted excavator with masticator arm is restricted to slopes of 45 percent or less and when soil moistures are less than 18 percent. Therefore, insignificant amounts of rutting will occur when using this machine. In addition, the 30-inch track produces ground pressures of up to six pounds per square inch, so chances of any soil compaction occurring would also be insignificant. The 50-foot treatment buffer on small perennial and intermittent streams and 100-foot buffer on larger perennials (greater than 1-foot wetted width) reduces the possibility of sediment reaching these streams to insignificant. The short- and long-term risk of sediment delivery from mechanical units to streams is insignificant due to the locations of units on ridgetops and relatively gentle slopes. In addition, designated dry intermittent channel crossings where minimal ground disturbance will occur, reduces the opportunity for sediment to reach any live channel to insignificant. Adverse effects on steelhead and trout and their habitat associated with mastication are expected to be insignificant in the short and long term.

Thinning. Thinning within stands will stimulate the growth of trees that remain on site and increase total yield of the remaining stand. Trees that would ultimately die of suppression are removed, freeing-up moisture, nutrients, and growing space for the remaining trees. The favored trees grow more rapidly, and are healthier, than they would be without thinning. Dense, unthinned stands often severely restrict the growth and vigor of all trees within the stand. Even those that express dominance and go on to become the largest and most vigorous survivors usually develop live crowns that are too short and narrow in proportion to the total height of the trees. In the practice of thinning, the number of trees per acre is reduced, as it would be under purely natural conditions, but at a substantially more rapid rate. Thinning and release will increase growth and vigor of the remaining stand, which will create a healthier forested stand faster than if stands were left untreated.

Proposed hand thinning would occur across the landscape in FRZs and Roadside (RS) treatment areas, including within Riparian Reserves, but would have insignificant short- and long-term adverse effects on fish and aquatic habitat due to the proposed methods (hand work, mastication, and underburning), which would result in minimal soil disturbance. Fuel hazard reduction can move stands out of the dense, closed-canopy stage and accelerate the development of conditions found in late-successional forests. Thinning and release, or fuel hazard reduction, can also encourage survival of suppressed and intermediate trees and promote growth of conifers already present, resulting in a more diverse forest structure. Therefore, the objectives of LSR and Riparian Reserves will be met quicker, than if no thinning or fuel hazard reduction occurred. This represents a long-term beneficial effect of the project.

As a result of the increased growth that will be realized from the thinning, long-term beneficial effects on water temperature could be evident sooner than if no thinning took place. Other long-term beneficial effects of the project would be larger trees in the Riparian Reserve that will provide future coarse and large woody debris recruitment to streams.

Proposed mechanical thinning activities would occur in small units located on ridgetops and would have no short- or long-term adverse effects on Riparian Reserves, steelhead, trout, or their habitat due to locations on ridgetops and on relatively gentle slopes.

Hand Piling and Burning. Handpile and burn would occur in some Riparian Reserves. Handpiles would be small (less than 6 feet in diameter), scattered, and away from the edge of small perennial and intermittent streams. Intact ground and canopy cover will separate burn pile areas from channels. Resource protection measures require that piles not be stacked one above the other, and the piles be small in size (less than 6 feet). Adverse effects on steelhead and trout associated with handpile and burn activities are expected to be insignificant in the short and long term.

Underburning. Underburning may increase sediment yield in the short term, but it is expected to have insignificant effects. Any adverse effects would result from fine sediment reaching the creeks after prescribed fire activities. However, it has been noted by fire research scientists that forb growth after prescribed fire is significant and will provide soil cover. Soil cover will also be provided by needle cast from the remaining conifers. Within Riparian Reserves, only low burn intensity fires will be allowed. Any temporary increases in sediment levels are not expected to change current functioning of Riparian Reserves due to implementation of Forest Service Region 5 cover standards, the growth of herbaceous plant material, soil cover provided by needle cast, the avoidance of fireline construction in Riparian Reserves within 25 feet of a watercourse where practical, handline construction being avoided in riparian vegetation, and low-intensity burns in Riparian Reserves. Adverse effects on steelhead and trout or their habitat associated with underburning are expected to be insignificant in both the short and long term.

Cumulative Effects

The Fish BA/BE and the project EIS contain a detailed discussion of cumulative effects. There are approximately 178 miles of streams in the Eddy Gulch LSR that provide habitat for steelhead and resident trout, and 7.8 miles of stream on private lands that provide habitat for steelhead and resident trout. The LSR includes 60,331 acres of Klamath National Forest lands and 2,323 acres of private lands. Reasonably foreseeable future actions on these private lands include small-scale timber harvest and fuel reduction projects. Theses actions have the potential to increase sedimentation into these streams, possibly affecting habitat for these species. However, these activities would occur under the State Forest Practice Rules with protection measures for riparian and stream habitat. Thus, effects on steelhead trout and resident rainbow trout habitat are not expected to be significant.

Instream woody debris would not be significantly affected by the project. Riparian Reserve canopies and sediment filtration buffers would be intact at project completion and they would maintain existing habitat conditions (water quality) in streams. Water temperatures would remain cool and within the range of salmonid habitat requirements.

Of all the 7th-field watersheds in the project Assessment Area, only Kanaka-Olsen Creek has risk ratios over 1.0, and that represents the current condition (GEO=1.53). By 2014 Cumulative Watershed

Effects modeling shows that risk ratios are declining due to vegetative recovery. Increases in risk ratios due to project activities are very small. As an example, Shadow Creek, which contains the largest area of mechanical treatments, would increase from USLE=0.93 to 0.97 by project conclusion in 2021. All other watersheds would have risk ratios that hold static or decline over the period of project implementation.

Under existing conditions, none of the 5th- or 6th-field subwatersheds are over threshold for surface soil erosion, mass-wasting, or equivalent roaded area, and project activities would not change that situation.

The modeled foreseeable future action (North Fork roads maintenance project) brought the Eddy Gulch 7th-field USLE risk ratio below threshold (USLE = 1.05 to 0.90) and lowered the Kanaka-Olsen 7th-field GEO risk ratio (GEO = 1.53 to 1.43).

Project activities would not result in any watershed going over threshold nor would they create any major increases in risk ratios. At project conclusion, most risk ratios would be at levels equal to or less than those that currently exist. The project is expected to result in reduced risk ratios over the long term by reducing the risk of stand-replacing wildfire. There are no expected long-term cumulative effects on water quality or aquatic habitat or populations. It is expected that habitat quality would be improved in the long term as a result of project implementation.

Effects of the proposed project on steelhead and trout, when combined with other proposed projects, would be insignificantly adverse, and in the long term, effects would be positive due to reduction in fire risk.

Summary of Effects to River/Stream Association: Fish—Rainbow and Steelhead Trout

All actions, when considered collectively and individually, would either have no effect or negligible effects (as described in the efficiency measures section of the fish BA/BE). Water drafting is the one Project Element that could directly affect steelhead and rainbow trout and their habitat. Potential adverse effects of water drafting will be minimized through implementation of NMFS Water Drafting Guidelines that maintain instream flows and require screening of pumps. The project has indirect beneficial effects that would result in increased protection from wildfire.

River/Stream Association: Nonfish—Group A, Tailed Frog and American Dipper

The tailed frog and the American dipper were chosen to represent cold, swift perennial streams. Specifically, they were chosen as an indicator for water quality, instream woody debris, bottom substrate, and flows. There are 75 miles of perennial streams in the Eddy Gulch LSR Project Assessment Area that provide suitable habitat for American dipper. There are 67 miles of perennial streams in the Assessment Area that provide suitable habitat for tailed frog.

Environmental Baseline and Population Trend

Tailed Frog

Tailed frogs are found in cool perennial streams in conifer-dominated habitats. The species occurs more frequently in mature or late-successional stands and uses submerged rocks and logs in streams for cover. Potential habitat for tailed frogs in the Assessment Area occurs in approximately 67 miles of perennial streams. Tailed frogs have been collected from the Eddy Gulch LSR in Music Creek, Johns Meadows Creek, and South Russian Creek east of Robinson Flat on the North Fork Salmon River watershed; and just outside the LSR in Dry Gulch, South Fork Taylor Creek, and Taylor Creek east of Cecilville (CNDDB 2008).

American Dipper

American dippers live along clear, fast-flowing, perennial streams and rivers with rock faces, waterfalls, large boulders, or other features that provide similar niches for nesting (Kingery 1996). Important habitat elements include gravel and cobble within the stream, instream or streamside boulders for perching, and overhanging ledges and crevices for nesting. Fallen logs and tree roots are sometimes used for nesting and roosting (Kingery 1996).

The California population of American dippers, as reported by the USFWS Breeding Bird Survey (BBS) data (1966–2006), is only slightly increasing at a rate of 0.5 percent annually (p=0.8, n=21) (Sauer et al. 2008). This data should be interpreted with caution as BBS rates it as having a deficiency for the following reasons (Sauer et al. 2008): (1) the regional abundance is less than 1.0 bird/route (low abundance); (2) the sample is based on less than 14 routes for the long term (small sample size); (3) the results are so imprecise that a 3 percent per year change would not be detected over the long term (quite imprecise); or (4) the sub-interval trends are significantly different from each other (P less than 0.05, based on a z-test; suggesting inconsistency in trend over time). The PIF population trend data for BCR5 is uncertain for the American dipper (Panjabi et al. 2005).

There are approximately 75 miles of streams containing suitable habitat for American dippers throughout the Assessment Area, and individual dippers have been observed at multiple locations along the larger perennial streams and were observed during surveys from 1992 to 1998 (Long and Herrera 2009).

Implementation of Klamath LRMP Standards and Guidelines

The Klamath LRMP Standards and Guidelines (USFS 1995) related to river/stream-dependent species, and that are being implemented as part of the project, include a 340-foot buffer on both sides of fish-bearing streams and a 170-foot buffer on both sides of permanently flowing nonfish-bearing streams and intermittent streams (Klamath LRMP page 4-133). The Eddy Gulch LSR Project is consistent with Aquatic Conservation Strategy goals and Riparian Reserve guidelines, including maintaining and restoring riparian-dependent structures and functions, providing benefits to riparian-dependent and transition zone species, and providing habitat connectivity.

Klamath LRMP Standards and Guidelines and resource protection measures for thinning and fuels reduction in Riparian Reserves are designed to ensure that the reserves are intact and functioning following treatment and that existing stream shading is not reduced. Klamath LRMP BMPs and resource protection measures for temporary road construction ensure that sediment delivery to streams from this activity is minimized.

Please refer to the resource protection measures and BMPs (found in the Aquatics Resources Report for the Eddy Gulch LSR Project) that address protection for the following as they relate to riverine and stream habitat: streamsides, erosion control, water temperature, underburning, mastication, water drafting, and Riparian Reserves.

Effects of the Project on River/Stream Association: Nonfish—Group A, Tailed Frog and American Dipper

Alternative A: No Action

In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no direct effects on river and stream habitats. Large-diameter shade trees and CWD would increase over the long term, resulting in indirect beneficial effects.

Wildfires may consume vegetation that adjoins aquatic habitats, but fire would not directly affect aquatic habitat. Wildfires, especially a high-intensity fire, could remove riparian vegetation, which would adversely affect stream temperatures and other habitat components. Areas that burn with high intensity are likely to contribute sediment to aquatic habitats, which could suffocate egg masses and/or tadpoles or reduce the macroinvertebrate prey base. Sedimentation effects would vary with stream type, as low-gradient reaches are more likely to accumulate sediment and small debris than high-gradient reaches. Fire could increase the recruitment of CWD to streams, but very long-term recruitment (well beyond 20 years) of CWD would eventually approach zero in areas burned by stand-replacing fire.

There are no proposed or anticipated actions that would combine with Alternative A to broadly cause cumulative effects on the River/Stream MIS Association beyond the project's direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating inside the Assessment Area.

Alternative B: Proposed Action and Alternative C: No New Temporary Roads Constructed

Thinning and mastication would not have any direct effects on habitat because it would be protected in the Riparian Reserves under both Alternatives B and C and project implementation will follow Klamath LRMP Standards and Guidelines and resource protection measures for thinning and fuels reduction. Prescribed fires that would be implemented in Riparian Reserves may reduce vegetative cover over the short term, but limited low-intensity fire in Riparian Reserves is not likely to affect the overall habitat.

Thinning and fuel reduction treatments are expected to have a beneficial indirect effect in the long term by reducing the chances and effects of stand-replacing fires, which can remove riparian vegetation and lead to increases in stream temperature and sedimentation. Large-diameter shade trees and CWD would increase over the long term as a result of Alternative B or C.

Road-related activities have the potential to affect habitat under both alternatives. The construction of new temporary roads (1.03 miles) would not have a significant adverse effect on riparian-associated species because all new temporary roads are on ridgetops or near-ridgetop locations. None of the new temporary roads are near Riparian Reserves, none require any stream crossing structures, none traverse unstable slopes, and none are proposed on granitic or similarly non-cohesive soils. All of the new temporary roads would be closed using normal erosion control measures (ripped and mulched, as needed). Thus, direct effects from road-related activities would be negligible under either Alternative B or C.

Temporary road construction (under Alternative B) and fuel reduction effects would be negligible because any sedimentation would be minimized by the retention of buffers around all Riparian Reserves. These buffers, as well as BMPs, would minimize the sediment load that could reach stream channels.

Implementation of hazard tree removal would not change canopy cover at the stand or landscape level because the individual trees that would be removed are limited to road prisms and scattered throughout the landscape. Removal of these trees would not have a significant effect on habitat suitability or function for these species.

In summary, the amount and quality of river and stream habitat in the Assessment Area would be the same pre- and post-project. Degradation of habitat components (such as riparian vegetation, individual shade trees) would occur in Riparian Reserves. A temporary shift or relocation of individuals may result from proposed activities in the landscape, but it is not expected to affect populations or population trends for tailed frogs or American dippers.

Alternatives B and C, combined with local community fuel reduction projects, including the proposed fuelbreak system west of Black Bear Ranch, would further decrease the risk of high-intensity fire inside and near the Assessment Area. The other proposed or anticipated actions include the installation of a fiber-optic line and road maintenance and, when combined with Alternative B or C, would cause no cumulative effects on river and stream habitat beyond the project's direct and indirect effects.

The cumulative effects on river and stream habitat under Alternative C are similar to Alternative B, except additional habitat could burn during a wildfire if that fire occurred in one of the untreated areas.

River/Stream Association: Nonfish—Group B, Cascade Frog

Cascade frogs prefer high-elevation stream habitat that are found in the Assessment Area. Specifically, cascade frogs were chosen as an indicator for water quality, instream woody debris, bottom substrate flows, and grassy streamside vegetation. There are approximately 18 miles of high-elevation stream habitat in the Eddy Gulch LSR Project Assessment Area.

Environmental Baseline and Population Trend

Cascades Frog

Cascades frogs are associated with still or slow-moving montane aquatic habitats to over 7,000 feet elevation (Jennings and Hayes 1994; Stebbins 2003). Cascade frogs are closely restricted to water, which may include marshes, ponds, lakes, ephemeral pools, potholes in meadows, and along small creeks (Stebbins 2003). They are most often found in meadows or in open coniferous forests (Leonard et al. 1993; Stebbins 2003), and sites used for reproduction appear to require direct sunlight for several hours a day (Leonard et al. 1993; Jennings and Hayes 1994). Cascades frogs are particularly vulnerable to population reductions by predatory fish, including salmonids (Jennings and Hayes 1994; Welsh and Pope 2004).

Aquatic habitat suitable for Cascades frogs in the Assessment Area is absent or very limited. No mapped or unmapped ponds, lakes, or marshes have been found on federal land, and there is only one known pond on private land. Almost all streams are characterized by steep gradients or, in low-gradient reaches, have dense shade or contain salmonids. It is unlikely that the Cascade frog occurs in the Assessment Area, but its presence cannot be ruled out. Suitable habitat can be found in still waters adjacent to the Assessment Area, and populations are known to occur in the Trinity Alps, Marble Mountain, and Russian wilderness areas near or adjoining the Eddy Gulch LSR (Jennings and Hayes 1994; Welsh and Pope 2004). However, due to the limited habitat available for this species, there is only a low potential for it to occur in the Assessment Area.

Implementation of Klamath LRMP Standards and Guidelines

The Klamath LRMP Standards and Guidelines from the (USFS 1995) related to river/stream-dependent species, and that are being implemented as part of the project include a 340-foot buffer on both sides of fish-bearing streams and a 170-foot buffer on both sides of permanently flowing nonfish-bearing streams and intermittent streams (Klamath LRMP 4-133). The Eddy Gulch LSR Project is consistent with Aquatic Conservation Strategy goals and Riparian Reserve guidelines, including maintaining and restoring riparian-dependent structures and functions, providing benefits to riparian-dependent and transition zone species, and providing habitat connectivity. Implementation of Klamath LRMP Standards and Guidelines and resource protection measures for thinning and fuels reduction in Riparian Reserves are designed to ensure that Riparian Reserves are intact and functioning after treatment and that existing stream shading is not reduced. Klamath LRMP BMPs and resource protection measures for temporary road construction ensure that sediment delivery to streams from this activity will be minimized.

Please refer to the resource protection measures and BMPs found in the Aquatics Resources Report for the Eddy Gulch LSR Project, which address protection for the following as they relate to riverine and stream habitat: streamsides, erosion control, water temperature, underburning, mastication, water drafting, and Riparian Reserves.

Effects of the Project on River/Stream Association: Nonfish—Group B, Cascade Frog

Alternative A: No Action

Wildfire would likely not cause direct effects on individuals because this species is rarely found away from aquatic habitat during the fire season. Fire would not directly affect aquatic habitats used by this species, but it could remove shoreline vegetation (sometimes used by frogs). The indirect effects of fire would vary with fire intensity. Areas that burn with high intensity would likely contribute sediment to aquatic habitats that could suffocate egg masses and/or tadpoles or reduce the macroinvertebrate prey base. This is generally more likely to occur in low-gradient reaches where sediment may accumulate. Loss of vegetation that results in reduced stream shading may benefit this species because adults require basking sites for thermoregulation, and increased stream temperatures would likely benefit larval or juvenile development, especially for the species near their upper elevational limits.

There are no other proposed or anticipated actions in upland areas that would combine with Alternative A to cause cumulative effects on this species or their habitat beyond the project’s direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating in the Assessment Area.

Alternative B: Proposed Action and Alternative C: No New Temporary Roads Constructed

Thinning and mastication under Alternatives B and C would not have any direct effects on this association because the habitat is protected by design standards and resource protection measures designed to minimize effects on aquatic habitats and Riparian Reserves. Prescribed fires that burn in Riparian Reserves may reduce vegetative cover, but limited low-intensity prescribed fire in Riparian Reserves would not affect frogs because they are not likely to occur in terrestrial habitats that would be affected by fire. Direct effects from road-related activities are highly unlikely.

Fuel reduction activities are not expected to affect the amount of habitat along the edge of the Salmon Rivers or along the edge of private ponds. Underburns would not have a significant effect on shade within Riparian Reserves. The construction of temporary roads, under Alternative B, followed by subsequent closure following thinning, may have negligible short-term indirect effects on stream habitat as a result of the potential for sediment delivery to streams within the Assessment Area. Implementation of BMPs and protection measures for fish would eliminate any potential downstream effects (in the Salmon Rivers) of sedimentation from roadwork. There would be no indirect effects on river and stream habitat as a result of sedimentation.

Road-related activities have the potential to affect habitat under both alternatives. The construction of new temporary roads (1.03 miles) would not have a significant adverse effect on riparian-associated species because all new temporary roads are on ridgetops or near-ridgetop locations. None of the new temporary roads are near Riparian Reserves, none require any stream crossing structures, none traverse unstable slopes, and none are proposed on granitic or similarly non-cohesive soils. All of the new temporary roads would be closed using normal erosion control measures (ripped and mulched, as needed). Thus, direct effects from road-related activities would be negligible under Alternatives B and C.

Temporary road construction (under Alternative B) and fuel reduction effects would be negligible because any sedimentation would be minimized by the retention of buffers around all Riparian Reserves. These buffers, as well as BMPs, would minimize the sediment load that could reach stream channels.

Implementation of hazard tree removal would not change canopy cover at the stand or landscape level because the individual trees that would be removed are limited to road prisms and scattered throughout the landscape. Removal of these trees would not have a significant effect on habitat suitability or function for these species.

In summary, the amount and quality of river and stream habitat in the Assessment Area would be the same pre- and post-project. Degradation of habitat components (such as riparian vegetation, individual shade trees) would occur in Riparian Reserves. A temporary shift or relocation of individuals may result from proposed activities in the landscape, but it is not expected to affect populations or population trends for the Cascade frog.

Alternatives B and C, combined with local community fuel reduction projects, including the proposed fuelbreak system west of Black Bear Ranch, would further decrease the risk of high-intensity fire inside and near the Assessment Area. The other proposed or anticipated actions include the installation of a fiber-optic line and road maintenance and, when combined with Alternative B or C, would cause no cumulative effects on river and stream habitat beyond the project's direct and indirect effects.

The cumulative effects on river and stream habitat under Alternative C are similar to Alternative B, except additional habitat could burn during a wildfire if that fire occurred in one of the untreated areas.

River/Stream Association:
Nonfish—Group C, Northern Water Shrew and Long-tailed Vole

Northern water shrew was chosen to represent riparian with dense grass-forb cover. Specifically, they are an indicator of riparian vegetation including canopy, deciduous vegetation, and grasses and forbs along streams. There are 10,028 acres of Riparian Reserves (which include perennial and intermittent streams) in the Eddy Gulch LSR Project Assessment Area that provide suitable habitat for northern water shrew. Long-tailed vole habitat is defined as mesic habitat with dense riparian vegetations and is selected as an indicator of riparian vegetation, including canopy, deciduous vegetation, and grass/forbs. The habitat acreage is considered the same as the northern water shrew.

Environmental Baseline and Population Trend

Northern Water Shrew

Northern water shrews are common to abundant small mammals that are closely associated with montane riparian habitats. The species is seldom found further than 100 feet from water.

Streams containing habitat suitable for northern water shrews occur throughout the Assessment Area. When interpreting acreages of potential habitat, the acres of Riparian Reserves (all perennial and intermittent streams in the Assessment Area with required buffer) were used, which equates to 10,028 acres of potential habitat for the northern water shrew. This acreage is likely to be overstated for the shrew as it includes buffers that are larger than the species is known to travel from water; however, there is not enough data within the Forest Service datasets to extrapolate a more realistic (reduced) number.

Long-tailed Vole

Long-tailed voles are small mammals that are common residents of herbaceous understories of many forest habitat types, and they are expected to be abundant in montane riparian, wetlands, grasslands, and wet meadows. They nest in burrows in soft soils or within or beneath logs and seek cover in dense herbaceous vegetation.

Potential habitat for long-tailed voles may occur throughout the Assessment Area but is limited by a lack of meadows, grasslands, or other habitats with a well-developed herbaceous layer. Like the northern water shrew, when interpreting acreages of potential habitat, the 10,028 acres of Riparian Reserves were used to approximate the amount of potential habitat for the long-tailed vole. This acreage, too, is likely overstated; however, there is not enough data within the Forest Service datasets to extrapolate a more likely (reduced) number.

Implementation of Klamath LRMP Standards and Guidelines

The Klamath LRMP Standards and Guidelines contained in the (USFS 1995) that are related to river/stream-dependent species, and that are being implemented as part of the project include a 340-foot buffer on both sides of fish-bearing streams and a 170-foot buffer on both sides of permanently flowing nonfish-bearing streams and intermittent streams (Klamath LRMP page 4-133). The Eddy Gulch LSR Project is consistent with Aquatic Conservation Strategy goals and Riparian Reserve guidelines, including maintaining and restoring riparian-dependent structures and functions, providing benefits to riparian-dependent and transition zone species, and providing habitat connectivity.

The Klamath LRMP Standards and Guidelines and resource protection measures for thinning and fuels reduction in Riparian Reserves are designed to ensure that Riparian Reserves are intact and functioning after treatment and that existing stream shading is not reduced. Klamath LRMP BMPs and resource protection measures for temporary road construction ensure that sediment delivery to streams from this activity will be minimized.

The resource protection measures and BMPs described in the Aquatics Resources Report for the Eddy Gulch LSR Project address protection for the following as they relate to riverine and stream habitat: streamsides, erosion control, water temperature, underburning, mastication, water drafting, and Riparian Reserves.

Effects of the Project on River/Stream Association: Nonfish—Group C, Northern Water Shrew and Long-tailed Vole

Alternative A: No Action

In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, it is unlikely that the amount or quality of long-tailed vole or northern water shrew habitat would change in the near future.

Wildfires may consume vegetation that adjoins aquatic habitats. Wildfires, especially a high-intensity fire, could remove riparian vegetation, which would adversely affect these two species.

There are no proposed or anticipated actions that would combine with Alternative A to broadly cause cumulative effects on the River and Stream MIS Association beyond the project's direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating inside the Assessment Area.

Alternative B: Proposed Action and Alternative C: No New Temporary Roads Constructed

Thinning and mastication would not have any direct effects on habitat because it would be protected in the Riparian Reserves under Alternatives B and C. Prescribed fires that would be implemented in Riparian Reserves may reduce vegetative cover over the short term, but limited low-intensity fire in Riparian Reserves is not likely to affect the overall habitat for these two species.

Thinning and fuel reduction treatments are expected to have a beneficial indirect effect over the long term by reducing the chances and effects of stand-replacing fires, which can remove riparian vegetation. Large-diameter shade trees and CWD would increase over the long term as a result of Alternative B or C.

Road-related activities have the potential to affect habitat under both alternatives. The construction of new temporary roads (1.03 miles) would not have a significant adverse effect on riparian-associated species because all new temporary roads are on ridgetops or near-ridgetop locations. None of the new temporary roads are near Riparian Reserves, none require any stream crossing structures, none traverse unstable slopes, and none are proposed on granitic or similarly non-cohesive soils. All of the new temporary roads would be closed using normal erosion control measures (ripped and mulched, as needed). Thus, direct effects from road-related activities would be negligible under either Alternative B or C.

Temporary road construction (under Alternative B) and fuel reduction effects would be negligible because any sedimentation would be minimized by the retention of buffers around all Riparian Reserves. These buffers, as well as BMPs, would minimize the sediment load that could reach stream channels.

Implementation of hazard tree removal would not change canopy cover at the stand or landscape level because the individual trees that are removed are limited to road prisms and scattered throughout the landscape. Removal of a few scattered trees would not have a significant effect on habitat suitability or function for these species.

In summary, the amount and quality of river and stream habitat in the Assessment Area would be the same pre- and post-project. Degradation of habitat components (such as riparian vegetation, individual trees, and upland habitat) would occur in Riparian Reserves. A temporary shift or relocation of individuals may result from proposed activities in the landscape, but it is not expected to affect populations or population trends for northern water shrews or long- tailed voles.

Alternatives B and C, combined with local community fuel reduction projects, including the proposed fuelbreak system west of Black Bear Ranch, would further decrease the risk of high-intensity fire inside and near the Assessment Area. The other proposed or anticipated actions include the installation of a fiber-optic line and road maintenance and, when combined with Alternative B or C, would cause no cumulative effects on river and stream habitat beyond the project’s direct and indirect effects.

The cumulative effects on river and stream habitat under Alternative C are similar to Alternative B, except additional habitat could burn during a wildfire if that fire occurred in one of the untreated areas.

Marsh/Lake/Pond Association: Pacific Pond Turtle

The Pacific pond turtle was chosen to represent permanent or nearly permanent water in a variety of habitat. Indicators include standing open water and associated vegetation, chosen for sensitivity to physical aquatic conditions and CWD. There is one known pond in the Assessment Area, and it is found on private property.

Environmental Baseline and Population Trend

Pacific Pond Turtle

Pacific pond turtles occur in many low-gradient aquatic habitats up to about 5,000 feet in northern California. They typically select ponds or slow-moving water with many basking sites and aquatic vegetation. Upland nest sites typically have clay or silt substrate and a south-facing aspect. The pond turtle is known to nest up to 1,320 feet from aquatic habitat (Jennings and Hayes 1994) but usually nests much closer (within 600 feet). Reese and Welsh (1997) reported that individuals moved an average of approximately 600 feet from water to their over-wintering sites. Pacific pond turtles have also been reported to hibernate in mud.

Aquatic habitat suitable for pond turtles is very limited in the Assessment Area. No mapped or unmapped ponds, lakes, or marshes have been found, and most streams are characterized by steep gradients or, in low-gradient reaches, by dense shade; neither condition is suitable for pond turtles. The most likely habitat for pond turtles in the Assessment Area is along the North and South Forks of the Salmon River (approximately 4 miles) and in ponds on private property (only one has been identified on private property in the Assessment Area).

Implementation of Klamath LRMP Standards and Guidelines

The Eddy Gulch LSR Project is consistent with Aquatic Conservation Strategy goals and Riparian Reserve guidelines, including maintaining and restoring riparian-dependent structures and functions, providing benefits to riparian-dependent and transition zone species, and providing habitat connectivity. The resource protection measures and BMPs found in the Aquatics Resources Report for the Eddy Gulch LSR Project address protection for the following as they relate to marsh/lake/pond habitat: erosion control, water temperature, underburning, mastication, water drafting, and Riparian Reserves.

The Klamath LRMP Standards and Guidelines that are related to the marsh/lake/pond associated species include managing to promote large woody debris.

Effects of the Project on Marsh/Lake/Pond Association: Pacific Pond Turtle

Alternative A: No Action

In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no direct or indirect effects on aquatic habitats, including Riparian Reserves.

The modeled wildfire would not directly affect aquatic habitats, but it could remove shoreline vegetative cover. Wildfires, especially the high-intensity fire, could remove all or a portion of overstory vegetation, which could affect water temperature. Areas that burn with high intensity are likely to contribute sediment to aquatic habitats, which could suffocate egg masses and/or tadpoles or reduce the macroinvertebrate prey base. Sedimentation could also reduce pond longevity.

There are no proposed or anticipated actions that would combine with Alternative A to cause cumulative effects on the Marsh, Lake, and Pond MIS Association beyond the project's direct and indirect effects discussed above. Local community fuel reduction projects would decrease the risk of fire in the Assessment Area, but those areas represent a small fraction of the area surrounding the Assessment Area and would not affect fire behavior originating inside the Assessment Area.

Alternative B: Proposed Action and Alternative C: No New Temporary Roads Constructed

No direct effects are expected to occur as a result of thinning or mastication under Alternative B or C because aquatic habitats are protected by resource protection measures, BMPs, and Riparian Reserves.

Although riparian habitat is not the vegetation type proposed for prescribed burns, the burns could move into riparian habitat; however, protective measures would be in place to ensure that upland habitat is protected while benefiting from the positive effects of a light underburn.

Fuel reduction activities are not expected to affect the amount of habitat along the edge of the Salmon Rivers or along the edge of private ponds. Underburns would likely not have a significant effect on shade within Riparian Reserves. The construction of temporary roads, under Alternative B, followed by closure after thinning is complete, could deliver sediment to pond habitats, but implementation of BMPs would reduce any indirect effects to negligible. Treatments on land adjacent to Riparian Reserves may affect upland turtle nest sites, although these effects should be rare events because turtles select open areas dominated by grasses and herbaceous annual plants, and fuel reduction activities would be focused on forest or shrub habitats on forested ridges.

Temporary road construction (under Alternative B) and fuel reduction effects would be negligible because any sedimentation would be minimized by the retention of buffers around all Riparian Reserves. These buffers, as well as BMPs, would minimize the sediment load that could reach stream channels.

Implementation of hazard tree removal would not change canopy cover at the stand or landscape level because the individual trees that would be removed are limited to road prisms and scattered throughout the landscape. Removal of these trees would not have a significant effect on habitat suitability or function for these species.

In summary, the amount and quality of marsh, lake, and pond habitat in the Assessment Area would be the same pre- and post-project. Temporary degradation of some habitat components (such as riparian vegetation, basking sites, and upland nest areas) would occur in Riparian Reserves. A temporary shift or relocation of individuals may result from proposed activities in the landscape, but it is not expected to affect populations or population trends for the Pacific pond turtle.

Alternatives B and C, combined with local community fuel reduction projects, including the proposed fuelbreak system west of Black Bear Ranch, would further decrease the risk of high-intensity fire inside and near the Assessment Area. The other proposed or anticipated actions include the installation of a fiber-optic line and road maintenance and, when combined with Alternative B or C, would cause no cumulative effects on marsh, lake, or pond habitat beyond the project's direct and indirect effects.

The cumulative effects on marsh, lake, or pond habitat under Alternative C are similar to Alternative B, except additional habitat could burn during a wildfire if that fire occurred in one of the untreated areas.

Snag Species Association: Group A—Red-breasted Sapsucker, Hairy Woodpecker, White-headed Woodpecker, Pileated Woodpecker, and Vaux's Swift

Red-breasted sapsucker habitat is mid- to late-successional mixed-conifer and riparian deciduous vegetation. The hairy woodpecker prefers riparian deciduous habitats with large trees for cavities. The white-headed woodpecker prefers ponderosa pine and high-elevation mixed-conifer forest. The pileated woodpecker prefers late-successional coniferous forests. All four woodpecker species are indicators of snags as a habitat element and for other species that depend on woodpeckers for sapwells, cavities, or as prey.

Environmental Baseline and Population Trend

Red-breasted Sapsucker

Red-breasted sapsuckers in California nest in montane riparian, montane hardwood-conifer, mixed-conifer, and true fir forests, preferring sites near meadows, clearings, or streams (Manaan et al. 1980; Raphael and White 1984; Walters et al. 2002). The red-breasted sapsucker breeds from near sea level up to 9,514 feet in elevation, and in British Columbia, they have been observed using orchards, power line rights-of-way, and burns. They are more likely to breed in areas with snags than without (http://bna.birds.cornell.edu/BNA/account/White-headed_Woodpecker/BREEDING.html). Nest cavities are typically excavated in dead trees or dead portions of live trees (Raphael and White 1984; Joy 2000). Most foraging occurs on live trees, but red-breasted sapsuckers will forage on snags, logs, and the ground (Raphael and White 1984).

Population trends measured by BBS data are combined for the three *Sphyrapicus* species for 1966–2006, and suggests a decreasing rate in the California population by 0.09 percent (p= 0.60, n=76) (Sauer et al. 2008). This data should be interpreted with caution as BBS rates it as having a deficiency for the following reasons (Sauer et al. 2008): (1) the regional abundance is less than 1.0 bird/route (low abundance); (2) the sample is based on less than 14 routes for the long term (small sample size); (3) the results are so imprecise that a 3 percent per year change would not be detected over the long term (quite imprecise); or (4) the sub-interval trends are significantly different from each other (P less than 0.05, based on a z-test; suggesting inconsistency in trend over time). The PIF population trend data for BCR5 suggests a possible decrease to a moderate decrease in red-breasted sapsucker population numbers (Panjabi et al. 2005).

Habitat suitable for red-breasted sapsuckers is widespread in the Assessment Area, and individuals have been observed in the Eddy Gulch LSR (Long and Herrera 2009). The Assessment Area is large enough in size to potentially contain habitat for numerous red-breasted sapsucker territories. There are 21,406 acres of mid-successional and mature true fir or mixed-conifer habitat, potentially suitable for sapsuckers, scattered throughout the Assessment Area.

Hairy Woodpecker

Hairy woodpeckers are typically generalist woodpeckers that may occur in many types of conifer and hardwood–conifer habitats, with habitat preference varying geographically (Jackson et al. 2002). In California the species is usually found in open to moderately dense stands of mature conifers with snags of sparse to intermediate density, but they often favor burned stands and also use riparian habitats.

The California population of hairy woodpeckers, as reported by the USFWS BBS data (1966–2006), is slightly increasing at a rate of 0.3 percent annually (p=0.67, n=114) (Sauer et al. 2008). This data should be interpreted with caution as BBS rates it as having a deficiency for the following reasons (Sauer et al. 2008): (1) the regional abundance is less than 1.0 bird per route (low abundance); (2) the sample is based on less than 14 routes for the long term (small sample size); (3) the results are so imprecise that a 3 percent per year change would not be detected over the long term (quite imprecise); or (4) the sub-interval trends are significantly different from each other (P less than 0.05, based on a z-test; suggesting inconsistency in trend over time). The PIF population trend data for BCR5 is uncertain for the hairy woodpecker population numbers (Panjabi et al. 2005).

Habitat suitable for hairy woodpeckers is widespread, and hairy woodpeckers are common in the Assessment Area. Individuals were documented in both the 1992–1998 and 2007–2008 survey periods (Long and Herrera 2009). There are 21,406 acres of mixed-conifer habitat and hardwood conifer habitat potentially suitable for woodpeckers in the Assessment Area.

White-headed Woodpecker

White-headed woodpeckers reside in several types of montane coniferous forests up to higher elevation lodgepole pine and red fir habitats (Raphael and White 1984; Milne and Hejl 1989), but the species typically reaches its greatest abundance where two or more pine species are present, especially ponderosa pine (Garrett et al. 1996). They are a common year-long resident of forests up to lodgepole pine and red fir habitats. They nest in open conifer habitats, often near edges or roads or clearings or near natural openings. Nests typically occur in large-diameter snags and stumps, although live trees may also be used (Raphael and White 1984; Milne and Hejl 1989; Dixon 1995; Buchanan et al. 2003).

The California population of white-headed woodpeckers, as reported by the USFWS BBS data (1966-2006), is increasing at a rate of 1.9 percent annually (p=0.01, n=62) (Sauer et al. 2008). This data should be interpreted with caution as BBS rates it as having a deficiency for the following reasons (Sauer et al. 2008): (1) the regional abundance is less than 1.0 bird per route (low abundance); (2) the sample is based on less than 14 routes for the long term (small sample size); (3) the results are so imprecise that a 3 percent per ear change would not be detected over the long-term (quite imprecise); or (4) the sub-interval trends are significantly different from each other (P less than 0.05, based on a z-test; suggesting inconsistency in trend over time).

Habitat suitable for white-headed woodpeckers is widespread, and white-headed woodpeckers are fairly common in the Assessment Area. None were documented, however, in the Long and Herrera (2009) landbird report. There are 21,406 acres of mature dense true fir and mixed-conifer habitat, potentially suitable for woodpeckers in the Assessment Area.

Pileated Woodpecker

Pileated woodpeckers are generally residents of mature conifer or hardwood–conifer habitats near permanent water. They are most common in late-successional mixed-conifer forests with moderate to dense canopy cover and large numbers of snags, stumps, and logs (Bull 1987; Bull et al. 1992; Mellen et al. 1992; Bull and Holthausen 1993; Bull and Jackson 1995; Boleyn 1997; Aubry and Raley 2002). Pileated woodpeckers forage primarily on ants and wood-boring beetles (Bull and Jackson 1995). Downed logs have been shown to be an important substrate for forest-dwelling ants (Torgersen and Bull 1995) and are often frequented by foraging woodpeckers (Manaan 1984; Bull and Holthausen 1993; Boleyn 1997).

The national population of pileated woodpeckers, as reported by the USFWS BBS data (1966–2006), is increasing at a rate of 1.5 percent per year; in California, pileated woodpeckers are increasing at a rate of 1.3 percent annually (p=0.35, n=62) (Sauer et al.2008). This data should be interpreted with caution as BBS rates it as having a deficiency for the following reasons (Sauer et al. 2008): (1) the regional abundance is less than 1.0 bird per route (low abundance); (2) the sample is based on less than 14 routes for the long term (small sample size); (3) the results are so imprecise that a 3 percent per year change would not be detected over the long term (quite imprecise); or (4) the sub-interval trends are significantly different from each other (P less than 0.05, based on a z-test; suggesting inconsistency in trend over time). Density estimates range from one pair per 160–220 hectares (395–544 acres) in California to one nesting pair per 356 hectares (879 acres) in northeast Oregon (Bull and Jackson 1995). The PIF population trend data for BCR5 is uncertain for pileated woodpecker population numbers (Panjabi et al. 2005).

There are approximately 16,784 acres of conifer forest suitable for pileated woodpeckers that are distributed widely throughout the Assessment Area, and individuals have been observed in the Eddy Gulch LSR (Long and Herrera 2009).

Vaux’s Swift

Vaux’s swifts are aerial insectivores that nest and roost in large hollow trees and snags. Vaux’s swifts are most common in late-successional coastal forests, but they also occur in other conifer-dominated forests below the zone of true firs. The swifts are reported to be most common in old-growth forests with high canopy closure (Bull and Cooper 1991; Bull and Hohmann 1993; Sterling and Paton 1996), but they also occur in burned forests and in towns with no canopy cover as long as large hollow trees or chimneys are available for nesting (B. Williams, unpubl. data).

Little is known about population trends and current knowledge is limited to BBS data at http://www.mbr-pwrc.usgs.gov/bbs/bbs.html. BBS data shows a slightly decreasing trend at a rate of 2.0 percent from 1966 to 2007 (p=0.3, n=26). This data should be interpreted with caution as BBS rates it as having a deficiency for the following reasons (Sauer et al. 2008): (1) the regional abundance is less than 1.0 bird per route (low abundance); (2) the sample is based on less than 14 routes for the long term (small sample size); (3) the results are so imprecise that a 3 percent per year change would not be detected over the long term (quite imprecise); or (4) the sub-interval trends are significantly different from each other (P less than 0.05, based on a z-test; suggesting inconsistency in trend over time). The PIF population trend data for BCR5 suggests a possible increase to stable population in Vaux’s swift numbers (Panjabi et al. 2005).

The status of Vaux’s swift in the Assessment Area is unknown (it is most likely rare), but habitat generally suitable for Vaux’s swifts is fairly widespread. Individuals were documented during the 2007-2008 survey period (Long and Herrera 2009). There is a low probability of swifts occurring in the higher elevation (over 5,000 feet) true-fir habitats of the Assessment Area as literature suggests that they are known to mostly occur in lower-elevation forests (Sterling and Paton 1996; Bull and Collins 1993; Bull 1996). There are 21,406 acres of mature dense mixed-conifer or fir habitat, potentially suitable for swifts, in the Assessment Area. Habitat in the area is currently high capability for snags and low to high capability for large green recruitment trees.

Effects of the Project on Snag Association: Group A—Red-breasted Sapsucker, Hairy Woodpecker, White-headed Woodpecker, Pileated Woodpecker, and Vaux’s Swift

Alternative A: No Action

In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no direct effects on snags in the Assessment Area, and snags would slowly increase in areas not affected by wildfire. This could increase habitat suitability in some stands, but habitat in other stands would suffer from reduced tree growth and accumulation of only small snags, which are much less valuable to wildlife than large snags. Snags would not be produced by fire, which is an important factor in snag recruitment. The risk of high-severity fire would increase in most areas.

Any kind of fire could consume snags, but fire would also create snags and cavities that provide nest or roost sites. Although fire generally creates more snags than it destroys, most of the snags created by moderate- to high-intensity fire would not be located in live forests. Based on the 7,200-acre modeled wildfire, up to 81 percent of the forested habitat could be removed or adversely affected.

The modeled wildfire would have various indirect effects. The extent of these effects, whether beneficial or adverse, would vary by species and fire intensity, size, and pattern (Saab et al. 2007). The modeled fire may benefit snag-associated species by recruiting snags and by increasing foraging opportunities in the short term as beetles and other insects colonize newly killed trees. However, high-intensity wildfire would remove forest overstory (required by some snag-dependent species) and could initiate successional changes to brush fields that would reduce long-term snag recruitment.

The no-action alternative would not provide for the long-term protection of Snag MIS Association habitat in forested settings from the effects of high-severity wildfire. No other effects are expected as a result of ongoing or future projects.

Alternative B: Proposed Action and Alternative C: No New Temporary Roads Constructed

Thinning, hazard tree removal, and construction of 1.03 miles of new temporary roads (under Alternative B) may remove some large-diameter snags. However, the removal of large-diameter snags would only occur under limited circumstances, and snags would be retained at Klamath LRMP Standards and Guidelines over approximately 89 percent of the ridgetop FRZs. Prescribed fire and mastication would also remove snags; however, prescriptions are designed to imitate low-intensity fire and would also create many snags. Thus, habitat for snag-dependent species would remain abundant and well-distributed throughout the Assessment Area, and the effect is considered negligible to populations and population trends.

Thinning and fuel reduction treatments would benefit snag-dependent species in forested habitats by reducing fuels to a level that would decrease the likelihood of extensive stand-replacing fire. Fire would still burn with sufficient intensity to create snags within forested habitat. This type of pattern would be consistent with patterns under historic fire regimes.

In summary, fuel reduction treatments may cause a temporary shift or relocation of individuals, nest sites, or territories, but treatments are not expected to affect the populations or population trends of the red-breasted sapsucker, hairy woodpecker, white-headed woodpecker, pileated woodpecker, or the Vaux's swift. Maintenance of moderate to high capability snag habitat will provide for long-term viability of snag MIS (USDA 1995).

Alternatives B and C, combined with local community fuel reduction projects, including the proposed fuelbreak system west of Black Bear Ranch, would further decrease the risk of high-intensity fire inside and near the Assessment Area. The other proposed or anticipated actions include the installation of a fiber-optic line and road maintenance and, when combined with Alternative B or C, would cause no cumulative effects on snag habitat beyond the project's direct and indirect effects.

The cumulative effects on snag habitat under Alternative C are similar to Alternative B, except additional habitat could burn during a wildfire if that fire occurred in one of the untreated areas.

Snag Species Association: Group B—Downy Woodpecker

The downy woodpecker habitat is riparian deciduous. This species is an indicator of snags as a habitat element and for other species, which depend on woodpeckers for cavities or as prey.

Environmental Baseline and Population Trend

Downy Woodpecker

Downy woodpeckers are a common resident of riparian deciduous and associated hardwood and conifer habitats and are closely associated with riparian softwoods. Habitat suitable for downy woodpeckers is fairly widespread but generally sparse, and downy woodpeckers are most likely rare to uncommon in the Assessment Area.

The population trend for the downy woodpecker in California is decreasing at a rate of 0.8 percent per year ($p = 0.61$, $n = 97$). However, the USFWS BBS rates these data as having a deficiency for the following reasons (Sauer et al. 2008): (1) the regional abundance is less than 1.0 bird per route (low abundance); (2) the sample is based on less than 14 routes for the long term (small sample size); (3) the results are so imprecise that a 3 percent per ear change would not be detected over the long-term (quite imprecise); or (4) the sub-interval trends are significantly different from each other (P less than 0.05, based on a z-test; suggesting inconsistency in trend over time). The PIF population trend data for BCR5 is uncertain for downy woodpecker population numbers (Panjabi et al. 2005).

Individuals were observed during the 1992–1998 survey period; however, none were observed in the more recent (2007–2008) survey period (Long and Herrera 2009). The Assessment Area contains approximately 10,028 acres of Riparian Reserves, potentially suitable for downy woodpeckers, within the Assessment Area.

Implementation of Klamath LRMP Standards and Guidelines

Standards and Guidelines contained in the Klamath LRMP (USFS 1995) that are related to riparian-dependent species, and that are being implemented as part of the project include a 340-foot buffer on both sides of fish-bearing streams and a 170-foot buffer on both sides of permanently flowing nonfish-bearing streams and intermittent streams (Klamath LRMP page 4-133). The Eddy Gulch LSR Project is consistent with Riparian Reserve guidelines, including maintaining and restoring riparian-dependent structures and functions, providing benefits to riparian-dependent and transition zone species, and providing habitat connectivity.

Klamath LRMP Standards and Guidelines and resource protection measures for thinning and fuels reduction in Riparian Reserves are designed to ensure that Riparian Reserves are intact and functioning after treatment and that existing stream shading is not reduced. The resource protection measures and BMPs contained in the Aquatics Resources Report for the project address protection for the following as they relate to riparian habitat: streamsides, underburning, mastication, and Riparian Reserves.

Effects of the Project on Snag Association: Group B—Downy Woodpecker

Alternative A: No Action

In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no direct effects on riparian deciduous and associated hardwood and conifer habitats in the Assessment Area, and habitat would slowly increase in areas not affected by wildfire. This could increase habitat suitability in some stands, but habitat in other stands would suffer from reduced tree growth and accumulation of only small snags, which are much less valuable to wildlife than large snags. Snags would not be produced by fire, which is an important factor in snag recruitment. The risk of high-severity fire would increase in most areas.

Wildfires may consume riparian vegetation, directly affecting habitat. Wildfires, especially a high-intensity fire, could remove riparian vegetation, which would adversely affect foraging and other habitat components. Any kind of fire could consume snags, but fire would also create snags and cavities that provide nest or roost sites. Although fire generally creates more snags than it destroys, most of the snags created by moderate- to high-intensity fire would not be located in live forests.

The modeled wildfire would have various indirect effects. The extent of these effects, whether beneficial or adverse, would vary by fire intensity, size, and pattern (Saab et al. 2007). The 7,200-acre modeled wildlife may benefit snag-associated species, such as the downy woodpecker, by recruiting snags and by increasing foraging opportunities in the short term as beetles and other insects colonize newly killed trees. However, high-intensity wildfire would remove forest overstory (required by some snag-dependent species) and could initiate successional changes to brush fields that would reduce long-term snag recruitment. Based on a modeled fire, up to 81 percent of the riparian habitat could be removed or adversely affected.

The no-action alternative would not provide for the long-term protection of Snag MIS Association habitat in forested riparian settings from the effects of high-severity wildfire. No other effects are expected as a result of ongoing or future projects.

Alternative B: Proposed Action and Alternative C: No New Temporary Roads Constructed

Thinning and mastication would not have any direct effects on the habitat because it would be protected in the Riparian Reserves under Alternatives B and C. Prescribed fire and mastication would remove some snags; however, prescriptions are designed to imitate low-intensity fire and would also create many snags. Therefore, effects on the distribution and abundance of snags and overall riparian habitat are expected to be negligible to populations and population trends.

Thinning and fuel reduction treatments would benefit snag-dependent species in forested habitats by reducing fuels to a level that would decrease the likelihood of extensive stand-replacing fire, which can remove riparian habitat. Fire would still burn with sufficient intensity to create snags within forested habitat. This type of pattern would be consistent with patterns under historic fire regimes.

Road-related activities have the potential to affect habitat under both alternatives. However, all activities in Riparian Reserves will be subject to BMPs, Klamath LRMP Standards and Guidelines, and resource protection measures designed for fish. Thus, direct effects from road-related activities would be negligible under Alternative B or C.

Temporary road construction (under Alternative B) and fuel reduction effects would be negligible because any potential effects would be minimized by the retention of buffers around all Riparian Reserves. These buffers, as well as BMPs, would minimize the effects on riparian vegetation.

In summary, fuel reduction treatments may cause a temporary shift or relocation of individuals, nest sites, or territories, but treatments are not expected to affect the populations or population trends of the downy woodpecker. Maintenance of moderate to high capability snag habitat will provide for long-term viability of snag MIS (USDA 1995).

Alternatives B and C, combined with local community fuel reduction projects, including the proposed fuelbreak system west of Black Bear Ranch, would further decrease the risk of high-intensity fire inside and near the Assessment Area. The other proposed or anticipated actions include the installation of a fiber-optic line and road maintenance and, when combined with Alternative B or C, would cause no cumulative effects on snag habitat beyond the project’s direct and indirect effects.

The cumulative effects on snag habitat under Alternative C are similar to Alternative B, except additional habitat could burn during a wildfire if that fire occurred in one of the untreated areas.

Snag Species Association: Group C—Black-backed Woodpecker

The black-backed woodpecker is a high-elevation fir and lodgepole pine habitat focused species that occur in response to large stand-replacing fires. This species is an indicator of snags as a habitat element and for other species that depend on woodpeckers for cavities or as prey.

Environmental Baseline and Population Trend

Black-backed Woodpecker

Black-backed woodpeckers in California are generally rare and mostly confined to recently burned lodgepole pine, red fir, or other higher-elevation forests (Dixon and Saab 2000) where outbreaks of wood-boring beetles follow fires (Goggans et al. 1988; Murphy and Lenhausen 1998). The black-backed is considered an irruptive species that forages opportunistically on outbreaks of wood-boring beetles following stand-replacing fires (Dixon and Saab 2000). They also occur in unburned forests if there is adequate prey (Bull et al. 1986; Goggans et al. 1988). Nests are frequently located in dead trees although live trees are also used (Raphael and White 1984; Bull et al. 1986). Unlike many other woodpeckers of the Pacific Northwest, this species often nests in small-diameter trees (Raphael and White 1984; Bull et al. 1986). Potential habitat for black-backed woodpeckers is widely distributed across upper elevations of the Assessment Area, but black-backed woodpeckers are very rare in northwestern California (Harris 2006) because this species is confined mostly to burned-over coniferous forest sites where populations of wood-boring beetles irrupt. Such a restricted diet leaves the population vulnerable to local and regional extinction as fire-suppression continues and post-fire salvage logging increase (Dixon and Saab 2000). Black-backed woodpeckers are unlikely to occur in the Assessment Area with regularity, and they are most likely to occur in response to large stand-replacing fires.

High to moderate levels of past insect-caused tree mortality can be found throughout the Assessment Area; however, very little present insect-caused tree mortality was observed during the 2008 field season. Current insect activity in the Assessment Area appears to be at or below an endemic level, reducing foraging opportunities for black-backed woodpeckers. Any large outbreak (present or future) may provide ephemeral habitat for black-backed woodpeckers for several decades.

The population trend for the black-backed woodpecker in California is decreasing at a rate of 6.4 percent per year ($p = 0.34$, $n = 57$) (Sauer et al. 2008). However, the USFWS BBS rates these data as having an important deficiency for the following reasons (Sauer et al. 2008): (1) the regional abundance of this species is less than 0.1 bird per route; (2) the sample is based on less than 5 long-term routes; (3) the results are so imprecise that a 5 percent per year change would not be detected over the long term.

No individuals were observed during either survey period in the Eddy Gulch LSR (Long and Herrera 2009). The Assessment Area contains approximately 21,406 acres of mature dense true fir and mixed-conifer habitat, potentially suitable for woodpeckers, within the Assessment Area. Infections of dwarf mistletoe, fomes annosus root disease, sugar pine blister rust, and cytospora canker fungus have been documented in small patches of weakened and dying trees within the Assessment Area, which have in turn created small patches of suitable environment for wood-boring beetles and thus potential foraging opportunities for the black-backed woodpecker. However, the current infestation of wood-boring beetles is unlikely to provide abundant foraging opportunities for black-backed woodpeckers.

Implementation of Klamath LRMP Standards and Guidelines

Klamath LRMP Standards and Guidelines related to snag-dependent species and that are being implemented as part of the Eddy Gulch LSR Project include assessing the availability of snags within each landscape, providing for an average of 5 snags per acre, in a variety of size and decay classes, within each landscape (snags need not be equally distributed). The actual number of snags to be maintained in areas managed for timber production may vary from 2 to 5, depending on the amount of snags available within the surrounding landscape and the desired future condition of that landscape.

Effects of the Project on Snag Association: Group C—Black-backed Woodpecker

Alternative A: No Action

In the absence of wildfire, and with no fuel reduction activities under the no-action alternative, there would be no direct effects on insect recruitment and snags in the Assessment Area, and habitat components for the black-backed woodpecker have the potential to slowly increase in areas not affected by wildfire that may, over time, be affected by density-related mortality, mistletoe, or root disease, which create a suitable environment for wood-boring insects. This could increase habitat suitability in some stands. Dead and dying trees, as well as snags, would not be produced by fire, which is an important factor in black-backed recruitment. The risk of high-severity fire would increase in most areas.

Any kind of fire could consume snags, but fire would also create a potential prey base, snags, and cavities that provide nest or roost sites. Although fire generally creates more snags than it destroys, most of the snags created by moderate- to high-intensity fire would not be located in live forests. Based on the 7,200-acre modeled wildfire under Alternative A, up to 81 percent of the forested habitat could be removed or adversely affected, thus providing more habitat for a species that is considered rare in the region (Harris 2006).

The modeled wildfire would have various indirect effects. The extent of these effects, whether beneficial or adverse, would vary by fire intensity, size, and pattern (Saab et al. 2007). The modeled fire may benefit the black-backed woodpecker by increasing foraging opportunities in the short term as beetles and other insects colonize newly killed trees. However, high-intensity wildfire would remove forest overstory (required by some snag-dependent species) and could initiate successional changes to brush fields that would reduce long-term snag recruitment.

The no-action alternative would not provide for the long-term protection of Snag MIS Association habitat in forested settings from the effects of high-severity wildfire; however, in the short term (up to 6 years [Saab et al. 2007]), the modeled wildfire may provide an increase in foraging habitat. No other effects are expected as a result of ongoing or future projects.

Alternative B: Proposed Action and Alternative C: No New Temporary Roads Constructed

Thinning, hazard tree removal, and construction of 1.03 miles of temporary roads (under Alternative B) may remove large-diameter snags. However, the removal of large-diameter snags would only occur under limited circumstances, and snags would be retained at Klamath LRMP Standards and Guidelines over approximately 89 percent of the ridgetop FRZs. Prescribed fire and mastication would also remove snags; however, prescriptions are designed to imitate low-intensity fire and would also create many snags. Thus, habitat for snag-dependent species will remain abundant and well-distributed throughout the Assessment Area, and the effect is considered negligible to populations and population trends.

Thinning and fuel reduction treatments would not benefit fire-dependent species in forested habitats. By reducing fuels to a level that would decrease the likelihood of extensive stand-replacing fire, it would decrease the likelihood of improving habitat for the black-backed woodpecker. Fires that would still burn with sufficient intensity to create snags within forested habitat may provide limited habitat, but this type of pattern would be consistent with patterns under historic fire regimes.

In summary, fuel reduction treatments may cause a temporary shift or relocation of individuals, nest sites, or territories, but treatments are not expected to affect the populations or population trends of the black-backed woodpecker. Maintenance of moderate to high capability snag habitat will provide for long-term viability of snag MIS (USDA 1995).

Alternatives B and C, combined with local community fuel reduction projects, including the proposed fuelbreak system west of Black Bear Ranch, would further decrease the risk of high-intensity fire inside and near the Assessment Area. The other proposed or anticipated actions include the installation of a fiber-optic line and road maintenance and, when combined with Alternative B or C, would cause no cumulative effects on snag habitat beyond the project's direct and indirect effects.

The cumulative effects on snag habitat under Alternative C are similar to Alternative B, except additional habitat could burn during a wildfire if that fire occurred in one of the untreated areas.

6. Summary of MIS Information for Inclusion into the NEPA Document

The proposed actions would result in minor effects on MIS habitats in the Assessment Area. Overall, habitat quality for hardwood, river and stream, marsh, pond, lake, and snag-associated species is not expected to decline or be reduced in volume in the short term (5 years), and habitat quality is expected to be promoted over the long term (20-30 years). Long-term cumulative effects on habitat and populations are expected to be beneficial as a result of project actions. The proposed actions would reduce occasional terrestrial habitat elements such as individual snags but would not reduce any patches of mature forest habitat scattered throughout the landscape. Effects may result in the loss or shifting of individual nest sites or home ranges, but would have negligible effects on the overall amount of habitat in the Assessment Area and are expected to have no effect on populations of any MIS species. High-capability snag habitat would be retained for the short and long term across the Assessment Area. Late-Successional Reserves, Riparian Reserves, Wilderness Areas, other reserved land allocations, and conformance to Klamath LRMP Standards and Guidelines for snag retention are expected to provide adequate habitat to maintain viable populations of all MIS-associated species.

River and Stream MIS Association

Alternative A Conclusion. Areas not affected by fire under the no-action alternative would experience long-term, negligible to minor adverse effects. Areas affected by fire would result in short-term and long-term, negligible to moderate, adverse or beneficial effects.

Alternative B Conclusion. All actions, when considered collectively and individually, would either have no effect or negligible effects (as described in the efficiency measures section of the Project BA/BE). Water drafting is the one Project Element that could directly affect salmonids and their habitat. Potential adverse effects of water drafting will be minimized through implementation of

NMFS Water Drafting Guidelines that maintain instream flows and require screening of pumps. The project has indirect beneficial effects that would result in increased protection from wildfire..

Alternative C Conclusion. All actions, when considered collectively and individually, would either have no effect or negligible effects (as described in the efficiency measures section of the Project BA/BE). Water drafting is the one Project Element that could directly affect salmonids and their habitat. Potential adverse effects of water drafting will be minimized through implementation of NMFS Water Drafting Guidelines that maintain instream flows and require screening of pumps. The project has indirect beneficial effects that would result in increased protection from wildfire.

Marsh, Lake, and Pond MIS Association

Alternative A Conclusion. Areas not affected by wildfire under the no-action alternative would result in negligible effects. Areas affected by low-to moderate-intensity fire would experience short-term, negligible to minor, adverse or beneficial effects, and long-term, negligible to minor beneficial effects. Areas affected by moderate- to high-intensity wildfire would experience short-term and long-term, negligible to moderate, adverse or beneficial effects.

Alternative B Conclusion. Alternative B would result in short-term, negligible to minor adverse effects, and long-term negligible to minor, beneficial or adverse effects.

Alternative C Conclusion. Alternative C would result in short-term, negligible to minor adverse effects, and long-term negligible to minor, beneficial or adverse effects.

Hardwood MIS Association

Alternative A Conclusion. Areas not affected by wildfire under the no-action alternative would experience long-term, negligible to minor, beneficial or adverse effects. In general, suitable habitat would remain suitable, but fire hazard would increase. Areas affected by low-to moderate-intensity fire would experience short-term, negligible to moderate, adverse or beneficial effects, and long-term, negligible to moderate beneficial effects. Areas affected by moderate- to high-intensity wildfire would experience short-term and long-term, minor to moderate adverse effects.

Alternative B Conclusion. Alternative B would result in short-term, negligible to minor, adverse or beneficial effects, and long-term, negligible to moderate, beneficial or adverse effects.

Alternative C Conclusion. Alternative C would result in short-term, negligible to minor, adverse or beneficial effects, and long-term, negligible to moderate, beneficial or adverse effects.

Snag MIS Association

Alternative A Conclusion. Areas not affected by wildfire under the no-action alternative would experience long-term, negligible to minor, beneficial or adverse effects. In general, suitable habitat would remain suitable, but fire hazard would increase. Areas affected by low- to moderate-intensity fire would experience short-term, negligible to moderate, adverse or beneficial effects, and long-term, negligible to moderate beneficial effects. Areas affected by moderate- to high-intensity wildfire would experience short-term and long-term, minor to moderate adverse effects.

Alternative B Conclusion. Alternative B would result in short-term, negligible to minor, adverse or beneficial effects, and long-term, negligible to moderate, beneficial or adverse effects.

Alternative C Conclusion. Alternative C would result in short-term, negligible to minor, adverse or beneficial effects, and long-term, negligible to moderate, beneficial or adverse effects.

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Attachment 1

Management Indicator Species Report Part I Checklist

Attachment 1: Management Indicator Species Report Part I Checklist

PROJECT: Eddy Gulch LSR Fire/Habitat Protection Project	REVIEWER NAME: Brian Williams and Alice Berg	DATE: 10/2007-05/25/09

The Klamath National Forest identified the following six species associations and 26 species (white-headed woodpecker is listed under two different associations) as management indicators to assess landscape and project-level effects on habitat conditions (LRMP 4-39). Rationale for designation of these MIS is found in the EIS for the Klamath National Forest Land and Resource Management Plan (1995) and on the "LRMP MIS Selection Summary" located in the project file. Completion of this checklist certifies that all project level MIS have been considered for the proposed actions.

MIS		Habitat* is not in or adjacent to the treatment area** and is not affected by the project	Habitat* is in or adjacent to the treatment area** but is not directly or indirectly affected by the project activities (needs rationale).	Habitat* is potentially affected by project activities (proceed to Part II)	Habitat removed by project activities (based on analysis in Part II)
Common Name	**Scientific Name**				
Hardwood Species Association					
Acorn woodpecker	*Melanerpes formicivorus*			*1276 acres	0 acres removed; habitat elements such as nest trees may be removed through fuel treatments
Western gray squirrel	*Sciurus griseus*			*1276 acres	0 acres removed; habitat elements such as nest trees may be removed through fuel treatments
River/Stream Species Association					
Rainbow trout	*Oncorhynchus mykiss*		Habitat is in watersheds proposed for treatments. All actions, when considered collectively and individually, would either have no effect or negligible effects (as described in the efficiency measures section of the Project BA/BE). Water drafting is the one Project Element that could directly affect salmonids and their habitat. Potential adverse effects of water drafting will be minimized through implementation of NMFS Water Drafting Guidelines that maintain instream flows and require screening of pumps. The project has indirect beneficial effects that would result in increased protection from wildfire.	75 miles	No habitat removed

Steelhead	*Oncorhynchus mykiss*		Habitat is in watersheds proposed for treatments. All actions, when considered collectively and individually, would either have no effect or negligible effects (as described in the efficiency measures section of the Project BA/BE). Water drafting is the one Project Element that could directly affect salmonids and their habitat. Potential adverse effects of water drafting will be minimized through implementation of NMFS Water Drafting Guidelines that maintain instream flows and require screening of pumps. The project has indirect beneficial effects that would result in increased protection from wildfire.	18.4 miles		No habitat removed
Tailed frog	*Ascaphus truei*			67 miles (perennial streams)		No habitat removed
Cascades frog	*Rana cascadae*			18 miles (approximated by steelhead miles, but much less)		No habitat removed
American dipper	*Cinclus mexicanus*			75 miles (approximated by trout streams)		No habitat removed
Northern water shrew	*Sorex palustris*			X		No habitat removed
Long-tailed vole	*Microtus longicaudus*			X		No habitat removed
Marsh/Lake/Pond Species Association						
Northern red-legged frog	*Rana aurora aurora*	Eddy Gulch LSR not in species range		n/a		n/a
Western pond turtle	*Actinemys marmorata*			One known pond on private property		0 acres removed; roadside treatment below pond

MIS						
Common Name	**Scientific Name**	**Habitat* is not in or adjacent to the treatment area** and is not affected by the project**	**Habitat* is in or adjacent to the treatment area** but is not directly or indirectly affected by the project activities (needs rationale).**	**Habitat* is potentially affected by project activities (proceed to Part II)**		**Habitat removed by project activities (based on analysis in Part II)**
Snag Species Association						
Red-breasted sapsucker	*Sphyrapicus ruber*			21,790 acres		0 acres removed; habitat elements such as nest trees may be removed through fuel treatments
Hairy woodpecker	*Picoides villosus*			21,790 acres		0 acres removed; habitat elements such as nest trees may be removed through fuel treatments
White-headed woodpecker	*Picoides albolarvatus*			21,790 acres		0 acres removed; habitat elements such as nest trees may be removed through fuel treatments
Vaux's swift	*Chaetura vauxi*			21,790 acres		0 acres removed; habitat elements such as nest trees may be removed through fuel treatments
Downy woodpecker	*Picoides pubescens*			21,790 acres		0 acres removed; habitat elements such as nest trees may be removed through fuel treatments
Pileated woodpecker	*Dryocopus pileatus*			16,784 acres		0 acres removed; habitat elements such as nest trees may be removed through fuel treatments
Black-backed woodpecker	*Picoides arcticus*			21,790 acres		0 acres removed; habitat elements such as nest trees may be removed through fuel treatments

Grassland/Shrub-Steppe Species Association (BVNG)						
Pronghorn	*Antilocarpa americana*	No grassland/shrub-steppe habitat		n/a		n/a
Montane vole	*Microtus montanus*	No grassland/shrub-steppe habitat		n/a		n/a
Loggerhead shrike	*Lanius ludovicianus*	No grassland/shrub-steppe habitat		n/a		n/a
Swainson's hawk	*Buteo swainsoni*	No grassland/shrub-steppe habitat		n/a		n/a
Sage thrasher	*Oreoscoptes montanus*	No grassland/shrub-steppe habitat		n/a		n/a
Burrowing owl	*Athene cunicularia*	No grassland/shrub-steppe habitat		n/a		n/a
MIS						
Common Name	**Scientific Name**	**Habitat* is not in or adjacent to the treatment area** and is not affected by the project**	**Habitat* is in or adjacent to the treatment area** but is not directly or indirectly affected by the project activities (needs rationale).**	**Habitat* is potentially affected by project activities (proceed to Part II)**		**Habitat removed by project activities (based on analysis in Part II)**
Mature Ponderosa Pine Species Association (Eastside Pine)						
Flammulated owl	*Otus flammeolus*	No eastside pine habitat		n/a		n/a
White-headed woodpecker	*Picoides albolarvatus*	No eastside pine habitat		n/a		n/a
Pinyon jay	*Gymnorhinus cyanocephalus*	No eastside pine habitat		n/a		n/a
*"Habitat" as defined in the Klamath LRMP, and supplemented by the California Wildlife Habitat Relationships System (CDFG).						
** "treatment area" is defined as the specific locations (units, roads, etc) where project activities will occur						
Note: Habitat associations that are not directly or indirectly affected by project activities are not discussed in detail in Part II						

Attachment 2

Klamath National Forest MIS
Habitat Crosswalk for GIS Habitat Layer

Attachment 2: Klamath National Forest MIS Habitat Crosswalk for GIS Habitat Layer

LRMP MIS Category	LRMP Defined MIS Habitat	LRMP Defined Habitat Components	GIS hab_type knfeveg94_7	Timber Strata or Cal Veg Type knveveg99_2 (2006)	Acres on Forest knfeveg99_2 (2006)
Individual Species	Mature/OG conifer forest	Large snags, stumps, logs	Mature MC	DF,DP,DW,JP,KP, MF,MK,MP,MU, PD,PO,PW,RD, WW size 4,5	444,276
Individual Species	Mature/OG true fir forest	Large snags, stumps, logs	Mature F	MH,RF,WB,WF,SA size 4, 5	160,609
Individual Species	Early seral forest types	Grasses, forbs, berries	Early seral	All size N,0,1,2	295,562
Individual Species	Mid-seral veg types	Quality forage	Mid seral	All size 3	466,674
Individual Species	Brush/shrub	Quality forage	Brush	BB,BM,BR,C1,CG, CH,CL,CM,CN,CQ,CS,CV,CW ,CX,SN	178,190
Hardwood	Oak woodlands w/large conifers (oak as primary)	Diversity of oaks, large conifers, acorns	Oak	CJ, QC, QG, QK, QT	61,168
Hardwood	Mature mixed hardwood/conifer	Mature conifers and hardwoods	Mature hardwood	QM,TX size 4	2,074
River/Stream	River/Stream	Water quality, instream woody debris, substrate, flows	**see note below	**see note below	**see note below
River/Stream	Riparian habitat w/dense cover	Canopy, grass/forb, deciduous veg	Riparian	NR, QF, QO, QR, QS, QY, TA combined with river/stream layer	3,234
Marsh/lake/pond	Lakes, ponds, streams	Associated riparian veg, CWD	Wet meadow and water	HJ and WA	2,306 (HJ) 3,730 (WA)
Snag	Late-successional conifer forest	Snags	Mature MC	See above	See above
Snag	Mature true fir and lodgepole pine	Snags	Mature F and mature LP	See above for F, LP size 4	975 (LP) (F above)
Snag	Riparian deciduous	Snags	N/A	N/A	N/A
Snag	Ponderosa pine	Snags	Mature PP	PP size 4, 5	3,585

LRMP MIS Category	LRMP Defined MIS Habitat	LRMP Defined Habitat Components	GIS hab_type knfeveg94_7	Timber Strata or Cal Veg Type knveveg99_2 (2006)	Acres on Forest knfeveg99_2 (2006)
Snag	Pileated woodpecker specific	Snags	Mature conifer >40% cc	Same as mature MC above but >40% crown closure only	428,993 (subset of above)
Grassland/shrub-steppe	Grasslands and shrubs on Butte Valley National Grassland (BVNG)	Perennial grass cover, sagebrush/grass mosaic	Grassland on BVNG	HG, BS on BVNG	7,342
Grassland/shrub-steppe	Open habitats near seasonally flooded wetlands and brush on BVNG	Perennial grass cover, sagebrush/grass mosaic	Grassland on BVNG	BL on BVNG	1,572
Mature p. pine	Mature eastside pine	Mature pines and snags	Mature EP	EP size 4, 5	2,623
Mature p. pine	Ponderosa pine and mixed conifer	Mature pines and snags	Mature PP or mature MC	Mature PP and MC	3,585 (PP) (MC above)
Mature p. pine	Eastside pine/juniper	Mature pines and junipers	Juniper	WJ	17,138
Non-MIS habitat			other	UB, AG, BA	13,208

Rivers/streams and fish GIS layers must be brought in separately for project analysis, they are not included in Forest MIS layer. See KNF Runstreams database for habitat data and CDFG and tribal stream habitat evaluations. Consider Standards and Guidelines in MA-10 of the LRMP for long term protection and restoration of riparian habitat.

Attachment 3

Klamath National Forest MIS Selection Summary

Attachment 3: Klamath National Forest MIS Selection Summary

Level of Analysis	Reasons for Selection as MIS	Monitoring and/or Evaluation Objective from LRMP	Tool for Monitoring and/or Habitat Evaluation Assessment
Forest Plan	Specific habitat needs, represents other old-growth species, sensitive to habitat changes	Determine number of pairs within LSRs.	Northwest Forest Plan Long Term Monitoring
Forest Plan	Indicator of mature forest conditions on eastside and higher elevations than NSO	Determine goshwak of suitable habitat.	
Forest Plan	Indicator of habitat quality, specific habitat needs, indicator of mature true fir and large logs, special interest	None identified in Chapter 5 of the LRMP	
Forest Plan	Indicator of habitat quality, special interest species	None identified in Chapter 5 of the LRMP	Surveys in partnership with USDI-FWS
Forest Plan	Associated with early and late seral stages and need for logs, special interest game species	None identified in Chapter 5 of the LRMP	CDFG data
Forest Plan	Associated with early and mid-seral stages, important game species	None identified in Chapter 5 of the LRMP	CDFG data
Forest Plan and Project	Indicator for diversity of oak species and large conifers	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models, and LRMP Appendix I for Habitat Capability Models
Forest Plan and Project	Indicator for mature hardwood and mixed conifer-hardwood	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models, and LRMP Appendix I for Habitat Capability Models
Forest Plan and Project	Indicator for water quality, in-stream woody debris, bottom substrate, flows and channel condition	As an MIS, determine population trends and relationship to habitat changes (Implementation monitoring)	CDFG fishing effort and success evaluations. Use project level analysis for effects on water quality and stream side vegetation. Also consider S&G in MA-10 for long term protection and restoration of stream habitat

Level of Analysis	Reasons for Selection as MIS	Monitoring and/or Evaluation Objective from LRMP	Tool for Monitoring and/or Habitat Evaluation Assessment
Forest Plan and Project	Indicator for water quality, in-stream woody debris, bottom substrate, flows and channel condition	As an MIS, determine population trends and relationship to habitat changes (Implementation monitoring)	Coordinated surveys with CDFG and tribes. Use project level analysis for effects on water quality and stream side vegetation. Also consider S&G in MA-10 for long term protection and restoration of stream habitat
Forest Plan and Project	Indicator for water quality, in-stream woody debris, bottom substrate, flows and channel condition	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	Use project level analysis for effects on water quality and stream side vegetation. Also consider S&G in MA-10 for long term protection and restoration of stream habitat.
Forest Plan and Project	Indicator for water quality, instream woody debris, bottom substrate. flows, and grassy streamside vegetation	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	same as tailed frog
Forest Plan and Project	Indicator for water quality, instream woody debris, bottom substrate and flows	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	same as tailed frog
Forest Plan and Project	Indicator of riparian vegetation including canopy, deciduous veg, and grass/forb.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	same as tailed frog
Forest Plan and Project	Indicator of riparian vegetation including canopy, deciduous veg, and grass/forb.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	same as tailed frog
Forest Plan and Project	Indicator of standing open water and associated vegetation, chosen for sensitivity to physical aquatic conditions and CWD.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	same as tailed frog
Forest Plan and Project	Indicator of standing open water and associated vegetation, chosen for sensitivity to physical aquatic conditions and CWD.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	same as tailed frog

Level of Analysis	Reasons for Selection as MIS	Monitoring and/or Evaluation Objective from LRMP	Tool for Monitoring and/or Habitat Evaluation Assessment
Forest Plan and Project	Indicator of snags as a habitat element and of other species which depend on sapwells for food.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Forest Plan and Project	Indicator of snags as a habitat element and of other species which depend on woodpeckers for cavities or as prey.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Forest Plan and Project	Indicator of snags as a habitat element and for other species which depend on woodpeckers for cavities or as prey.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Forest Plan and Project	Indicator of large snags as a habitat element	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Forest Plan and Project	Indicator of snags as a habitat element and for other species which depend on woodpeckers for cavities or as prey.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Forest Plan and Project	Indicator of snags as a habitat element and for other species which depend on woodpeckers for cavities or as prey.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Forest Plan and Project	Indicator of snags as a habitat element and for other species which depend on woodpeckers for cavities or as prey.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Forest Plan and Project	Indicator for coverage of perennial grasses, increased mesic conditions and diverse sagebrush/grassland mosaic on the BVNG.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models

Level of Analysis	Reasons for Selection as MIS	Monitoring and/or Evaluation Objective from LRMP	Tool for Monitoring and/or Habitat Evaluation Assessment
Forest Plan and Project	Indicator for coverage of perennial grasses, increased mesic conditions and diverse sagebrush/grassland mosaic on the BVNG.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Forest Plan and Project	Indicator for diverse sagebrush mosaic on the BVNG.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Forest Plan and Project	Indicator for coverage of perennial grasses and diverse sagebrush/grassland mosaic on the BVNG.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Forest Plan and Project	Indicator for coverage of perennial grasses, increased mesic conditions and diverse sagebrush/grassland mosaic on the BVNG.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Project level	Indicator for coverage of perennial grasses, increased mesic conditions and diverse sagebrush/grassland mosaic on the BVNG.	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Project level	Indicator for mature eastside Ponderosa pine habitat with large snags	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Project level	Indicator for mature eastside Ponderosa pine habitat with large snags	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models
Project level	Indicator for mature cone-producing eastside ponderosa pine and juniper	None identified in Chapter 5 of the LRMP. Standard and Guideline 8-21 states landscape- and project-level effects on habitat conditions will be assessed.	GIS habitat crosswalk, and LRMP Appendix I for Habitat Capability Models

Attachment 4

Klamath National Forest Project-level Analysis Species Natural History Summary for MIS

Attachment 4: Klamath National Forest Project-level Analysis Species Natural History Summary for MIS

MIS Species:	LRMP Defined Habitat:	General Natural History Information for Project Level Analysis (citations):
Information on natural history, including habitat requirements, for MIS was compiled during preparation of the Klamath Land and Resource Management Plan (LRMP) and the associated EIS. Supplemental information, as displayed below, was obtained from the California Wildlife Habitat Relationship System and other sources as listed in the Literature Cited section.		
Hardwood Species Association:		
Acorn woodpecker	Oak woodlands with associated large conifers	Common, yearlong resident, communal groups of 2-16, consisting of at least 2 breeding adults and offspring. Territories consist of defending 1–7 (average 2) large, isolated trees for acorn storage (CWHR, 5/2002). Requires low-density stands of large oaks w/sparse canopy and snags. Peak breeding/nesting activity in May and June (CDFG 1990).
Western gray squirrel	Mature hardwood and mixed hardwood-conifer	Common locally, dependent on mature oak and mixed conifer, require large trees, mast and snags. Homerange size in Sierra Nevada foothills varied from 1.2 to 2.5 acres (males). (CDFG April 1990).
River/Stream Species Association:		
Rainbow trout	Rivers/streams	Common in cool, clear, fast-flowing permanent streams and rivers w/in the Klamath River Basin. Refer to fish KNF species range distribution layer for steelhead trout habitat location. Rare to abundant in accessible low gradient non-permanent streams where suitable habitat is present. Flows necessary to provide dissolved oxygen (typically close to saturation); cool water temperatures (optimum 15-18 degrees C); and diverse and abundant invertebrate life is required. Coarse (1-13 cm diameter) gravels in riffles or pools are used for spawning and cobble and boulders for cover. Ample and complex cover from riparian vegetation, CWD, boulders, deep pools, or undercut banks reduces exposure to predators, high flows, and excessive energy expenditure. (Moyle 2002; Mehan 1991; Groot and Margolis 1991).
Steelhead	Rivers/streams	Habitat same as for rainbow trout, but including ability to migrate to and from estuaries and ocean habitats. Refer to fish KNF species range distribution layer for resident rainbow trout habitat location.

MIS Species:	LRMP Defined Habitat:	General Natural History Information for Project Level Analysis (citations):
Tailed frog	Perennial montane streams with dense vegetation	Considered common in suitable habitats. Occurs in permanent streams of low temperatures in conifer-dominated habitats including redwood, Douglas-fir, Klamath mixed conifer, ponderosa pine, and montane hardwood-conifer. Intermittent streams with all the other proper environmental factors are unsuitable. Occurs more frequently in mature or late-successional stands. Uses submerged rocks and logs in streams for cover. Tadpoles require cool streams and prefer turbulent water. Permanent water is critical for larvae. Individuals have been collected up to 40 feet from streams during moist periods, during dry periods usually restricted to stream bed. Normal range has a long dimension that rarely exceeds 80 feet. (CDFG 1988, CWHR, CDFG-HCPB Website).
Cascades frog	Higher elevation streams	Found in water and surrounding vegetation in mountain lakes, small streams, and ponds in meadows up to timber line. Closely restricted to water. Occurs in both ephemeral and permanent ponds or streams, but probably cannot survive in ephemeral situation where at least some of the substrate does not remain saturated. Standing water is required for reproduction. Females prefer to lay eggs at sites with low or patchy aquatic vegetation cover (open, shallow water that is unshaded). Larvae voluntarily select a high water temperature (~27 degrees C), postmetamorphic life stages select temps <17 degrees C. Individuals bask on water covered rocks. Hibernate in mud at bottom of lakes during the winter. (CDFG 1988, CWHR, CDFG-HCPB Website).
American dipper	Cold, swift, perennial streams	Uncommon to common on clear, fast-flowing streams and rivers in montane regions. Eats aquatic insects, fish, snails and tadpoles. Builds a domed nest of grasses in crevice, stump, log, bank or human structure, usually w/in 3–6 feet of water. Defends territory of up to 1,050 feet of stream during breeding season, year-round density of 2.1 to 4.6 per mile of stream. Peak reproduction activity May to July. (CDFG November 1990).
Northern water shrew	Riparian w/dense grass-forb cover	Common to abundant in montane riparian, nests w/in inches or feet of water, none more than 100’ from water. Homerange “small”, need perhaps 1 mile or more of stream for viable population (CDF&G, April 1990).
Long-tailed vole	Mesic habitats, dense riparian vegetation	Range map shows Cascade Range (eastern Siskiyou County). Common resident of herbaceous understories of many forest habitats. Abundant in montane riparian, wetlands, cropland, aspen, grasslands, and wet meadows. Nests in burrows in soft soils, or within or beneath logs, seeks cover in dense herbaceous veg. May be found several hundred meters from water. Homerange average .5 acres. (CDFG April 1990).

MIS Species:	LRMP Defined Habitat:	General Natural History Information for Project Level Analysis (citations):
Marsh/Lake/Pond Species Association:		
Northern red-legged frog	Shallow wetlands, ponds and streams with emergent vegetation.	Inhabits quiet pools of streams, marshes, and occasionally ponds usually below 3936 ft. Highly aquatic with little movement away from streamside habitats, prefers shorelines with extensive vegetation. Usually escapes to water. Peak breeding March through July. (CDFG May 1988).
Western pond turtle	Permanent or nearly permanent water in a variety of habitats.	Uncommon to common in suitable aquatic habitat throughout CA. Associated with permanent or nearly permanent water in a wide variety of habitats. Turtles require basking sites such as logs, rocks, mats of floating veg, or open mud banks. They retreat under water when disturbed. Nesting occurs upland up to 1/4 mile from water in a variety of soil types. Eggs are laid from March to August. (CDFG May 1988).
Snag Species Association:		
Red-breasted sapsucker	Mid- to late seral mixed conifer and riparian deciduous	Uncommon to fairly common, nests in montane riparian, aspen, montane hardwood-conifer, mixed conifer and red fir, especially near meadows, clearings, lakes or streams. Nests and roosts in tree cavities which it excavates in snags or rotted trees. In Modoc Co., defense area minimum reported at 150 feet around nest tree, territory up to 15 acres. Probably most sensitive to disturbance from early June to late July. (CDFG Nov 1990 and NTMB Reference Book, 1994).
Hairy woodpecker	Riparian deciduous habitats with large trees for cavities	Fairly common, permanent resident in mixed conifer and riparian deciduous habitats. Uses stands of large, mature trees and snags of sparse to intermediate density. Also uses relatively open or patchy stands of conifers with adjacent riparian habitats and abundant snags. In central Ontario, breeding territory averaged 7 acres (range 6–8). Peak nesting activity late May through June. (CDFG Nov 1990).
White-headed woodpecker	Ponderosa pine and high elevation mixed-conifer	A common year-long resident of montane coniferous forests up to lodgepole pine and red fir habitats. Nests in open conifer habitats, often near edges or roads or clearings or near natural openings. Excavates cavity in large snag or stump at lease 2 feet in diameter at nest height (6 feet–50 feet above ground). Average territory of 15 acres reported for Blue Mts or Oregon. Peak reproductive activity mid-June through mid-July. (CDFG Nov 1990).

MIS Species:	LRMP Defined Habitat:	General Natural History Information for Project Level Analysis (citations):
Vaux's swift	Late-successional forests with large hollow snags	A summer resident in N. CA. Roosts in hollow trees and snags, occasionally in chimneys and buildings; often in large flocks. Nests in redwood, DF and occasionally other coniferous forests. The most important requirement appears to be an appropriate nest-site in a large, hollow tree, esp. tall burned-out stubs. Forages over most habitats high in air, apparent preference for foraging over rivers and lakes. No homerange or territory data, homerange may be very large (Zeiner et al. 1990) and territory presumably limited to nest tree. Suggested minimum snag size of 30 feet tall and 20 inches diameter. Nesting season June through August. (CDFG, Nov. 1990 and NTMB Reference Book, 1994).
Downy woodpecker	Riparian deciduous habitats	A common, year-long resident of riparian deciduous and associated hardwood and conifer habitats. Closely associated with riparian softwoods. Excavates cavity in snag or dead branch 4-50' above ground. Requires abundant snags, and tree/shrub, tree/herbaceous, and shrub/herbaceous ecotones. In Ontario, breeding territories of 5 and 9 acres observed. Peak nesting May through June. (CDFG Nov 1990).
Pileated woodpecker	Late-successional coniferous forests	Uncommon, year-long resident of mature, montane conifer habitats with permanent water. Occupies dense (preferably >40% canopy), mature forest with large numbers of snags, stumps and logs. Frequents DF, WF and RF more than other conifers. Nest tree selection at least 20 inches dbh. Homerange or territory estimated (in Oregon) at 320-600 acres. Bull and Meslow, 1977, recommended a 100 acre nest core and a 500-1200 acre forage area with 90 snags over 20 inches per square mile. Peak reproduction early May through mid-June. (CDFG Nov. 1990).
Black-backed woodpecker	High elevation fir and lodgepole pine	Uncommon year-long resident predominantly in true fir and lodgepole pine forests. Prefers relatively large trees for foraging and nesting, canopy cover may range from sparse to dense. Apparently attracted to stands with wood-boring insect infestations, frequents areas with snags, windfalls, and burns. Present in areas some years, absent others. No data on homerange or territory, in Michigan foraging was observed at least 0.25 miles from nest. Peak nesting mid-May through early July. (CDFG, Nov. 1990).

MIS Species:	LRMP Defined Habitat:	General Natural History Information for Project Level Analysis (citations):
Grassland/shrub-steppe Species Association:		
Pronghorn	Grassland, shrub-steppe and agricultural lands	Fairly common resident of NE California, found only in sagebrush, low sage, bitterbrush, grassland, PJ, riparian, and alkali desert scrub habitats. Prefer low, rolling topography in open grassland and sagebrush. Optimal habitat described as 40–60% grass, 10–30% forb, and 5–20% shrub cover. Large herds in winter (600+), smaller groups in spring/summer. Homeranges extremely variable, up to .5 miles in spring/summer, up to 5.8 miles in fall/winter. Summer range, dominant males hold territories up to 2 square miles with some water. (CDFG, April 1990).
Montane vole	Grasslands with relatively high plant moisture	Found in Cascade Range (middle and eastern portion of SisQ), common to abundant in wet meadow, perennial grassland, and alpine dwarf-shrub habitats. Also may be common in herbaceous understory of many forest habitats, as well as sagebrush, bitterbrush, annual grassland and cropland (5000-12,000' elevation). Nest of dried grasses is constructed in a burrow excavated in moist soil. Requires dense herbaceous growth for cover, prefers meadows or grasslands with a water source. In Montana, home ranges averaged about .25 acres. Reported densities range up to 220/ac, and fluctuate considerably from year to year. (CDFG, April 1990).
Loggerhead shrike	Diverse shrub-steppe habitats	A common resident of lowlands and foothills throughout CA. Prefers open habitats with scattered shrubs, trees, posts, fences, or other perches. Uses scattered trees and shrubs for nesting and cover. Territories in Contra Costa and Kerns Counties averaged 18.7 acres (11-40 ac). Peak reproduction in May and June. (CDFG Nov 1990 and NTMB Reference Book, 1994).
Swainson's hawk	Perennial grasslands and shrub-steppe.	Uncommon breeding migrant in Klamath Basin. Breeds in stands with few trees in juniper-sage flats and riparian areas. Forages in adjacent grasslands or ag fields. Homeranges in Utah and Wyoming averaged 1.0 to 1.5 sq. mi. Peak nesting period is about April through June. (CDFG Nov 1990 and NTMB Reference Book, 1994).
Sage thrasher	Low, moderately spaced sagebrush	A common summer visitor and breeder east of the Cascade Range, primarily in sagebrush and low sagebrush habitats. Uses moderately spaced shrubs for cover and nesting. Breeding territories in Idaho averaged 2.3 ac. Density in Washington was recorded at 5 pairs per sq. mi. Peak breeding season is May and June. (CDFG Nov 1990 and NTMB Reference Book, 1994).

MIS Species:	LRMP Defined Habitat:	General Natural History Information for Project Level Analysis (citations):
Burrowing owl	Open habitat near seasonally flooded wetlands and dense brush	Summer resident in northeastern plateau of CA (Klamath). Uses open, dry grassland and desert habitats, and in grass, forb and open shrub stages of pinyon -juniper and ponderosa pine habitats. Uses rodent or other burrows for roosting and nesting cover. Mean homerange was 2 acres in Oakland (.1 to 4 ac). Susceptible to disturbance and soil compaction. Peak breeding season April through May. (CDFG Nov 1990 and NTMB Reference Book, 1994).
Mature Ponderosa Pine Species Association:		
Flammulated owl	Mature conifer stands and eastside pine habitats	A common summer resident in a variety of coniferous habitats from ponderosa pine to red fir forests. Nests in cavity or woodpecker hole in aspen, oak, or pine snags and trees (secondary cavity nester). Occasionally will nest in burrow or nest box. Favors small openings, and edges and clearings with snags for nesting and roosting. Territory defended in May and June, seldom more than 900 feet in diameter, varying from 4–10 acres. Most susceptible to disturbance during peak breeding season in June and July. (CDFG Nov 1990 and NTMB Reference Book, 1994).
White-headed woodpecker	Ponderosa pine and high elevation mixed-conifer	See above, white-headed woodpecker under Snag Association.
Pinyon jay	Eastside pine and pine/juniper habitats	A fairly common but somewhat local resident in coniferous habitats east of the Cascade-Sierra Nevada Crest. Preferred nesting habitats are PJ and eastside pine. Trees of moderate size, esp. PJ afford nesting and roosting cover. Nesters most numerous in pinyon, ponderosa and Jeffery pine woodlands with sparse to open canopy and a well defined shrub layer. Live in integrated, social flocks year round and nest in colonies. Flock homerange is up to 7 miles or more. Peak egg-laying in probably April through June. (CDFG Nov 1990 and NTMB Reference Book, 1994).

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